

Parenting, criminogenic settings and delinquency

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1 General introduction

The relationship between parenting and delinquency has received a lot of attention, both in the field of criminology and in the field of parenting research (for a meta analytical overview see Hoeve et al., 2009). Increasing attention has been given to mechanism that might explain the relationship between parenting and delinquency. In both criminological and parenting literature a fairly large number of studies have already examined various mediating mechanisms, including self-control, delinquent attitudes, and peer delinquency (e.g. Burt, Simons, & Simons, 2006; Hay, 2001; Knoester, Haynie, & Stephens, 2006; Pardini, Loeber, & Stouthamer-Loeber, 2005; Ragan, Osgood, & Feinberg, 2014; Warr, 2005). However, most of the previous studies focused on single mediation models, that is, only one of the suggested mediating mechanisms was assessed, whereas it is logical to assume that various mediating mechanisms are also interrelated. This pleads for a simultaneous approach, since only when examined simultaneously, the relative contribution of various intervening mechanisms that might explain the relationship between parenting and delinquency can be determined. The present dissertation aims to bring together theoretical and empirical knowledge from parenting and criminological literature about how parenting is related to adolescent involvement in delinquency. By integrating components from different theoretical perspectives, we aimed to explain how various aspects of parenting are directly and indirectly related to adolescent delinquency.

Parenting adolescents

Adolescence is a period of changes in individual and contextual factors (Mulvey, 2014; Smetana, Campione-Barr, & Metzger, 2006; Steinberg & Silk, 2002). The establishment of autonomy is a normative developmental task of adolescence and involves the adolescent's strive for responsibility, independence, and freedom. It is also well known that as youth move into adolescence, they spend more time away from home in absence of their parents, and other factors become more important, especially peers (Dekovic, Buist, & Reitz, 2004).

During adolescence, parent-adolescent relationships go through significant changes. Parents perceive adolescence as the most challenging stage of child rearing (Smetana et al., 2006). The quality of the parent-adolescent relationship declines and parental monitoring becomes less restrictive (Loeber et al., 2000; McGue, Elkins, Walden, & Iacono, 2005; Wikström, Oberwittler, Treiber, & Hardie, 2012). The ways in which parents and adolescents deal with these changes have important consequences (Goldner, Peters, Richards, & Pearce, 2011; Pettit, Laird, Dodge, Bates, & Criss, 2001; Steinberg, 2000; Steinberg & Morris, 2001). Parents have the important task to learn to facilitate some level of independence in their children while remaining supportive (Galambos, Barker, & Almeida, 2003; Simons, Simons, Chen, Brody, & Lin, 2007). As the amount of time adolescents spent away from parents increases, direct supervision becomes more difficult and requires different parenting strategies. Three key constructs of parenting that have emerged as critical

for adolescent development are parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship (Dishion & Patterson, 2006; Smetana et al., 2006; Wright & Cullen, 2001).

Parental monitoring allows parents to keep track of their adolescents' activities, peer associations and whereabouts, while permitting greater autonomy (Smetana et al., 2006). Adolescents who receive adequate parental monitoring have to ask permission to go out or have to explain afterwards where they have been and what they have been doing. As parental monitoring is a way of keeping track of adolescents' whereabouts, it offers parents possibilities to intervene.

Another parenting strategy found to be important during adolescence is parental limit-setting. Parental limit-setting involves setting clear rules and providing consequences for misbehavior (Harris-McKoy & Cui, 2013). The purpose of providing consequences for misbehavior is to reduce the chance that the adolescent will again engage in that kind of behavior. There are several ways in which parents can show their disapproval of their children's behavior, for example by telling their children off or by grounding them. The idea is that the adolescent will consider the perceived reactions of their parents before engaging in behavior (Wyatt & Carlo, 2002).

In addition to parental control strategies, the quality of the parent-adolescent relationship has been found to be important for adolescent development (Dishion & Patterson, 2006; Hoeve et al., 2009). Adolescents with a warm and healthy relationship with their parents may be more likely to engage in behavior that their parents approve in order to avoid disapproval or disappointment (Warr, 2005). Furthermore, the quality of the parent-adolescent relationship might serve as a protective factor since adolescents who perceive a warm relationship with their parents are more likely to spend time in presence of their parents, whereas adolescents who experience high levels of conflict and low emotional bonding with their parents might prefer to spend time away from home and parents. Only when examined simultaneously, the relative importance of the various aspects of parenting (*i.e.* parental monitoring, parental limit-setting, and quality of the parent-adolescent relationship) can be determined (Simons et al., 2007).

Indirect parental influence

Two major criminological theories that offer possible explanations for *how* parenting is related to delinquency are self-control theory (Gottfredson & Hirschi, 1990) and differential association theory (Sutherland, 1947). According to self-control theory (Gottfredson & Hirschi, 1990), children who experience a better relationship with their parents, who perceive more monitoring by their parents and receive clear limit setting, are expected to develop higher levels of self-control and to internalize conventional norms. Individuals with lower self-control are more impulsive, tend to engage in risk-taking activities, and prefer easy or immediate gratifications of desires compared to individuals with higher levels of self-control

and are therefore more likely to engage in delinquent activities (Gottfredson & Hirschi, 1990).

Differential association theory (Sutherland, 1947) put forward that delinquent attitudes and peer delinquency are possible mechanisms through which parents influence adolescent behavior. With regards to delinquent attitudes, individuals that receive adequate parental control and support are expected to develop prosocial attitudes. In turn, the more an individual holds attitudes that approve of delinquent behavior, the more likely he or she is to engage in delinquent behavior (Sutherland, 1947). Regarding peer delinquency, there are several ways in which parents intentionally or unintentionally might encourage their children to associate less with delinquent peers. Parents can encourage their children to join one peer group over another, they can promote participation in various conventional activities and they can select the schools their children attend (Simons, Chao, Conger, & Elder, 2001). In addition, a warm and healthy parent-adolescent relationship might result in less association with delinquent peers as the adolescent is more likely to avoid parental disapproval or disappointment (Knoester et al., 2006; Warr, 2005). Although differential association is not limited to interaction with peers (Sutherland, 1947), peer associations are a major part of the differential association process, especially during adolescence. Delinquent peers are expected to be an important source of adapting delinquent attitudes, and therefore related to an individual's involvement in delinquent behavior (Sutherland, 1947).

Although self-control theory and differential association theory are usually seen as competing theoretical frameworks (Pratt & Cullen, 2000), we expect that the mechanisms derived from both these perspectives each explain a portion of the relationship between parenting and delinquency. In addition, the present dissertation adds to the existing literature by examining an alternative mechanism, derived from routine activity theory (Cohen & Felson, 1979), that might explain the relationship between parenting and adolescent delinquency: time spent in criminogenic settings. Altogether, this approach enables us to detect the unique contribution of these mechanisms derived from different theoretical perspectives to the explanation of the relationship between parenting and adolescent delinquency of each.

Time spent in criminogenic settings

Studying where and how adolescents spend their time is important for understanding how daily activities provide opportunities and temptations for involvement in delinquent behavior. Time spent in some activities and settings are more riskier than time spent in other activities and settings (Augustine & Felson, 2015). According to the routine activity perspective (Cohen & Felson, 1979), opportunities that arise in everyday life are central in explaining criminal behavior. Certain settings provide opportunities for delinquent behavior, and the degree of involvement in delinquent behavior depends on the amount of time an individual spends in criminogenic settings.

One characteristic of the environment that potentially makes crime more or less attractive is the level of physical disorder, such as graffiti, litter and poorly maintained houses. According to the broken window perspective (Kelling & Wilson, 1982), (minor) signs of public disorder are expected to lead to more disorder and criminal behavior. The underlying mechanism is that physical disorder is assumed to indicate that no one cares what goes on in the neighborhood, which in turn might reduce the perceived risk of getting caught when committing a crime (Kelling & Wilson, 1982; Sampson & Raudenbush, 2004). Support for the idea that disorder leads to more disorder and delinquent behavior has been found in a series of experiments conducted by Keizer, Lindenberg, and Steg (2008). In an environment with signs of disorder, individuals behaved in a more disorderly or delinquent way than in an environment without signs of disorder. For example, in an alley with graffiti on the walls, individuals were more likely to throw advertising flyers on the ground compared to an alley without graffiti on the walls. If people observe violations of norms, their concern for appropriate behavior weakens, making it more likely that they violate norms and rules themselves (Keizer et al., 2008).

Although spending time in settings with high levels of physical disorder is assumed to be criminogenic, spending time in such settings may not necessarily be conducive for criminal behavior. The circumstances under which adolescents spent time in these settings is expected to play an important role in whether they will get involved in delinquency. Osgood, Wilson, O'Mally, Bachman, and Johnston (1996) theoretically and empirically demonstrated that time spent unsupervised with peers in unstructured activities provides situational inducements for involvement in delinquent behavior. The presence of peers may increase potential crime involvement by making delinquent behavior easier and more rewarding. Peers can exert social pressure and reinforce delinquent behavior, especially among adolescents (Osgood et al., 1996). The absence of authority figures during unsupervised socializing with peers makes delinquency more likely to occur because social control is limited. Unstructured activities (*e.g.* socializing, hanging out) increase potential involvement in delinquency as they leave time available for delinquency because there is little constraint on how time is spent. Structured activities, on the other hand, usually provide fewer opportunities to engage in delinquent behavior (Osgood, Anderson, & Shaffer, 2005; Osgood et al., 1996). In the present dissertation, inspired by the broken windows perspective (Kelling & Wilson, 1982) and the routine activity perspective (Cohen & Felson, 1979), we considered where (*i.e.* settings with high levels of physical disorder) and how (*i.e.* unsupervised and unstructured socializing with peers) adolescents spend their time in order to determine their exposure to criminogenic settings. In the present dissertation, we examined the extent to which time spent in criminogenic settings could explain the relationship between parenting and adolescent delinquency, in addition to explanations derived from self-control theory and differential association theory. We examined these different explanations simultaneously, in order to determine their unique contribution to explaining this relationship.

However, since exposure to criminogenic settings provides a relatively new insight into adolescent engagement in delinquent behavior, little is known about the determinants of time spent in criminogenic settings. In order to develop a thorough understanding of how adolescents get involved in delinquency (Wikström et al., 2012), it is important to identify the processes that underlie the amount of time adolescents spent in criminogenic settings. In the present dissertation, we examined how parenting is related to time spent in criminogenic settings.

Current dissertation

Figure 1.1 represents the conceptual model that guided the present dissertation. The main aim of the present dissertation was to examine the relative contribution of the proposed mediators derived from different theoretical perspectives (*i.e.* self-control, delinquent attitudes, peer delinquency, time spent in criminogenic settings) to explaining the relationship between parenting and adolescent delinquency. In Chapter 4, we examined these mechanisms derived from self-control theory (Gottfredson & Hirschi, 1990), differential association theory (Sutherland, 1947), and routine activity theory (Cohen & Felson, 1979) simultaneously in order to determine their relative contribution to explaining how parenting is related to adolescent delinquency. To our knowledge, no previous study has examined the mediating role of these mechanisms while controlling for the effects of the others. Because these mediators are interrelated, it is important to examine these mediators simultaneously in order to determine their relative contribution to explaining the relationship between parenting and delinquency.

In order to develop a thorough understanding of the role of time spent in criminogenic settings in explaining the relationship between parenting and adolescent delinquency, however, we first examined how parenting is directly and indirectly related to the amount of time adolescents spend in criminogenic settings. Scholars have increasingly studied where and how adolescents spend their time as possible explanation for involvement in delinquent behavior (Osgood et al., 1996; Warr, 2005; Wikström et al., 2012). Nevertheless, little is known about the determinants of spending time in criminogenic settings. The present dissertation attempts to address this gap in the literature by examining the amount of time adolescents spend in criminogenic settings as a dependent variable in Chapter 2 and 3. Chapter 2 addresses whether parenting is related to the amount of time adolescents spend in criminogenic settings. Furthermore, effects of changes in parenting over time on time spent in criminogenic settings are examined. Chapter 3 aims at the extent to which the associations between parenting and time spent in criminogenic setting are indirect through self-control and delinquent attitudes. In addition, we examined how changes over time in self-control and in delinquent attitudes could explain the relationship between changes in parenting and time spent in criminogenic settings.

As a final step, in Chapter 5 we examined gender differences in the direct and indirect pathways from parenting to delinquency, through self-control, delinquent

attitudes, peer delinquency, and time spent in criminogenic settings. It is well established that boys are generally much more involved in delinquent behavior than girls. We examined two possible explanations for this gender-gap in delinquency. The first explanation entails that boys and girls differ in the extent to which they are exposed to risk factors. The second explanation entails that boys and girls are differentially affected by these risk factors. Differences in parenting, self-control, delinquent attitudes, and peer delinquency between boys and girls are often assumed to be important explanations for the gender gap in delinquency (Bartusch & Matsueda, 1996; Daigle, Cullen, & Wright, 2007; Fagan, Van Horn, Hawkins, & Arthur, 2007; Pauwels & Svensson, 2009). We examined whether boys and girls differ in the mean levels of parenting, self-control, delinquent attitudes, peer delinquency, time spent in criminogenic settings. Second, we examined whether the direct and indirect pathways linking parenting to delinquency, through self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, differ for boys and girls.

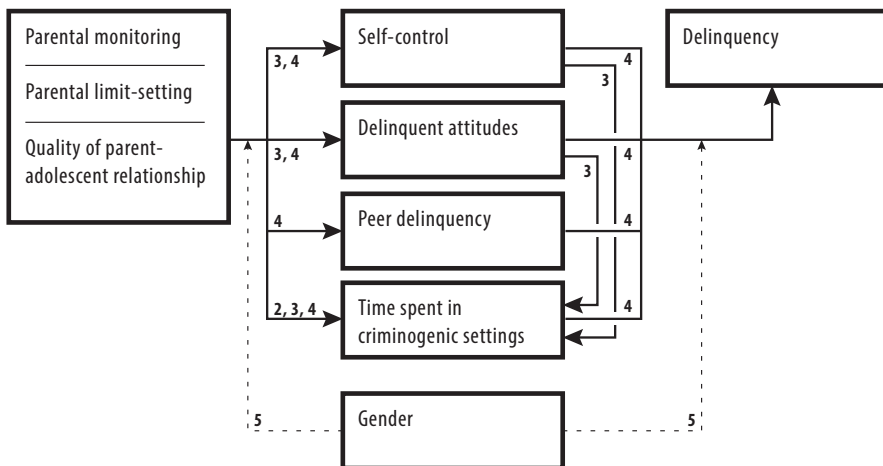


Figure 1.1 Conceptual model. Numbers indicate the chapters in which each part of the model was tested.

Study design

In the present dissertation data from the Study of Peers, Activities and Neighborhoods (SPAN) were used. The SPAN study is a longitudinal study that aims to explain adolescent delinquency, consisting of two waves of data collection among adolescents who were between the ages of 11 and 17 at T1 ($M = 14.3$). At T1, participants were enrolled in the first year of secondary school (mainly age 12 - 13) or in the fourth year of secondary school (mainly age 15 - 16). The two measurement

occasions were separated by two years. The first wave of data collection took place in 2008/2009 and the second wave in 2010/2011. Participants for the SPAN study were recruited from secondary schools in the city of The Hague and its neighboring suburbs in the Netherlands. Forty schools for secondary education were approached and ten schools agreed to participate in the study. In the present dissertation three sources of data were used from SPAN are used: (1) a self-reported questionnaire, (2) a space-time budget interview, and (3) systematic social observation data. Self-reported questionnaires were used to measure delinquency, parenting, self-control, delinquent attitudes and peer delinquency. A questionnaire was individually conducted in groups of four adolescents during a school hour of about 45 minutes, supervised by a research assistant.

In the present dissertation we examined both between-person differences as well as over time within-person changes simultaneously using multilevel modeling. The between-person level explains time-stable differences between individuals, whereas the within-person level addresses within-person change (over time), by controlling for all stable individual differences.

Parental monitoring was measured by the use of a summary construct based on the scale developed by Kerr and Stattin (2000; Stattin & Kerr, 2000) asking whether the adolescent has to inform his parents about his whereabouts. *Parental limit-setting* is a summary construct based on the scale developed by Wikström and Butterworth (2006) that reflects the extent to which parents intervene in rule-breaking behavior. The *quality of the parent-adolescent relationship* was based on the scale developed by Wikström and Butterworth (2006).

Self-control was measured by the use of a summary construct based on the scale developed by Grasmick, Tittle, Bursik, and Arneklev (1993) asking about the respondents' general behavior. *Delinquent attitudes* were operationalized as the adolescent's beliefs about the acceptability of several delinquent acts, and the construct was based on a scale that was developed by Loeber, Farrington, Stouthamer-Loeber, and Kammen (1998). *Peer delinquency* was a summary construct based on the scale developed by Wikström and Butterworth (2006) asking about the amount of delinquent behavior of the adolescent's peers.

Time spent in criminogenic settings is indicated by the number of hours a respondent spent unsupervised and unstructured socializing with peers in settings with high levels of physical disorder. Whereas the previously mentioned concepts were measured by existing constructs using a self-reported questionnaire, time spent in criminogenic settings is measured using space-time budget interviews combined with systematic social observation. The space-time budget interview is a structured personal interview, which was conducted individually and face to face with the respondents. The instrument was originally developed by Wikström and Butterworth (2006) in the Peterborough Youth Study and refined in its successor, the Peterborough Adolescent Delinquency Study (PADS+). During the space-time interview, the activities of the adolescent during each hour of four recent days

(always including the previous Friday and Saturday), including the nature of the main activity (*e.g.* sports, learning), the function of the place (*e.g.* soccer field, school), persons present in the setting (*e.g.* peers, teacher, parents), and the geographical location. To record the geographical locations of the respondent, detailed colored maps of the city of The Hague and its neighboring suburbs were used, on which the respondent indicated his geographical location during each hour. The maps were overlaid with a numbered grid of 200 by 200 meters (0.04 km²) to assist respondents in communicating their whereabouts with greater precision. To assess the level of physical disorder of these small settings, systematic social observation was carried out in the city of The Hague and its neighboring suburbs during the first half of 2012. The closest address to the centroid of the grid cell was determined first, and then the trained observers walked 50 meters in one direction and 50 meters in the other direction. Hence a street segment of 100 meters was observed in each grid cell (200 by 200 meters). As the observers walked the street, they completed an observation checklist, which was based on the instrument used by Raudenbush and Sampson (1999).

Outline of this dissertation

In the following chapters, four empirical studies are described. Table 1.1 presents an overview of the research questions, measures and the statistical techniques that were used in each chapter. In the following chapters, four empirical studies are described Table 1.1 presents an overview of the research questions, measures and the statistical techniques that were used in each chapter.

Chapter 2 addresses whether parenting is related to the amount of time adolescents spend in criminogenic settings. Furthermore, effects of changes in parenting over time on time spent in criminogenic settings are examined.

In Chapter 3 we examined the extent to which the associations between parenting and time spent in criminogenic setting are direct and indirect through self-control and delinquent attitudes. In addition, we examined how changes over time in self-control and in delinquent attitudes could explain the relationship between changes in parenting and time spent in criminogenic settings.

In Chapter 4 we examined direct and indirect pathways from parenting to adolescent delinquency. We examined the extent to which time spent in criminogenic settings could explain this relationship, next to other explanations (*i.e.* self-control, delinquent attitudes and peer delinquency). Again, we examined how changes over time in these characteristics were related.

In Chapter 5 we examined gender differences in direct and indirect pathways from parenting to involvement in delinquency.

In Chapter 6, the results of the different chapters are summarized, implications for theory, and directions for future research are discussed. This dissertation closes with practical implications.

Table 1.1 Overview of empirical chapters

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Title	Parenting and time spent in criminogenic settings	How is parenting related to time spent in criminogenic settings? The role of self-control and delinquent attitudes	How is parenting related to adolescent delinquency? The role of self-control, delinquent attitudes, having delinquent friends, and time spent in criminogenic settings	Gender differences in pathways from parenting to delinquency?
RQ	To what extent is (change in) parenting related to (change in) the amount of time adolescents spend in criminogenic settings?	To what extent are the associations between (change in) parenting and (change in) time spent in criminogenic settings mediated by (change in) self-control of (change in) delinquent attitudes?	To what extent are the associations between (change in) parenting and (change in) delinquency mediated by (change in) self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings?	To what extent differ direct and indirect pathways from parenting to delinquency between boys and girls?
Dependent Variable	Time spent in criminogenic settings	Time spent in criminogenic settings	Delinquency	Delinquency
Independent Variables	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality
Mediators		Self-control Delinquent attitudes	Self-control Delinquent attitudes Peer delinquency Time spent in criminogenic settings	Self-control Delinquent attitudes Peer delinquency Time spent in criminogenic settings
Statistical Technique	Longitudinal Multilevel Analysis	Longitudinal Multilevel Structural Equation Modeling	Longitudinal Multilevel Structural Equation Modeling	Multiple Group Structural Equation Modeling

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2 Parenting and time spent in criminogenic settings

Although there has been increasing interest in explaining adolescents' crime involvement by the time adolescents spend in criminogenic settings, little is known about its determinants. We examine the extent to which (change in) parenting is related to (change in) time spent in criminogenic settings. Time spent in criminogenic settings is measured in a comprehensive way by including social and environmental characteristics of micro settings (200 by 200 meters). Longitudinal multilevel analysis on two waves of panel data on a Dutch sample of 603 adolescents (age 12–19) showed that more parental monitoring, more parental limit-setting and a higher quality of the parent adolescent relationship were related to less time spent in criminogenic settings (between-person). Decreases in parental limit-setting and in the quality of the parent–adolescent relationship were related to increases in the amount of time spent in criminogenic settings over time (within-person). These findings emphasize the important role parents continue to play during adolescence.

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In recent years, there has been increasing interest in explaining adolescent crime involvement by exposure to crime-inducing settings (Osgood et al., 1996; Osgood and Anderson, 2004; Wikström et al., 2010, 2012; Weerman et al., 2013). This strong emphasis on time spent in crime-inducing settings as cause of adolescent delinquency makes it important to further study the determinants of time spent in these criminogenic settings. Therefore, in the present study, time spent in criminogenic settings is examined as dependent variable.

Criminogenic settings

A criminogenic setting is a setting with social and physical characteristics that encourage acts of crime. First, a behavioural setting may be defined as the part of the social and physical environment that an individual, at a particular moment in time, can access with his senses (Wikström et al., 2012). In accordance with this definition, a setting has to be geographically small. In criminology, there has been a shift from large geographical units of analysis to very small, micro units. These small geographical units of analysis more closely approximate behavioural settings and are more likely to be homogeneous in terms of environmental characteristics (Oberwittler and Wikström, 2009). Weisburd et al., (2012) have shown that crime and factors that provide opportunities for crime are concentrated at specific places at micro geographical level. Furthermore, when studying the amount of time people spend in criminogenic settings, it needs to be taken into account that a person's spatial activity pattern goes beyond the residential neighbourhood. Instead of focusing only on the environment where people live, it is argued that the environment where people spend their time should be given more attention.

Social characteristics of behavioural settings indicate who is present and what activities are undertaken, whereas environmental characteristics indicate what kind of place the setting represents. Social characteristics of settings that might provide opportunities for crime involvement can be derived from the work of Osgood et al. (1996). Osgood et al., (1996) applied Cohen and Felson's (1979) routine activities perspective at individual level and stress that spending time unstructured socializing with peers in the absence of authority figures increases the risk of offending. The presence of peers may increase potential crime involvement by making criminal behaviour easier and more rewarding. The absence of authority figures indicates that social control is limited. Unstructured activities increase potential crime involvement as they leave time available for criminal behaviour because there is little constraint on how time is spent (Osgood et al., 1996; Osgood et al., 2005). Previous research has suggested that combinations of these characteristics are related to adolescents' crime involvement (Riley, 1987; Osgood et al., 1996; Osgood and Anderson, 2004; Haynie and Osgood, 2005; Maimon and Browning, 2010; Wikström et al., 2010, 2012). In addition, Weerman et al., (2013) showed that time spent with peers is only associated with delinquent behaviour when it occurs under at least two of the following conditions: socializing, being in public and being unsupervised.

Furthermore, spending time in the presence of all three of these conditions seem to be particularly conducive to crime (Weerman et al., 2013).

However, in addition to the social characteristics of the settings, the physical environment is also expected to provide opportunities for crime. A possible environmental characteristic of settings that provide opportunities for crime involvement can be derived from the broken windows approach (Kelling and Wilson, 1982). Minor signs of public disorder are expected to lead to more disorder and criminal behaviour. The underlying mechanism is that public disorder, such as graffiti, litter and poorly maintained houses, is assumed to indicate that residents are unresponsive to what goes on in the neighbourhood, which might reduce the perceived risk of being caught when committing a crime (Kelling and Wilson, 1982; Sampson and Raudenbush, 2004). Another reason why settings of high disorder are assumed to be criminogenic is because observing violations of certain norms or rules makes it more likely to violate norms or rules oneself (Keizer et al., 2008). For example, when people observe that others have painted graffiti where this should not have been painted, their concern for appropriate behaviour weakens, making it more likely for them to violate norms or rules themselves (Keizer et al., 2008). However, spending time in an area with high levels of disorder may not necessarily be conducive for criminal behaviour. Spending time in such a setting with peers and without adult supervision is assumed to have more criminogenic potential than spending time in such a setting, for example in the presence of parents. In the present study, therefore, we used a combination of social (unsupervised and unstructured socializing with peers) and environmental (high levels of physical disorder) characteristics to indicate criminogenic settings.

Parenting and time spent in criminogenic settings

It is likely that parents attempt to restrict the time adolescents spend in criminogenic settings in order to protect them from getting into trouble. However, from the literature, we know that during adolescence, the amount of time adolescents spent with peers away from parents increases. This makes direct supervision more difficult and requires different parenting strategies.

Two key constructs of parenting behaviour that have emerged as critical for adolescent development are control and support (Dishion and Patterson, 2006). Parental control involves the efforts by parents to supervise and monitor their children and to set and enforce rules (Wright and Cullen, 2001; Smetana et al., 2006). During adolescence, young people gain greater autonomy in how they spend their time in different social and spatial environments (Osgood et al., 2005; Wikström et al., 2012). *Parental monitoring* is increasingly important in adolescence because it allows parents to keep track of their adolescents' activities, peer associations and whereabouts while permitting greater autonomy (Smetana et al., 2006). Adolescents who lack parental monitoring do not have to ask for permission to go out or do not have to explain afterwards where they

have been and what they have been doing (Kerr and Stattin, 2000; Stattin and Kerr, 2000).

Another parenting strategy found to be important during adolescence is *parental limit-setting*, which involves setting clear rules and providing consequences for misbehaviour (Harris-McKoy and Cui, 2013). Parents can show their disapproval of behaviour in different ways, for example by telling their children off or by grounding them. The purpose of these consequences is to reduce the chance of the child engaging in that behaviour in the future as children will consider these perceived reactions of their parents before engaging in behaviour (Wyatt and Carlo, 2002).

In addition to these control strategies, parental support is recognized as being important during adolescence and involves the *quality of the parent–adolescent relationship* (Dishion and Patterson, 2006; Hoeve et al., 2009). Adolescents with a high-quality relationship with their parents will spend more time in presence of their parents, whereas adolescents who experience high levels of conflict and low emotional bonding with their parents might prefer to spend their time away from home and parents.

Adolescence is a period of developmental changes in individual and social factors (Steinberg and Silk, 2002; Smetana et al., 2006; Mulvey, 2014). The establishment of autonomy and independence from parents are normative developmental tasks of adolescence (Steinberg and Silk, 2002). The ways in which parents and adolescents deal with these changes have important consequences (Steinberg, 2000; Pettit et al., 2001; Steinberg, 2001; Goldner et al., 2011). During adolescence, parent–adolescent relationships go through significant changes and parents perceive adolescence as the most challenging stage of child rearing (Smetana et al., 2006). Parents have to learn to facilitate some level of independence in their children while remaining supportive (Galambos et al., 2003; Simons et al., 2007). Previous studies have suggested that during adolescence, the quality of the relationship between parents and adolescents declines and that parental monitoring becomes less restrictive (Loeber et al., 2000; McGue et al., 2005; Wikström et al., 2012). Furthermore, previous studies examining the stability of parenting dimensions over time indicate greater stability in the support dimension over time than in the control dimension (Stoolmiller, 1994; Loeber et al., 2000; Forehand and Jones, 2002). These changes in parenting over time can become important explanations for behavioural changes during this period (Jang, 1999; Mulvey, 2014).

Present study

In the current study, we examined how parental control strategies and the quality of the parent–adolescent relationship are related to the amount of time adolescents spend in criminogenic settings. We attempt to contribute to the existing literature in several ways. First, whereas previous longitudinal studies usually examined how a risk factor is related to an outcome at some late point in time, examining how changes in one

factor are related to changes in another factor could produce a more refined picture (Mulvey, 2014). In the present study, therefore, we examined how change in parental monitoring, parental limit-setting and in the quality of the parent–adolescent relationship are related to change in the amount of time spent in criminogenic settings. Although examined changes could produce a more refined picture, we cannot ignore that there is also considerable variability among families in the level of parental monitoring, parental limit-setting and in the quality of the parent–adolescent relationship. Thus, in the present study, we examined both how within-person changes as well as between-person differences in parenting are related to (change in) the amount of time spent in criminogenic settings.

Second, the present study measures time spent in criminogenic settings with great precision. Following Wikström and colleagues (see further, Wikström and Butterworth, 2006; Wikström et al., 2010, 2012), we used a space-time budget method that recorded hour by hour where respondents were, what they were doing and with whom they were during a period of 4 days. Because the geographical location of each hour was known, we were able to enrich these space-time budget data with information about the level of physical disorder, which was conducted using systematic social observation (Sampson and Raudenbush, 1999). Furthermore, the present study extends on two trends in environmental criminology. Instead of focusing only on the environment where people live, as a person's spatial activity pattern goes beyond the residential neighbourhood, we examined the environments where people spend their time. In addition, the present study extends on the shift from large geographical units of analysis to small micro units by using small geographical places of 200 by 200 m (0.04 km²) to represent a setting. The small geographical units of analysis more closely approximate behaviour settings and are more likely to be homogeneous in terms of environmental characteristics (Oberwittler and Wikström, 2009). The measure of time spent in criminogenic settings in the present study is far more detailed and precise than questionnaire items about how many hours on average per week are spent in certain activities used by previous studies (Osgood et al., 1996; Haynie and Osgood, 2005; Anderson and Hughes, 2009; Maimon and Browning, 2010).

In addition, whereas parental monitoring is conceptualized as parental tracking of adolescents' whereabouts, most previous research operationalized it as parental knowledge of the adolescents' whereabouts. As Stattin and Kerr (2000; Kerr and Stattin, 2000) argued, parental knowledge is not a valid measure of parents' efforts to monitor their adolescents' daily activities. The present study includes a measure of parental monitoring that indicates parents' efforts of tracking adolescents' whereabouts. Furthermore, we examined (change in) three parenting dimensions (parental monitoring, parental limit-setting, and the quality of the parent–adolescent relationship) simultaneously to determine their relative contribution to explaining (change in) the amount of time adolescents spent in criminogenic settings.

The present study examines two main hypotheses, each with three subhypotheses. First, we hypothesize that adolescents with (1a) lower levels of parental monitoring, (1b) lower levels of parental limit-setting and (1c) a lower quality in their relationship with their parents spend more time in criminogenic settings (*between*-individual hypotheses). Second, we hypothesize that a decrease in (2a) the level of parental monitoring, (2b) the level of parental limit-setting and (2c) in the quality of the parent–adolescent relationship over time is related to an increase in the amount of time spend criminogenic settings (*within*-individual hypotheses).

Method

Sample

The Study of Peers, Activities and Neighborhoods (SPAN) is a longitudinal study consisting of two waves of data collection, conducted by the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR) among adolescents (11–17 years of age (mean = 14.3) at T1 and 13–20 years of age (mean = 16.5) at T2) in the city of The Hague and its neighbouring suburbs in the Netherlands (Bernasco et al., 2013; Hoeben and Weerman, 2013; Weerman et al., 2013). The first wave was conducted in 2008/2009 and the second wave approximately 2 years later, in 2010/2011. Forty schools for secondary education were approached in the first wave; ten schools agreed to participate in the study. In total, 615 adolescents (52 percent boys) participated fully in both waves of the study; the retrieval rate at T2 was 73 percent. Boys ($t = 2.383, p = .018$) and older ($t = -8.099, p = .000$) respondents had relatively higher attrition rates. Furthermore, those who exited the study scored lower on parental monitoring ($t = 4.608, p = .000$) and parental limit-setting ($t = 3.686, p = .000$). No significant differences were found for the quality of the parent–adolescent relationship ($t = 1.884, p = .060$) and the amount of time adolescents spent in criminogenic settings ($t = -1.659, p = .098$).

The sample includes a relative high proportion of ethnic minority adolescents (47 percent). Relatively many adolescents come from lower forms of secondary education: 18 percent from schools for ‘practical education’ (the lowest level of secondary education), 46 percent from schools for lower vocational education (the most common form of secondary education), 9 percent from medium-level schools and 19 percent from the highest level of secondary education. Because the sample was drawn from a non-random sample of schools in The Hague, it is not a representative sample of the youth living in The Hague. However, the sample is highly diverse in terms of ethnicity and education, with an over representation of lower-educated youths from a highly urbanized region of the Netherlands.

Dependent variable

Two research instruments from the SPAN are used in the present study to measure time spent in criminogenic settings: *a space-time budget interview and systematic*

social observation. The *space-time budget* is a structured personal interview, which was conducted individually and face to face with the respondents. The instrument was originally developed by Wikström and Butterworth (2006) in the Peterborough Youth Study and refined in its successor, the Peterborough Adolescent Delinquency Study (PADS+). During the interview, the activities of the adolescent during each hour of 4 recent days (always including the previous Friday and Saturday) were recorded (see also Bernasco et al., 2013). Detailed information was collected about the activities of the adolescent for each hour of the day, including the nature of the main activity (e.g. sports, learning, sleeping), the function of the place (e.g. soccer field, school, friend's home), persons present in the setting (e.g. teacher, parents, peers) and the geographic location. To record the geographical locations of the respondent, detailed coloured maps of the city of The Hague and its neighbouring suburbs were used, on which the respondent indicated his geographical location during each hour. The maps were overlaid with a numbered grid of 200 by 200 meters (0.04 km²) to assist respondents in communicating their whereabouts with greater precision. As some people might have difficulties to interpret mapped information, to effectively determine the geographical location for each hour, additional resources were used such as street guides and comprehensive lists of local landmarks (specific stores, recreation venues, etc.). Furthermore, as the address of the respondent's home and school were known, the interviewer had some reference and starting points on the map to assist the respondent in reporting his location. We believe that this strategy ensured that even respondents who have difficulties to interpret mapped information provided valid answers. In sum, the space-time budget interview recorded very detailed information about *where*, *when* and *what* respondents were doing *with whom*, during 4 days of the week before the interview.

Additionally, to assess the level of the physical disorder of the settings, *systematic social observation* was carried out in the city of The Hague and its neighbouring suburbs during the first half of 2012. A grid of 200 by 200 meters that overlaid the maps of The Hague, on which the respondents indicated their locations, was used to select the street segments for the systematic social observation. The research area consisted of 4,561 grid cells, of which a sample of 1,422 grid cells was selected for observation¹. The closest address to the centroid of the grid cell was determined first, and then the observers, trained at the NSCR, walked 50 meters in one direction

¹ We used the geostatistical method of kriging to interpolate the level of disorder at the unobserved locations. The level of disorder at an unmeasured location is estimated using observed values at surrounding locations weighted according to the spatial covariance structure in the data and the distance between points. Cross validation of the estimated values is done by randomly splitting the data in two sets: a modelling set, which contains two-thirds of the data, and a validation set, which contains the remaining one-third of the data (Bivand 2008, p. 222). The modelling set is used for kriging on the locations of the validation set. Comparing the measured and kriged disorder values for the validation set resulted in a correlation of 0.45.

and 50 m in the other direction. Hence, a street segment of 100 m was observed in each grid cell (200 by 200 meters). As the observers walked the street, they completed an observation checklist, which was based on the instrument used by Raudenbush and Sampson (1999), capturing *physical disorder* by 13 items (e.g. 'How much trash or broken glass is on the street or sidewalks?'). All items have three answering categories (none, one, and more); α was .62. An area was indicated as highly disordered if it belonged to the top 25 percent of locations with the highest scores on physical disorder.

Because not all hours in the space-time budget were spent in the geographical study area of the city of The Hague and its suburbs (the area covered by the systematic social observation), the level of physical disorder of these areas is not known for every hour for every respondent. To retain comparability of the data across the respondents, only those respondents who spent every relevant hour (unsupervised, with peers, unstructured socializing) within the geographical study area of The Hague and its suburbs were included in the analyses. This resulted in a final sample of 603 respondents who had a measurement on at least one of the two time points. A total of 516 respondents had measurements for both time points, 580 respondents had a measurement at T1 and 539 respondents had a measurement at T2. In the longitudinal multilevel analysis, all these data can be used (Snijders and Bosker 1999, p. 175).

The dependent variable in this study, *time spent in criminogenic settings*, was measured by the total number of hours (for the 4 days covered by the space-time budget interview) spent unstructured socializing with peers, without supervision in settings of high disorder. For each respondent, we summed the number of hours that met all the following conditions: it was spent with at least one peer, in the absence of adults or any other authority figure, included socializing or 'hanging around' as the main activity, was spent outside a household settings in an area with high physical disorder².

² In order to determine whether the settings we defined as criminogenic were indeed criminogenic, we examined the number of offences that took place in these settings. The space-time budget interview also included the question whether at any time during the day the respondent had been involved in offending. In case of a positive answer, the specific hours during which this had happened were recorded (see Bernasco et al. 2013). Following the strategy of Bernasco et al. (2013), we found that across both waves, almost 11 offences per 1,000 wake hours took place in what we defined as criminogenic setting, compared to nearly 1 offence per 1,000 wake hours in other settings. To put it differently, only 1.8 percent of the wake hours were spent in criminogenic settings, whereas 17 percent of the offences took place in these settings, indicating that these settings are indeed conducive for criminal behaviour.

Independent variables

The *self-report questionnaire* from the SPAN is used to measure the parenting dimensions. The questionnaire was administered in groups of four adolescents, supervised by one research assistant during a school hour of about 45–50 min. *Parental monitoring* indicates whether the adolescent has to inform his/her parents about his/her whereabouts. It is measured by the use of a summary construct based on the scale developed by Kerr and Stattin (2000; Stattin and Kerr, 2000) consisting of five items (e.g. ‘If I go out, my parents want me to tell them where I go, with whom and what I’m going to do’). All items have five answering categories, ranging from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s α was .77 at T1 and .82 at T2.

Parental limit-setting reflected how likely it was that parents intervene in rule-breaking behaviour and is based on the scale developed by Wikström and Butterworth (2006). The scale consists of four items (e.g. ‘If you had been beating up or threatening somebody at school, your parents would tell you off or punish you’). All items have five answering categories, ranging from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s α was .62 at T1 and .58 at T2.

The *quality of the parent–adolescent relationship* was based on the scale developed by Wikström and Butterworth (2006) and was measured by seven items (e.g. ‘Do you talk to your parents when you have a problem or feel sad about something?’). All items have four answering categories, ranging from 0 (*never*) to 3 (*every day*). Cronbach’s α was .68 at T1 and .70 at T2.

Analytical approach

As a first step, in order to examine whether parenting and the amount of time spent in criminogenic settings change over time, we report the absolute and relative stability of these variables (Holden and Miller, 1999; Loeber et al., 2000; Forehand and Jones, 2002). Absolute stability refers to the stability of a particular behaviour over time and is represented by comparing the mean value of, for example, parental monitoring at T1 with the mean value of parental monitoring at T2. Relative stability refers to the consistency of the rank order of individuals on, for example, parental monitoring over time and is represented by stability coefficients (Forehand and Jones, 2002).

Second, in order to examine how (change in) parenting is related to (change in) the amount of time spent in criminogenic settings, negative binomial multilevel analyses³ were carried out because the dependent variable, time spent in criminogenic settings, is a highly right skewed count variable (Hilbe, 2011). Longitudinal multilevel analysis allowed us to examine both between- and within-person effects simultaneously (Bryk and Raudenbush, 1992; Snijders and Bosker,

³ Negative binomial random intercept models were estimated using the adaptive Gaussian quadrature algorithm in the PROC GLIMMIX procedure of SAS (Version 9.2, SAS Institute Inc.).

1999; Hoffman and Stawski, 2009). The multilevel structure consists of time (level 1) nested in persons (level 2)⁴.

The level 1 model (within-person analysis) addresses within-person change (over time) in the amount of time spent in criminogenic settings, by controlling for all stable individual differences, and the level 2 model (between-person analysis) explains timestable differences between individuals. Finally, gender and age were used as control variables in the analysis.

The incidence rate ratio (IRR) is reported, which is the exponentiated value of the coefficients, to compare the effects of the different parenting dimensions and can be interpreted as follows (Hilbe, 2011, p. 494). An IRR of 0.95 indicates that for every one unit change in the independent variable, the expected count of the dependent variable changes by 0.95. In other words, an increase of one unit in the independent variable is related to a 5 percent decrease in the count of the dependent variable.

Results

Time spent in criminogenic settings

Table 2.1 shows the average number of hours spent in settings with characteristics that we used to construct our measure of criminogenic settings. On average in both waves, respondents spent around 7 hours per day in presence of peers, 2 hours per day without supervision and almost 3 hours per day in non-household settings with high physical disorder. The amount of time spent unstructured socializing significantly increased between both waves ($t = -6.045, p = .000$) from 1.9 hours at T1 to 2.4 hours at T2. Likewise, the amount of time spent unstructured socializing with peers without supervision increased over time ($t = -2.887, p = .004$), as well as the time spent unstructured socializing with peers without supervision in settings of high disorder, which is our measure of time spent in criminogenic settings ($t = -3.664, p = .000$).

⁴ For each independent variable (i.e. parental monitoring, perceived parental limit-setting and the quality of the parent- adolescent relationship), two variables were added to the model: a between-person variable and a within-person variable. The between-person variables were computed by first averaging the scores on the parenting characteristics across both waves for each respondent, then subtracting the sample mean from these scores (Hoffman and Stawski 2009; Snijders and Bosker 1999). A positive score on between-person parental monitoring indicates that the respondent is more monitored than average, whereas a negative score indicates less parental monitoring than average. The within-person variables specify the deviation from the score at T1, known as the within-person deviation score (Snijders and Bosker 1999). For example, a negative score on within- person parental monitoring indicates that the respondent was less monitored at T2 than at T1.

Table 2.1 Number of hours spent in selected settings and percentage of respondents who did not spend time in these settings at T1 (N = 580) and T2 (N = 539)

	Number of hours per day		Percent of respondents who spent 0 h	
	T1	T2	T1	T2
With peers	6.7	6.7	0.2	0.9
Unsupervised	2.1	2.06	4.0	9.5
Unstructured socializing	1.9	2.4 ^a	9.0	4.1
In high disorder	2.6	2.7	16.0	16.1
Unsupervised unstructured socializing with peers	0.3	0.5 ^a	65.0	51.8
Unsupervised unstructured socializing with peers in high disorder	0.2	0.3 ^a	78.3	65.5

Note: ^aSignificant increase between T1 and T2 ($p < .01$).

Table 2.2 Descriptives and Spearman's correlations at T1 (N = 580) and T2 (N = 539)

	1	2	3	4	Mean	SD
1. Parental monitoring	0.440	0.438	0.323	-0.214	17.35	4.05
2. Parental limit-setting	0.433	0.458	0.223	-0.239	16.86	2.66
3. Quality of parent-adolescent relationship	0.179	0.193	0.557	-0.120	23.05	3.30
4. Time spent in criminogenic settings	-0.204	-0.253	-0.170	0.254	0.73	1.93
Mean	16.36	16.61	22.76	1.22		
SD	4.56	2.46	3.42	2.42		

Note: The values above the diagonal represent correlations and descriptive statistics at T1, the values below the diagonal represent correlations and descriptive statistics at T2 and the values on the diagonal represent stability coefficients. All correlations are significant at $p < .01$.

Furthermore, Table 2.1 shows the percentages of respondents that spent no time in settings with these characteristics. Almost all respondents spent at least 1 hour per day in presence of peers. Less than 10 percent of the respondents did not spend any hour without supervision or unstructured socializing and 16 percent of the respondents did not spend any hour in a non-household setting with high physical disorder. As our final outcome measure of time spent in criminogenic settings requires all characteristics (*i.e.* with peers, unsupervised, unstructured, in high physical disorder) to be present, a large proportion of the respondents (78 percent at T1, 66 percent at T2) spent no time in criminogenic settings. Among the respondents, 19 percent at T1 and 28 percent at T2 spent 1–5 hours in criminogenic settings, 2 percent at T1 and 6 percent at T2 spent 6–10 hours

in criminogenic settings and 6 percent at T1 and T2 spent more than 10 hours in criminogenic settings.

Descriptive statistics

Table 2.2 shows the descriptive statistics of, and Spearman's rank correlations between the parenting dimensions and time spent in criminogenic settings. On the diagonal, stability coefficients are reported which indicate the relative stability over time. The stability coefficient of time spent in criminogenic settings is rather low (0.254), which indicates that the ranking order of individuals on the amount of time spent in criminogenic settings changes over time. The stability coefficients for the parenting dimensions are moderate (0.440–0.557), which are in line with the results of Loeber et al. (2000) and support slightly higher relative stability of parenting behaviour over time.

To examine the absolute stability in the parenting dimensions, mean scores of both waves are compared. Parental monitoring declined during adolescence ($t = 3.850, p = .000$), whereas parental limit-setting ($t = 0.484, p = .628$) and the quality of the parent–adolescent relationship ($t = 1.462, p = .144$) did not significantly differ between both waves. The correlations between the parenting dimensions indicate that parental monitoring and parental limit-setting are more strongly correlated with each other than with the quality of the parent–adolescent relationship. In both waves, all three parenting dimensions are significantly negatively correlated with the amount of time adolescents spent in criminogenic settings.

Predicting time spent in criminogenic settings

Table 2.3 shows the results of the negative binomial multilevel analysis that examined how (change in) parenting is related to (change in) the amount of time spent in criminogenic settings. The statistically significant between-person estimates of the parenting dimensions indicate that respondents who perceived more parental monitoring, more parental limit-setting and who reported a better relationship with their parents spent less time in criminogenic settings, which supports hypotheses 1a, 1b, and 1c.

In addition, as indicated by the within-person estimates, changes in parental limit-setting and in the quality of the parent–adolescent relationship *over time* can explain changes in time spent in criminogenic settings, which supports hypotheses 2b and 2c. Respondents with less parental limit-setting compared with approximately 2 years earlier were more exposed to criminogenic settings, controlling for changes in parental monitoring and the quality of the parent-adolescent delinquency. The same applies to the quality of the parent–adolescent relationship. Respondents who perceived a decline in the quality of the relationship with their parents spent more time in criminogenic settings. No support is found for hypothesis 2a, a decrease in parental monitoring over time was not related to an increase in the amount of time spent in criminogenic settings.

Table 2.3 Negative binomial multilevel regression predicting time spent in criminogenic settings (N = 603)

	Estimate	SE	IRR
Intercept	-1.625	0.290	
Age (centered at 11)	0.272***	0.043	1.31
Gender (ref. = girl)	-0.048	0.171	0.95
Between-person			
Parental monitoring	-0.085***	0.026	0.92
Parental limit-setting	-0.135**	0.042	0.87
Quality of relationship	-0.056*	0.029	0.95
Within-person			
Parental monitoring	-0.010	0.023	0.99
Parental limit-setting	-0.104*	0.040	0.90
Quality of relationship	-0.076*	0.034	0.93

Note: Unstandardized regression coefficients, * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$, $R^2 = .30$.

The last column of Table 2.3 presents the IRR. The IRR of 0.92 for the between-person estimate of parental monitoring indicates that for every one unit less of parental monitoring, an adolescent is expected to spend 8 percent more hours in criminogenic settings. In comparison, an IRR of 0.87 for the between-person estimate of parental limit-setting indicates that for every one unit less of parental limit-setting, an adolescent is expected to spend 13 percent more hours in criminogenic settings. The same applies to the within-person estimates; an IRR of 0.93 for the quality of the parent-adolescent relationship indicates that for every one unit decrease in the quality of the relationship over time, the amount of time spent in criminogenic settings increases with 7 percent more hours. Parental limit-setting is most strongly associated with time spent in criminogenic settings, both between-persons as within-persons, compared with parental monitoring and the quality of the parent-adolescent relationship. The model explained 30 percent of the variance in time spent in criminogenic settings ($R^2 = .3025$).

Discussion

In criminology, there has been an increasing interest in explaining adolescent crime involvement by the time adolescents spend in criminogenic settings (Osgood et al., 1996; Osgood and Anderson, 2004; Wikström et al., 2012). The main purpose of the present study was to determine the extent to which parental control strategies and the quality of the parent-adolescent relationship were related to the amount of

time adolescents spend in criminogenic settings. In addition to differences between persons, we examined the extent to which change in parenting was related to change in the amount of time spent in criminogenic settings. Longitudinal multilevel analysis was used to examine simultaneously how differences in parenting between adolescents and how changes in parenting over time are related to the amount of time adolescents spent in criminogenic settings.

The period of adolescence involves numerous changes at the individual and contextual level (Steinberg and Silk, 2002; Smetana et al., 2006; Mulvey, 2014). The establishment of autonomy can be considered a normative development during adolescence and involves the adolescent's strive for responsibility, independence and freedom. Whereas adolescents may welcome this newfound freedom, parents may find it challenging to grant more autonomy and at the same time continue to have some control the adolescent's behaviour and activities (Steinberg and Silk, 2002). In the present study, we found that overall, parental monitoring decreased during adolescence, which is in line with previous studies (Loeber et al., 2000; Wikström et al., 2012). This might indicate that decreasing parental monitoring is a way in which parents grant their children more freedom. Moreover, our findings showed that a decrease in parental monitoring over time was not related to an increase in the amount of time spent in criminogenic settings. These findings indicate that a decrease in parental monitoring might be a normative development during adolescence and therefore not a risk factor.

Although parenting changes during adolescence, there are considerable differences among families as well. The results of the present study indicated that adolescents who perceive more parental monitoring, more parental limit-setting and a relationship with their parents of high quality, spent less time in criminogenic settings. Although change in parental monitoring over time was not related to change in the amount of time spent in criminogenic settings, adolescents who perceive less parental monitoring compared to other adolescents are more likely to spend time in criminogenic settings.

Furthermore, adolescents whose parents provide less rules and consequences for misbehaviour are also more likely to spend more time in criminogenic settings. The underlying idea is that adolescents will consider the reactions of their parents before engaging in certain behaviour (Wyatt and Carlo, 2002). The quality of the parent-adolescent relationship was also found to be related to the amount of time spent in criminogenic settings. Adolescents with a relationship of high quality with their parents might prefer to spend more time at home in presence of their parents, while adolescents who experience high levels of conflict with their parents might prefer to spend time away from home.

Although change in parental monitoring was not related to change in the amount of time spent in criminogenic settings, decreases in parental limit-setting and in the quality of the parent-adolescent relationship were related to increases in the amount of time spent in criminogenic settings. In the present study, we found that, overall,

parental limit-setting and the quality of the parent–adolescent relationship did not decrease during adolescence. However, adolescents who did experience a decrease in parental limit-setting or in the quality of the parent–adolescent relationship showed an increase in the amount of time spent in criminogenic settings. To conclude, whereas a decrease in parental monitoring might be a normative development during adolescence and therefore not a risk factor for adolescent behaviour, these findings indicate that decreases in parental limit-settings and in the quality of the parent–adolescent relationship are not normative developments and might put adolescents more at risk.

Certainly, there are limitations to what parents can do to restrict the amount of time spent in criminogenic settings. Firstly, although adolescents respond to the behaviour of their parents, parents also react to the behaviour of the adolescent (Gault-Sherman, 2012). The bidirectional nature of the parent–adolescent relation means that parenting may affect the amount of time spent in criminogenic settings, and that the amount of time adolescents spend in criminogenic settings may affect the type of parenting they receive. Secondly, certain parents might not have the ability, due to, *e.g.*, lack of experience or lack of resources, to effectively exert parental control and support (Warr, 2005). In some families, parents might be too distracted by their own problems to adequately monitor and set limits to their adolescents' activities and behaviour. However, the results of the present study have shown that parents who, for whatever reason, do not effectively monitor their adolescent's behaviour or provide rules and consequences, are more likely to have adolescents who spend more time in criminogenic settings.

As with any study, the present study has some limitations that need to be addressed. First, respondents who refused to participate in the second wave were more often male, older, less monitored by their parents and perceived less parental limit-setting. We have no reason to believe this somewhat selective dropout biased our results, other than providing relative conservative tests of the associations between parenting and the amount of time spent in criminogenic settings due to less variation. Second, it is uncertain whether the 4 days covered by the space-time budget are representative for the overall activity patterns of adolescents. However, the space-time budget data provide a much more detailed record of the activity pattern of adolescents compared with questionnaire data used in previous studies (Osgood et al., 1996; Osgood and Anderson, 2004; Haynie and Osgood, 2005).

Despite these limitations, the present study contributed to the literature in several ways. First, compared with previous studies measuring time spent in criminogenic settings by questionnaire items about how many hours are spent in certain activities (Osgood et al., 1996; Haynie and Osgood, 2005; Anderson and Hughes, 2009; Maimon and Browning, 2010), we developed a comprehensive measure of time spent in criminogenic settings that included social as well as environmental characteristics of the settings where adolescents spent their time. The space-time budget data provided very detailed information about the social characteristics of the setting and the

systematic social observation data provided additional information about the level of physical disorder of the geographical location. The present study extends on the shift from large geographical units of analysis to small micro units that more closely approximate behaviour settings (Oberwittler and Wikström, 2009; Weisburd et al., 2012) by using small geographical places of 200 by 200 meters. Furthermore, instead of focusing only on the environment where people live, we examined the environments where people spend their time, going beyond the residential neighbourhood.

Second, as suggested by Stattin and Kerr (Kerr and Stattin, 2000; Stattin and Kerr, 2000; Kerr et al., 2010), parental monitoring was measured as the actual tracking by parents of the adolescents' whereabouts. In previous studies that examined some aspect of the time spent in criminogenic settings (*e.g.* spending time unsupervised with peers in an unstructured activity), parental monitoring is measured as what parents know about their children's whereabouts instead of what they do to obtain this knowledge (Flannery et al., 1999; Pettit et al., 1999; Osgood and Anderson, 2004; Wikström et al., 2012). As parental knowledge might reflect adolescent disclosure rather than parental monitoring, significant results of parental monitoring in previous studies may merely be due to a parent–adolescent relationship in which the adolescent is willing to inform his parents about his whereabouts (Collins and Steinberg, 2008). Furthermore, we examined three parenting dimensions simultaneously to determine their relative contribution to explaining (change in) the amount of time adolescents spend in criminogenic settings.

Third, as the SPAN contained measures of parental monitoring, parental limit-setting, the quality of the parent–adolescent relationship and time spent in criminogenic settings at two time points during adolescence, we were able to examine change over time. Adolescence is a period of changes which is challenging for both parents and adolescents (Smetana et al., 2006). The present study has shown that time spent in criminogenic settings and to some lesser extent parental monitoring, parental limit-setting and the quality of the parent–adolescent relationship are subject to change during adolescence. Longitudinal multilevel analysis made it possible to examine how changes in the parenting dimensions were related to changes in time spent to criminogenic settings, controlling for stable individual differences that might predict time spent in criminogenic settings. Although most longitudinal studies on adolescence examine the extent to which some predictors (*e.g.* parental monitoring) are related to an outcome measured at some later point (Mulvey, 2014), the present study examined how changes in the predictor variables were related to changes in the amount of time spent in criminogenic settings. In the current study, by examining both between-person and within-person differences, we provided a more nuanced understanding of how parental control and support are related to adolescent behaviour. The results of the present study have shown that parents continue to play an important role during adolescence as changes in parental limit-setting and in parental support are related to changes in the amount of time adolescents spend in criminogenic settings.

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3 How is parenting related to time spent in criminogenic settings? The role of self-control and delinquent attitudes

Although spending time in criminogenic settings is increasingly recognized as an explanation for adolescent delinquency, little is known about its determinants. The current study aims to examine the extent to which (change in) self-control and (change in) delinquent attitudes relate to (change in) time spent in criminogenic settings, and the extent to which they mediate the effects of (change in) parenting. Time spent in criminogenic settings was measured comprehensively, by including social and environmental characteristics of micro settings (200 by 200 meters). Multilevel structural equation models on two waves of panel data on 603 adolescents (aged 12-19) showed that self-control and delinquent attitudes contributed to between-person differences in time spent in criminogenic settings. Within-person increases in time spent in such settings were predicted by increased delinquent attitudes. For indirect effects, self-control and delinquent attitudes partially mediated between-person effects of parenting, while delinquent attitudes partially mediated both between- and within-person effects.

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Scholars have increasingly recognized that spending time in certain settings is linked to the involvement in delinquent behavior (*e.g.*, Osgood & Anderson, 2004; Osgood, Wilson, O'Mally, Bachman, & Johnston, 1996; Warr, 2005; Weerman, Bernasco, Bruinsma, & Pauwels, 2013; Wikström, Ceccato, Hardie, & Treiber, 2010; Wikström, Oberwittler, Treiber, & Hardie, 2012). Nevertheless, little is known about the determinants of spending time in criminogenic settings. The present study attempts to address this gap in the literature by examining the role of parenting, self-control, and delinquent attitudes as predictors of time spent in criminogenic settings.

Criminogenic settings

According to the routine activity perspective, opportunities that arise in routine everyday life are central in explaining crime rates (Cohen & Felson, 1979). Certain characteristics of settings can encourage or discourage involvement in delinquency. At the individual level, the degree of involvement in delinquency depends on the amount of time a person spends in criminogenic settings. A behavioral setting may be defined as “the environments they [individuals] can access with their senses” (Oberwittler & Wikström, 2009, p. 57). In accordance with this definition, a setting has to be geographically small. Two main components of settings that provide temptations, opportunities, and controls that make crime more or less attractive are social and environmental characteristics (Felson & Boba, 2010; Wikström et al., 2012). Social characteristics entail what individuals are doing and with whom, whereas the environmental component entails the characteristics of the settings where they are doing it (Simons, Burt, Barr, Lei, & Stewart, 2014).

With regards to social characteristics, for example, Weerman (2011) has shown that changes in time spent with peers was not related to delinquent behavior, but a measure of time spent with peers including publicly hanging out on the street was related to delinquent behavior. This indicates that *what* adolescents are doing with their peers and *where* they are doing it are two important factors that influence the likelihood of involvement in criminal behavior. Osgood et al. (1996) applied Cohen and Felson's (1979) routine activities perspective to explain involvement in delinquent behavior and theorized that spending unstructured time socializing with peers in the absence of adult authority increases the risk of offending. Although this perspective is not specifically aimed at explaining adolescent delinquency, unstructured socializing particularly applies during the period of adolescence. The idea is that the presence of peers makes criminal behavior easier to conduct and more rewarding, while the absence of adult supervision indicates low social control over the potential offender. Furthermore, unstructured socializing leaves time available for crime involvement as it provides little constraints for how time is spent (Osgood, Anderson, & Shaffer, 2005; Osgood et al., 1996).

Previous studies have shown that combinations of the presence of peers, absence of authority figures, and involvement in an unstructured activity are related to

adolescents' offending (Haynie & Osgood, 2005; Maimon & Browning, 2010; Osgood & Anderson, 2004; Osgood et al., 1996; Riley, 1987; Wikström et al., 2010; Wikström et al., 2012). In addition, Weerman et al. (2013) indicated that spending time with peers is only associated with offending when it occurs under at least two of the following three conditions: socializing, being in public, and being unsupervised. Furthermore, spending time with peers while socializing, being in public, and being unsupervised seems to be particularly conducive to crime involvement (Weerman et al., 2013).

In addition to the above mentioned social characteristics of settings, environmental characteristics are also expected to provide opportunities for crime. According to the broken windows theory (Kelling & Wilson, 1982), minor signs of public disorder lead to more disorder and criminal behavior (Skogan, 1990). The presence of signs of physical disorder (*e.g.*, litter, graffiti, deteriorated houses) may communicate to potential offenders a lack of social control over a particular area, which might reduce the perceived risk of being caught when committing a crime (Felson & Boba, 2010; Sampson & Raudenbush, 2004).

Following the ideas about the social (*i.e.*, unsupervised and unstructured socializing with peers) and environmental (*i.e.*, high levels of physical disorder) characteristics that provide opportunities for crime, we assume that time that is spent unstructured and unsupervised with peers in settings with high levels of physical disorder is particularly conducive for criminal behavior.

Parenting

Parents almost universally disapprove of delinquent behavior of their children. One primary way in which parents can prevent their children from getting into trouble is by attempting to restrict their exposure to opportunities for delinquency (Warr, 1993). Three key constructs of parenting that have emerged as critical for adolescent development are *parental monitoring*, *parental limit-setting*, and *the quality of the parent-adolescent relationship* (Dishion & Patterson, 2006; Smetana, Campione-Barr, & Metzger, 2006; Wright & Cullen, 2001). A recent study has shown that adolescents who perceive more parental monitoring, parental limit-setting, and a relationship of better quality with their parents spend less time in criminogenic settings (Janssen, Deković, & Bruinsma, 2014). However, during adolescence, parental influence on adolescent behavior becomes more indirect, as the amount of time youth spend away from home increases (Simons, Simons, Chen, Brody, & Lin, 2007). In the present study we examined the extent to which the associations between three parenting dimensions and time spent in criminogenic settings are mediated by the level of self-control and delinquent attitudes.

It has been theorized and empirically demonstrated that both self-control and delinquent attitudes are affected by parenting behavior (Grusec, 2011; Pardini, Loeber, & Stouthamer-Loeber, 2005; Pratt, Turner, & Piquero, 2004). Children who perceive a better relationship with their parents, who perceive monitoring by

their parents, and receive punishment for misbehavior are expected to develop self-control and internalize norms better than others (Gottfredson & Hirschi, 1990). Similarly, children who are securely attached to their parents will try to avoid parental disapproval or disappointment (Hirschi, 1969; Warr, 2005).

Self-control and delinquent attitudes

During adolescence, as a result of increasing mobility and freedom, young people expand their activity fields and spend a considerable amount of their leisure time outside their residential neighborhood (Simons et al., 2014; Wikström et al., 2012). They gain greater agency in selecting the settings where they spend their time and come into contact with a wider range of social contexts (Osgood et al., 2005; Wikström et al., 2012). In accordance with recent studies (Bernburg & Thorlindsson, 2001; Simons et al., 2014; Wikström et al., 2012), we assume that individuals develop personal characteristics and preferences that influence their participation in criminogenic settings.

We hypothesize that two prominent individual predictors of crime involvement, self-control and delinquent attitudes, also predict time spent in criminogenic settings. As adolescents with low *self-control* and *delinquent attitudes* are more prone to breaking rules, we expect that they are also more likely to spend time in settings where delinquent behavior is more likely to occur. Adolescents with lower levels of self-control are expected to spend more time in criminogenic settings as they have a greater tendency to seek risks and fail to consider the consequences that their behavior may bring than adolescents with higher levels of self-control (Gottfredson & Hirschi, 1990; Grasmick, Tittle, Bursik, & Arneklev, 1993). Delinquent attitudes refer to an individual's beliefs about whether delinquent acts constitute acceptable or unacceptable behavior (Pardini et al., 2005). Adolescents who consider delinquent behavior as acceptable are expected to spend more time in settings that offer opportunities to engage in delinquency (Simons et al., 2014). Adolescents with low self-control and delinquent attitudes tend to dislike settings that involve discipline, adult supervision, or other constraints on their behavior, and tend to like to participate in risky activities and environments (Gottfredson & Hirschi, 1990; Turanovic & Pratt, 2014).

The selection of individuals into settings is often viewed as a potential source of bias (Simons et al., 2014; Wikström et al., 2010; Wikström et al., 2012). If individuals with low self-control and delinquent attitudes select themselves into criminogenic settings, an effect of time spent in criminogenic settings on delinquent behavior might be confounded. However, in the present study the processes by which individuals come to take part in criminogenic settings, in accordance with previous work, are viewed as an important mechanism of substantive interest instead of as a potential source of bias (Bernburg & Thorlindsson, 2001; Sampson, 2012; Simons et al., 2014; Wikström et al., 2012).

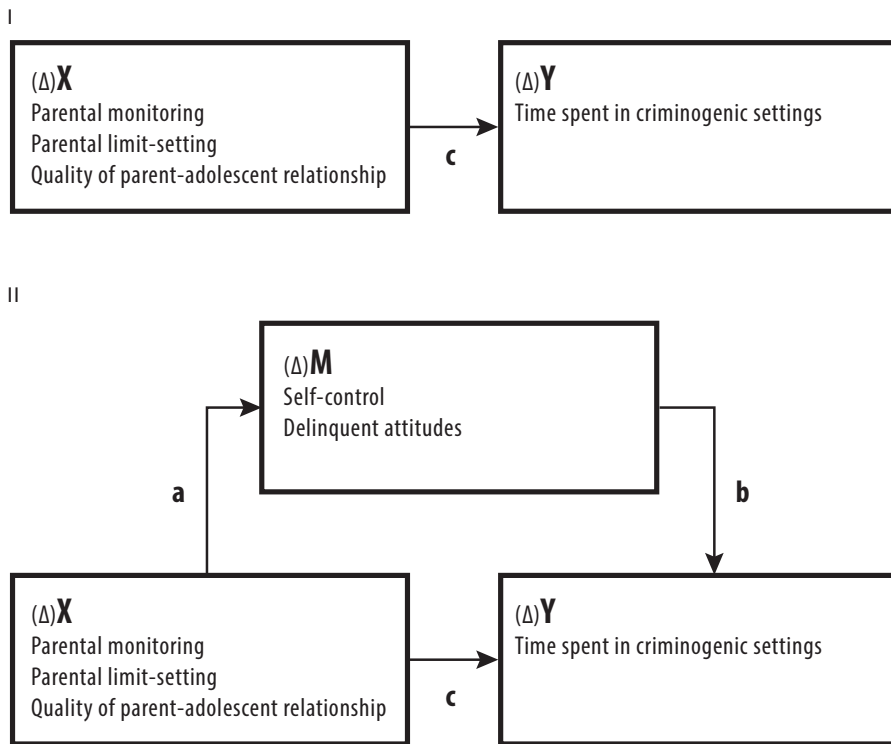


Figure 3.1 Conceptual model for (I) the effect of parenting on time spent in criminogenic settings and (II) for the mediation effect by self-control and delinquent attitudes.

Present study

It has been theorized and empirically demonstrated that time spent in certain settings is related to adolescents' offending. However, there is little research that focuses on the determinants of time spent in criminogenic settings. The present study attempts to fill this gap by examining (1) the extent to which (changes in) self-control and delinquent attitudes are related to (change in) time spent in criminogenic settings, and (2) the extent to which (changes in) self-control and delinquent attitudes can explain the associations between (change in) parenting and (change in) time spent in criminogenic settings. A conceptual model representing these relations is presented in Figure 3.1.

The current study contributes to the existing literature in several ways. First, whereas most previous studies used general questionnaires about how many hours per week of unsupervised time adolescents spend with peers away from home (Osgood & Anderson, 2004; Osgood et al., 2005; Osgood et al., 1996; Siennick & Osgood, 2012), we used space-time budget data to measure time spent specifically in criminogenic settings. This has the advantage of providing a comprehensive

measure of respondents' activities. Measuring respondents' activities using questionnaire items might be problematic as respondents may find it difficult to estimate how long they were engaged in an activity across the day (Hoeben, Bernasco, Weerman, Pauwels, & Van Halem, 2014). The space-time budget method, as used in the present study, provides detailed information about *where*, *when*, and *what* respondents were doing *with whom* for every hour during four days of the week before the interview (Wikström et al., 2010; Wikström et al., 2012). Second, unique to the space-time budget data, compared to questionnaire items asking 'how often' a person spends time in a setting, is that the geographical location for each hour is recorded. Therefore, these data can be geographically matched to data about characteristics of the settings, providing more detail on the setting where unstructured socializing occurs. To achieve this, the space-time budget data were combined with data from systematic social observation (Sampson & Raudenbush, 1999) about the level of physical disorder of the small geographical units.

Third, small geographical places of 200 by 200 meters (0.04 square kilometers) were used to measure the exact spatial setting. We followed the recent perspective in criminological literature studying small micro units instead of large geographical units of analysis such as neighborhoods (Weisburd, Bernasco, & Bruinsma, 2009; Weisburd, Groff, & Yang, 2012). These small units of analysis are a better approximation of behavioral settings than larger units as they are more likely to be homogeneous in physical and social characteristics (Oberwittler & Wikström, 2009).

Fourth, studies rarely examine multiple parenting dimensions simultaneously to determine their relative importance in explaining adolescent delinquency (Simons et al., 2007). The present study included three key constructs of parenting (*i.e.*, parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship) that have emerged as critical for adolescent development to examine their relative contribution to explaining the amount of time spent in criminogenic settings. Finally, it is important to take change into account when examining behavior during critical developmental phases, such as adolescence (Wikström & Treiber, 2009). Using two waves of panel data from the Study of Peers, Activities and Neighborhoods (SPAN), we were able to examine change over time.

Method

Sample

The Study of Peers, Activities and Neighborhoods (SPAN) is a longitudinal study consisting of two waves of data collection, conducted by the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR). The first wave of data collection was conducted in 2008/2009 (T1) and the second wave was conducted two years later, in 2010/2011 (T2) among adolescents (11-17 years of age at T1) in The Hague and its neighboring suburbs in the Netherlands. Forty schools for secondary education were

approached in the first wave, with ten schools agreeing to participate in the study. Comparisons of the approached schools with the schools that agreed to participate do not show differences in school size or geographical location. However, the schools that participated were more often schools with vocational training (lower secondary education) or with pre-university (higher secondary education), and relatively fewer schools with higher general secondary education (middle category; see Bernasco, Ruiters, Bruinsma, Pauwels, & Weerman, 2013).

In total, 615 adolescents (52% boys) participated fully in both waves of the study and completed both the questionnaire and the space-time budget interview; the follow-up response rate at T2 was 73%. Those who exited the study were more often male ($t=2.383$, $p=.018$), older ($t=-8.099$, $p=.000$), and scored lower on parental monitoring ($t=4.608$, $p=.000$) and parental limit-setting ($t=3.686$, $p=.000$) than those that remained in the study. No significant differences were found for the quality of the parent-adolescent relationship ($t=1.884$, $p=.060$), or the amount of time adolescents spent in criminogenic settings ($t=-1.659$, $p=.098$). The sample included a relatively high proportion of ethnic minority adolescents (47%), and a relatively high proportion of adolescents from lower forms of secondary education. (see for more details Bernasco et al., 2013; Weerman et al., 2013).

The systematic social observations were only carried out in The Hague and its suburbs. Therefore, the level of disorder could not be determined for the hours spent outside this area. To retain comparability across the respondents, only those with complete information were included in the analyses. This resulted in a final sample of 603 respondents, where the amount of time spent in criminogenic settings was known for at least one of the two time points. Comparing the 12 respondents who were excluded from the final sample to the 603 respondents who remained in the sample indicates that these 12 respondents perceived significantly less parental monitoring ($t=3.941$, $p=.000$), less parental control ($t=2.370$, $p=.018$), and had more delinquent attitudes ($t=-2.729$, $p=.007$).

Dependent variable

Two research instruments from the Study of Peers, Activities and Neighborhoods (SPAN) were used to measure time spent in criminogenic settings: a *space-time budget interview*, and *systematic social observation*. The *space-time budget interview* is a structured personal interview, which was conducted individually and face to face with the respondents. The instrument was originally developed by Wikström and Butterworth (2006) in the Peterborough Youth Study and refined in its successor, the Peterborough Adolescent Delinquency Study (PADS+). During the interview, the activities of the adolescent during each hour of four recent days (always including the previous Friday and Saturday) were recorded, including the nature of the main activity (e.g., sports, learning), the function of the place (e.g., soccer field, school), persons present in the setting (e.g., teacher, parents), and the geographical location (see also Bernasco et al., 2013).

To record the geographical locations of the respondent, detailed colored maps of The Hague and its neighboring suburbs were used, on which the respondents indicated their geographical location during each hour. The maps were overlaid with a numbered grid of 200 by 200 meters (0.04 square kilometers), to assist respondents in communicating their whereabouts with greater precision.

Additionally, to assess the level of the physical disorder of the settings, *systematic social observation* was carried out during the first half of 2012. The same grid of 200 by 200 meters that overlaid the maps of The Hague on which the respondents indicated their locations, was used to select the locations for the systematic social observation. With the address closest to the centroid of the grid cell as starting point, a street segment of 100 meters in each grid cell (200 by 200 m).

Physical disorder was measured by observers trained at the NSCR using a checklist based on the instrument used by Raudenbush and Sampson (1999) consisting of 13 items (e.g., “How much trash or broken glass is on the street or sidewalks?”) using a three-point scale from 0 (*none*) to 2 (*more than one*). Internal consistency was moderate with a Cronbach’s alpha of .62. The scores on physical disorder ranged from 9 to 20.5 ($M=13.67$; $SD=2.12$). An area was indicated as highly disordered if it belonged to the top 25% of locations with the highest scores (> 15) on physical disorder.

The research area consisted of 4561 grid cells, of which a sample of 1422 grid cells was selected for observation. We used the geostatistical method of kriging to interpolate the level of physical disorder at the unobserved locations. The level of physical disorder at an unmeasured location is estimated using observed values at surrounding locations weighted according to the spatial covariance structure in the data and the distance between points (Bivand, 2008).

Time spent in criminogenic settings was measured by the total number of hours (of the four days covered by the space-time budget interviews) spent in unstructured socializing with peers, without supervision in settings of high disorder. For each respondent, we summed the number of hours that met all the following conditions: time was spent with at least one peer, in the absence of authority figures, included socializing or ‘hanging around’ as the main activity, and was spent outside a residence in a setting with high physical disorder.

Independent variables

The *self-report questionnaire* from the Study of Peers, Activities and Neighborhoods (SPAN) was used to measure perceived parenting, self-control, and delinquent attitudes. The questionnaire was administered individually in groups of four adolescents, supervised by a research assistant during a school hour of approximately 45 to 50 minutes.

Parental monitoring was measured by a summary construct based on the scale developed by Kerr and Stattin (2000; Stattin & Kerr, 2000) consisting of five items asking whether the adolescent has to inform his parents about his whereabouts (e.g.,

“If I go out, my parents want me to tell them where I go, with whom and what I’m going to do”) using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s alpha was .77 at T1 and .82 at T2.

Parental limit-setting is a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of four items that reflect the extent to which parents intervene in rule-breaking behavior (e.g., “If you had been beating up or threatening somebody at school, your parents would tell you off or punish you”) using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s alpha was .62 at T1 and .58 at T2.

The *quality of the parent-adolescent relationship* was based on the scale developed by Wikström and Butterworth (2006) and measured by seven items (e.g., “Do you talk to your parents when you have a problem or feel sad about something?”) using a four-point scale from 0 (*never*) to 3 (*every day*). Cronbach’s alpha was .68 at T1 and .70 at T2.

Mediators

Self-control was a summary construct based on the scale developed by Grasmick et al. (1993) and consist of 10 items asking about the respondent’s general behavior (e.g., “I sometimes find it exciting to do things that may be dangerous”) using a five-point scale from 0 (*totally agree*) to 4 (*totally disagree*). Cronbach’s alpha was .75 at T1 and .72 at T2.

Delinquent attitudes indicated the adolescent’s beliefs about the acceptability of several delinquent acts. The construct was based on the scale that was developed by Loeber, Farrington, Stouthamer-Loeber, and Kammen (1998) and consisted of 16 items asking the respondent about how wrong it would be for someone his age to engage in the behavior (e.g., “Ride a bike through red light”) using a four-point scale from 0 (*not wrong at all*) to 3 (*very wrong*). The scale was reversed so that a higher score indicated more delinquent attitudes. Cronbach’s alpha was .91 at T1 and .88 at T2.

Control variables

Following the definition of Statistics Netherlands (2014), ethnicity was measured by two dummy variables with Dutch origin as reference category. Non-Western origin indicates that at least one parent is born in Africa, South-America, Asia (excluding Indonesia and Japan) or Turkey. Western origin indicates that at least one parent is born in Europe (excluding Turkey), North America, Oceania, Indonesia or Japan. Gender is measured with a dummy variable with girls as reference category, and age at T1 is measured in years. In addition, we included a dummy variable that indicated whether the respondent was living in an area of high disorder, as for some adolescents, settings with high physical disorder may be all around their homes, whereas others have to travel some distance. In total 30.5% of the respondents lived in an area with high physical disorder.

Analytical approach

As a first step, in order to examine how the assessed variables in general changed over time, we reported two different types of stability (Forehand & Jones, 2002; Loeber et al., 2000). Absolute stability is examined by comparing mean values across both waves. Relative stability was examined by stability coefficients which represent correlations over time. Second, to examine our research questions, we applied multilevel structural equation modeling in Mplus (Version 7, Muthén & Muthén, 1998-2012). The multilevel structure consists of time (level 1) nested in persons (level 2). Because the dependent variable of time spent in criminogenic settings was a highly right skewed count variable, negative binomial models were estimated using maximum likelihood estimation with robust standard errors (Hox, Maas, & Brinkhuis, 2010; Yuan & Bentler, 1998). To estimate the indirect effects, we followed the approach of Hayes (2009), which goes beyond the approach of Baron and Kenny (1986) by providing statistical tests of mediation. The indirect effects are estimated in Mplus by multiplying the coefficients of path *a* and path *b*. The standard errors of the indirect effects are estimated using the multivariate delta method (Bollen, 1987).

For each independent variable, two variables were constructed: a between-person variable and a within-person variable. The between-person variables were computed by averaging the scores across both waves for each respondent (Hoffman & Stawski, 2009; Snijders & Bosker, 1999). The within-person variables specify the deviation from the score at T1 (Snijders & Bosker, 1999). Thus, the level 1 model addressed within-person change in the amount of time spent in criminogenic settings, whereas the level 2 model explains time-stable differences between individuals.

Three separate multilevel path models were analyzed. In Model 1 we examined the extent to which (change in) parenting predicts (change in) time spent in criminogenic settings (path *c* in Figure 3.1). To disentangle the individual mediating effects of self-control and delinquent attitudes, we estimated two separate mediation models. In Model 2 we examined the extent to which (change in) self-control mediated the relations between (change in) parenting and (change in) time spent in criminogenic settings. Finally, in Model 3 we examined the extent to which (change in) delinquent attitudes mediated the relations between (change in) parenting and (change in) time spent in criminogenic settings.

The incidence rate ratio (IRR) was reported for the negative binomial analyses with time spent in criminogenic settings as the outcome variable (path *b*, *c'* and *c*). An IRR is the exponentiated value of the coefficient that can be interpreted as follows: An IRR of .95 indicates that for every one unit increase in the independent variable, the expected count of the dependent variable changes by .95 (Hilbe, 2011).

Table 3.1 Descriptives and Spearman's Correlations at T1 and T2

	Parental monitoring	Parental limit-setting	Quality of relationship	Self-control	Delinquent attitudes	Time spent in crim. settings	M	SD
Parental monitoring	.440	.438	.323	.232	-.465	-.223	17.35	4.05
Parental limit-setting	.433	.458	.223	.219	-.353	-.192	16.86	2.66
Quality of relationship	.179	.193	.557	.286	-.372	-.111	23.05	3.30
Self-control	.183	.231	.310	.548	-.281	-.209	29.74	6.35
Delinquent attitudes	-.358	-.355	-.274	-.303	.567	.215	30.06	9.06
Time spent in crim. settings	-.232	-.251	-.186	-.142	.234	.254	.73	1.93
M	16.36	16.61	22.76	30.34	35.06	1.22	–	–
SD	4.56	2.25	3.42	5.76	8.17	2.43	–	–

Note: The values above the diagonal represent correlations and descriptive statistics at T1, the values below the diagonal represent correlations and descriptive statistics at T2, the values on the diagonal represent stability coefficients. All correlations are significant at $p < .01$.

Results

Descriptive statistics

A large proportion of the respondents (56%) did not spend any time in a criminogenic setting in either wave of data collection. At T1, respondents spent 0.2 hours on average per day in criminogenic settings, with a range from 0 to 5.5 hours. At T2, respondents spent .3 hours on average per day in criminogenic settings was 0.3 (which is a significant increase from T1 $t = -3.664$, $p < .001$), with a range from 0 to 5 hours per day.

Means, standard deviations, stability coefficients and Spearman's rank correlations between all variables are reported in Table 3.1. The stability coefficients, which indicate relative stability, on the diagonal line in Table 3.1 indicate that on average, parenting, the level of self-control, and delinquent attitudes were relatively stable over time, ranging from .44 to .57. The stability coefficient of time spent in criminogenic settings was lower (.25). A comparison of mean levels of the assessed variables at both waves, to examine absolute stability, indicated that on average, parental monitoring decreased ($t = 3.866$, $p < .001$) and that delinquent attitudes ($t = 7.771$, $p < .001$) increased over time. In general, there were no significant differences over time in parental limit-setting ($t = 0.484$, $p = .629$), the quality of the parent-adolescent relationship ($t = 1.464$, $p = .143$), and self-control ($t = -1.662$, $p = .097$).

Parenting and time spent in criminogenic settings

Results of the multilevel path models are shown in Table 3.2. Model 1 corresponds with path *c* in Figure 3.1 and includes the parenting and control variables as predictors of the amount of time spent in criminogenic settings. The between-person results showed that adolescents who report more parental monitoring ($IRR=0.90$) and more parental limit-setting ($IRR=0.80$), and adolescents who had a better quality relationship with their parents ($IRR=0.94$) spent less time in criminogenic settings. Older respondents and respondents who lived in an area with higher levels of physical disorder spent more time in criminogenic settings. The within-person estimates indicated that decreases in parental limit-setting ($IRR=0.90$) and in the quality of the parent-adolescent relationship ($IRR=0.91$) were related to increases in the amount of time spent in criminogenic settings. Changes in parental monitoring were not related to changes in the amount of time spent in criminogenic settings.

Model 2 included self-control as a mediator, whereas Model 3 included delinquent attitudes as a mediator of the associations between parenting and time spent in criminogenic settings. In both models, the remaining effects of parenting are very similar. The between- and within-person estimates of the parenting variables slightly changed in magnitude, but remained unchanged in direction and significance (corresponding with path *c'* in Figure 3.1).

Self-control as mediator

The between-person estimates representing path *a* in Figure 3.1 reveal that all parenting dimensions were related to self-control. Adolescents who reported more parental monitoring, more parental limit-setting and a relationship of higher quality with their parents also reported higher levels of self-control. The within-person estimates showed that decreases in parental monitoring, parental limit-setting and in the quality of the parent-adolescent relationship were related to decreases in self-control.

Adolescents with higher levels of self-control spent less time in criminogenic settings ($IRR=0.95$) than those with lower levels of self-control, which corresponds with path *b* in Figure 3.1. However, the within-person estimates showed that change in self-control was not related to change in the amount of time spent in criminogenic settings.

As a final step, we estimated the indirect paths (path *axb* in Figure 3.1) from parenting to time spent in criminogenic settings by self-control. The between-person results showed that self-control mediates the relations between parenting and time spent in criminogenic settings. The within-person indirect effects were not statistically significant.

Delinquent attitudes as mediator

All parenting dimensions were related to delinquent attitudes (path *a* in Figure 3.1). Adolescents who reported less parental monitoring, less parental limit-setting

Table 3.2 Multilevel Structural Equation Models predicting time spent in criminogenic settings (N=603)

	Model 1		Model 2 M=Self-control		Model 3 M=Delinquent attitudes	
	Between path c	Within	Between path c'	Within	Between path c'	Within
<i>Direct effects</i>						
Parental monitoring → Y	-.102*** (.028)	-.018 (.021)	-.094*** (.028)	-.012 (.021)	-.078*** (.025)	-.018 (.018)
Parental limit-setting → Y	-.112** (.040)	-.095** (.037)	-.094*** (.038)	-.098** (.037)	-.060 (.037)	-.051 (.032)
Quality of relationship → Y	-.057* (.027)	-.093** (.032)	-.044 (.027)	-.086** (.032)	-.025 (.026)	-.073** (.026)
			path a		path a	
Parental monitoring → M	–	–	.191** (.071)	.018 (.057)	-.703*** (.090)	-.266*** (.073)
Parental limit-setting → M	–	–	.315** (.116)	.223* (.100)	-.500** (.160)	-.721*** (.134)
Quality of relationship → M	–	–	.526*** (.071)	.358*** (.082)	-.523*** (.113)	-.460*** (.114)
			path b		path b	
M → Y	–	–	-.047** (.016)	.011 (.016)	-.058*** (.012)	-.043** (.013)
<i>Indirect effects</i>						
			path axb		path axb	
Parental monitoring → M → Y	–	–	-.009* (.004)	.000 (.001)	-.040*** (.010)	-.011* (.005)
Parental limit-setting → M → Y	–	–	-.015* (.007)	.002 (.004)	-.029** (.011)	-.031** (.010)
Quality of relationship → M → Y	–	–	-.025** (.009)	.004 (.006)	-.030*** (.008)	-.020* (.008)
<i>Control variables</i>						
Gender (ref.=girl)	-.116 (.162)	–	-.201 (.160)	–	-.250 (.152)	–
Age T1	.288*** (.050)	–	.300*** (.048)	–	.292** (.049)	–
Ethnicity (ref.=Dutch) Non-western	.343 (.201)	–	.284 (.197)	–	.513** (.190)	–
Western	.014 (.275)	–	-.038 (.261)	–	-.059 (.242)	–
Residential area high disorder	.554** (.206)	–	.526** (.199)	–	.758*** (.202)	–

Note: Unstandardized coefficients. All coefficients of the direct paths to time spent in criminogenic settings represent changes in the expected log count. Robust standard errors in parentheses. Y= time spent in criminogenic settings. In Model 2 M= self-control. In Model 3 M= delinquent attitudes. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

and a relationship with their parents of lower quality, reported to be more tolerant toward delinquent behavior. Furthermore, the within-person effects demonstrated that change in parenting is related to change in delinquent attitudes. Decreases in parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship over time were related to increases in tolerance toward delinquent behavior.

Adolescents who were more tolerant toward delinquent behavior spent more time in criminogenic settings ($IRR=0.94$) compared to adolescents who were less tolerant toward delinquent behavior, which corresponds with path b in Figure 3.1. Furthermore, change in delinquent attitudes over time was related to change in the amount of time spent in criminogenic settings ($IRR=0.96$). Adolescents who became more tolerant toward delinquent behavior were spending more time in criminogenic settings compared to two years earlier.

The indirect effects were estimated to examine mediation effects of parenting on time spent in criminogenic settings by delinquent attitudes (path axb in Figure 3.1). Both the between-person and within-person indirect effects were statistically significant ($p \leq .05$). This means that the associations between (change in) parenting and (change in) time spent in criminogenic settings can be partly explained by (change in) tolerance toward delinquent behavior.

In all models, age was related to time spent in criminogenic settings. Older respondents spent more time in criminogenic settings than younger respondents. In Model 3, ethnicity has a statistically significant effect, indicating that respondents from non-Western origin spend more time in criminogenic settings compared to adolescents from Western or Dutch origin. Gender was not related to time spent in criminogenic settings, which is in line with previous research (Wikström et al., 2012). Living in a setting with high levels of physical disorder was related to spending more time in criminogenic settings.

Discussion and conclusion

In the current study we examined the extent to which self-control and delinquent attitudes were related to time adolescents spend in criminogenic settings, and the extent to which self-control and delinquent attitudes mediated the associations between parenting (*i.e.*, parental monitoring, parental limit-setting and the quality of the parent-adolescent relationship) and the amount of time adolescents spend in criminogenic settings. It is important to understand the factors that increase the chances of spending time in criminogenic settings to reduce the risk of involvement in delinquency associated with this activity.

First, the findings of the present study showed that self-control and delinquent attitudes, two important individual predictors of crime, also predict the amount of time spent in criminogenic settings. Adolescents with lower levels of self-control

and more delinquent attitudes have a greater tendency to spend time in criminogenic settings. Furthermore, increasing delinquent attitudes over time were related to increases in the amount of time spent in criminogenic settings. These findings are in line with previous work that theoretically and empirically demonstrated that individual characteristics guide individuals into criminogenic settings (Bernburg & Thorlindsson, 2001; Sampson, 2012; Simons et al., 2014; Wikström et al., 2012). Decreases in self-control, however, were not related to increases in time spent in criminogenic settings. These findings only partially support our expectation that individual characteristics (*i.e.*, self-control and delinquent attitudes) are associated with the amount of time spent in criminogenic settings.

Second, self-control and delinquent attitudes also partially mediated the associations between parenting and time spent in criminogenic settings. Adolescents who perceived positive parental control and a warm and supportive relationship with their parents have a higher level of self-control and beliefs that are less tolerant of delinquent behavior (Pardini et al., 2005). If parents discuss the impact of their children's behavior on others, children will internalize their prosocial norms (Pardini et al., 2005). Furthermore, if parents reduce demonstrating their disapproval of misbehavior, tolerance toward delinquent behavior increases. These findings are consistent with studies on delinquency that found that influences of parenting were partially indirect through attitudes, beliefs, and emotions that parents have fostered in their children (Simons et al., 2007; Unnever, Cullen, & Agnew, 2006).

Parenting was also directly related to the amount of time adolescents spent in criminogenic settings. Next to their indirect effects, parental monitoring and parental limit-setting were directly negatively related to the amount of time adolescents spent in criminogenic settings. In addition, change in the quality of the parent-adolescent relationship was directly related to change in the amount of time spent in criminogenic settings. If conflicts at home increase, adolescents might prefer to spend time away from home and parents (Siennick & Osgood, 2012). Furthermore, changes over time in parental monitoring and in parental limit-setting were directly related to change in the amount of time spent in criminogenic settings. These findings indicate that providing rules and consequences remains important in order to restrict the amount of time adolescents spend in criminogenic settings.

As with any study, the present study has some limitations that need to be addressed. First, respondents who refused to participate in the second wave were more often male, older, less monitored by their parents and perceived less parental limit-setting. We have no reason to believe that this somewhat selective drop-out biased our results, other than providing relative conservative tests of the associations due to less variance in the assessed variables, and thus fewer chances to find significant associations. Second, it is uncertain whether the amount of time the respondents spent in criminogenic settings during the four days covered by the space-time budget interview are representative for the average amount of time they spent in criminogenic settings. However, these space-time budget data provide

much more detailed information than questionnaire items used in previous studies (Osgood & Anderson, 2004; Osgood et al., 2005; Osgood et al., 1996; Siennick & Osgood, 2012). Third, parenting is a bidirectional and reciprocal process (Rubin, 2001). Although adolescents react to the behavior of their parents, parents also respond to the behavior of the adolescent (Gault-Sherman, 2012). The analyses in the present study did not take into account that the amount of time adolescents spend in criminogenic settings may affect the type of parenting they receive rather than the other way around. Fourth, when we consider the within-person association between delinquent attitudes and time spent in criminogenic settings, it cannot be ruled out that increased time in criminogenic settings may have affected adolescents' delinquent attitudes.

Despite these limitations, the present study contributed to the literature in several ways. Although time spent in criminogenic settings is increasingly being recognized as an important cause of adolescent delinquency, little is known about its determinants. The present study addressed this gap in the literature by examining the extent to which parenting strategies could possibly prevent adolescents from spending time in criminogenic settings, directly and indirectly by affecting self-control and delinquent attitudes. Identifying and understanding the processes by which people come to take part in criminogenic settings are of prime criminological interest (Wikström et al., 2012). We showed that not only parenting is directly related to the time adolescents spend in criminogenic settings, but that self-control and delinquent attitudes are also related to the amount of time spent in criminogenic settings, and that these factors partially explain the effects of parenting. This is important information considering the fact that the period of adolescence involves changes in the parent-child interactions (Kreppner, 2001; Mulvey, 2014; Steinberg & Silk, 2002). Adolescents generally strive for more freedom and independence from their parents, which makes it more challenging for parents to control and monitor the adolescent's behavior and activities (Steinberg & Silk, 2002). We have shown in the present study that the role parents play remains of importance during adolescence. They may function as access barriers by directly restricting adolescents from spending time in criminogenic settings on the one hand, but also indirectly by fostering individual characteristics that prevent them from spending time in criminogenic settings on the other hand.

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4 How is parenting related to adolescent delinquency? The role of self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings

We examined how parenting is directly and indirectly associated with adolescent delinquency. We derived four possible mechanisms from major criminological theories and examined their relative contribution to explaining the relationship between parenting and delinquency: self-control theory (*i.e.* self-control), differential association theory (*i.e.* delinquent attitudes and peer delinquency) and routine activity theory (*i.e.* time spent in criminogenic settings). In addition, we examined how *changes* in different aspects of parenting during adolescence were directly and indirectly related to *changes* in delinquency. Results of multilevel structural equation modeling on two waves of panel data on 603 adolescents indicated that parenting was indirectly related to delinquency through self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings. However, only when examined together, these variables derived from major criminological theories almost fully mediate the effects of parenting. Furthermore, changes in parenting during adolescence were indirectly related to changes.

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A large body of research has demonstrated that parenting is related to adolescent delinquency (for a meta analytical overview see Hoeve et al., 2009). In the literature, however, the attention has been given to the mechanisms that might explain this relationship. Parents might be indirectly protective for involvement in delinquent behavior. In the present study we examined the extent to which the most important mechanisms, stemming from three major criminological theoretical approaches (*i.e.* self-control theory, differential association theory and routine activity theory) uniquely contribute to explaining the associations between parenting and adolescent offending.

According to self-control theory (Gottfredson and Hirschi, 1990), *self-control* is the key cause of crime involvement. People with lower levels of self-control are more impulsive, tend to engage in risk-taking activities, and prefer easy or immediate gratifications of desires compared to people with higher levels of self-control (Gottfredson and Hirschi, 1990; Grasmick et al., 1993). The theory states that low levels of self-control imply the inability to restrain from delinquent behavior when temptations or provocations to engage in criminal behavior are present.

Whereas Gottfredson and Hirschi (1990) stressed the importance of self-control in explaining engagement in delinquent behavior, differential association theory (Sutherland, 1947) put forward that delinquent attitudes and peer delinquency are the most important factors related to delinquent behavior. *Delinquent attitudes* refer to an individual's views about whether delinquent acts are acceptable or unacceptable. The more an individual holds attitudes that approve of delinquent behavior, the more likely he or she is to engage in delinquent behavior.

Although differential association is not limited to interaction with peers, peer associations are a major part of the differential association process, especially during adolescence. Differential association refers to an individual's exposure to attitudes that are more or less favorable of delinquent behavior and implies that these attitudes are learned in interaction with others (Sutherland, 1947). *Delinquent peers* are expected to be an important source of adapting delinquent attitudes, and therefore related to an individual's delinquent behavior.

An alternative explanation for engagement in delinquency is offered by the routine activity theory (Cohen and Felson, 1979). According to the routine activity perspective, opportunities that arise in routine everyday life are central in explaining criminal behavior. Certain settings provide opportunities for delinquent behavior, and the degree of involvement in delinquent behavior depends on the amount of *time a person spends in these criminogenic settings*. Social and environmental characteristics of settings provide temptations, opportunities and controls that make delinquent behavior more or less attractive (Felson and Boba, 2010; Wikström et al., 2012). Osgood et al. (1996) applied the routine activity perspective to explaining individual offending by time spent unsupervised with peers in unstructured activities. The presence of peers is believed to make criminal behavior more rewarding, and the absence of adult supervision indicates low social control over

the potential offender. Furthermore, unstructured socializing is suggested to leave time available for delinquent behavior as it provides little constraints on how time is spent (Osgood et al., 1996).

In addition to these social characteristics of settings, environmental characteristics are also expected to provide opportunities for crime. The presence of signs of disorder (e.g. litter, graffiti, deteriorated houses) may communicate lack of control over an area, which might reduce the perceived risk of being caught when committing a crime (Felson and Boba, 2010; Sampson and Raudenbush, 2004). Keizer et al. (2008) offer another explanation why settings with higher levels of disorder are criminogenic. In settings where norms and rules are violated, the concern for appropriate behavior weakens, which results in more violations of norms and rules.

Whereas the theoretical perspectives focus on different factors as most important direct cause of delinquency, self-control theory and differential association theory acknowledge parenting as important indirect cause. The role of parenting is, however, not directly addressed by the routine activity perspective. According to Gottfredson and Hirschi (1990), the development of self-control is a result of parental socialization during early childhood. More specifically, parental monitoring, discipline and support are necessary to foster self-control in young children. It has been demonstrated that the relation between parenting and delinquency is partially mediated by the level of self-control (Vazsonyi and Belliston, 2007; Hay, 2001; Perrone et al., 2004; Unnever et al., 2006; Burt et al., 2006).

Similarly, the differential association perspective also contends that parental monitoring and providing consequences for misbehavior are important indirect causes of delinquency. Individuals who receive less parental monitoring and control are more likely to acquire delinquent attitudes and engage with delinquent peers, and are therefore more likely to engage in delinquent behavior. Previous research indeed indicated that adolescents who received more effective parenting are less likely to have delinquent attitudes and delinquent peers (Warr, 2005; Knoester et al., 2006; Ragan et al., 2014; Pardini et al., 2005). By supervising and monitoring the child, parents may intentionally or unintentionally encourage the child to associate less with delinquent peers. Adolescents with a high quality relationship with their parents may be more likely to seek out friends whom their parents will like to avoid parental disapproval or disappointment (Knoester et al., 2006; Warr, 2005). In addition, previous work suggests that parenting has a possible spillover effect, meaning that parents do not only affect the behavior of their children but possibly also the behavior of their children's peers (Shakya et al., 2012).

Although the role of parents is not directly elaborated in the routine activity perspective, parents are expected to restrict their children from spending time in criminogenic settings in order to keep them out of trouble (Felson and Boba, 2010). Osgood and Anderson (2004) have shown that parental monitoring is negatively related to unstructured socializing with peers. A recent study has shown that

adolescents who have a relationship of high quality with their parents and who perceive more parental monitoring and limit-setting spend less time in criminogenic settings (Janssen et al., 2014).

The first aim of the present study is to determine the relative contribution of the proposed mediators (self-control, delinquent attitudes, delinquent peers, and time spent in criminogenic settings) to explaining the relation between parenting and adolescent delinquency. Previous research has shown that the proposed mediators of the relations between parenting and adolescent delinquent behavior are interrelated. For example, adolescents with delinquent peers are more likely to have delinquent attitudes and to seek out situations to gain opportunities to engage in delinquency (Bernburg and Thorlindsson, 2001; Pardini et al., 2005). Because of this interrelatedness, it is important to examine these mediators simultaneously in order to determine their relative contribution to explaining the relationship between parenting and adolescent delinquency. We examine how various dimensions of parenting (*i.e.* parental monitoring, Parental limit-setting, and the quality of the parent-adolescent relationship) are related to self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, and how these factors are in turn related to involvement in delinquency. We use the most important mechanisms as derived from self-control theory, differential association theory and routine activity theory in order to test whether these mechanism are interrelated and uniquely contribute to explaining how parenting is related to adolescent delinquency.

The second aim of the present study is to examine in addition to differences between individuals, the extent to which changes over time in self-control, delinquent attitudes, peer delinquency, and in time spent in criminogenic settings can account for the relations between changes in parenting and changes in delinquency over time. This is of specific importance when considering the period of adolescence, which is characterized by many changes at the individual and contextual level (Steinberg and Silk, 2002; Smetana et al., 2006; Mulvey, 2014). Naturally, adolescents strive for more freedom and independence from their parents. Peers become more important and adolescents spend more time away from home and their parents (Smetana et al., 2006). The parent-child relationship changes during adolescence as parents have to learn to allow more freedom and independence and at the same time continue to be supportive (Galambos et al., 2003; Simons et al., 2007). Furthermore, it has been demonstrated that self-control might be not as stable as Gottfredson and Hirschi (1990) predicted (Burt et al., 2014) and found that changes in levels of self-control could be explained by changes in social factors, including parenting (Burt et al., 2006). During adolescence individuals develop increasingly tolerant views about delinquency (Pardini et al., 2005). Association with delinquent peers is also likely to change over time. In general, exposure to delinquent peers peaks in adolescence and decreases when entering adulthood (Warr, 1993). Osgood et al. (1996) have shown that within-individual changes in spending time unsupervised and unstructured with peers were related to changes in delinquency.

Present study

In the present study we examined (I) the extent to which four components derived from different criminological theories mediate the associations between parenting and adolescent delinquency (between-person) and, (II) the extent to which changes in these factors over time mediate the associations between changes in parenting and changes in delinquency over time (within-person). We expect to find that all concepts derived from competing theoretical frameworks contribute to explaining the relations between parenting and adolescent delinquency.

In the present study we attempt to contribute to the theoretical understanding of the relationship between parenting and delinquency by examining the most important mechanism from three major criminological theories simultaneously. Although a fairly large number of studies have already examined various mediating mechanisms, including self-control, delinquent attitudes and peer delinquency, time spent in criminogenic settings is not examined previously as a mediator between parenting and delinquency. The present study focuses on the relative contribution of the proposed mechanisms to explaining the relationship between parenting and delinquency, as we know from previous studies that the mediators are interrelated. By examining the mechanism simultaneously, we can determine whether they all explain a portion of the association between parenting and delinquency.

In addition, we advance our theoretical understanding of the relation between parenting and delinquency by examining the extent to which the mechanisms derived from self-control theory, differential association theory, and routine activity theory are able to explain the effects of over time changes in parenting on changes in delinquency. Instead of using a static approach, the present study applies a dynamic approach in which change is possible. As the parent-child relationship is likely to change during adolescence (Galambos et al., 2003; Simons et al., 2007), it is important to examine the extent to which these mechanisms can explain how these changes in parenting are related to changes in delinquency.

In addition to these theoretical contributions, the present study makes methodological contributions as well. First, related to the above-mentioned theoretical contribution, we examined both between-person differences as well as within-person differences. Therefor we are able to examine how differences between adolescents are related to differences in delinquency, but also how changes in parenting over time is related to changes in delinquency over time. Whereas a majority of previous longitudinal studies usually examined how risk factors at T1 are related to delinquency at T2, examining how within-person over time changes in risk factors are related to over time changes in delinquency could produce a more refined picture (Mulvey, 2014).

Second, we examined three parenting dimensions simultaneously to determine their relative contribution to explaining adolescent delinquency (Simons et al., 2007). In general, three parenting dimensions can be derived from the literature as important for explaining adolescent delinquency: *parental monitoring* which entails

efforts of parents to track their children's behavior, *Parental limit-setting* which involves setting rules and providing consequences for misbehavior, and the *quality of the parent-adolescent relationship* (Smetana et al., 2006; Wright and Cullen, 2001).

Third, most previous studies used questionnaires about how many hours per week in general adolescents spent with peers away from home (Siennick and Osgood, 2012; Osgood et al., 1996; Osgood et al., 2005; Osgood and Anderson, 2004). In the current study, time spent in criminogenic settings is measured with greater precision and more detailed using space-time budget data that recorded hour by hour where respondents were, what they were doing, and with whom they were during a period of four days. Because the geographical small-scale location of each hour was known, we were able to enrich these space-time budget data with information about the level of physical disorder, which was conducted using systematic social observation (Sampson and Raudenbush, 1999). We used small geographical units of analysis of 200 by 200 meters (0.04 square kilometers) as they more closely approximate behavior settings, and are more likely to be homogeneous in terms of environmental characteristics (Oberwittler and Wikström, 2009).

Method

Sample

The Study of Peers, Activities and Neighborhoods (SPAN) is a longitudinal study conducted by the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR). The SPAN data consist of two waves of data collection among adolescents (11-17 years of age at T1) from The Hague and neighboring suburbs in The Netherlands. Forty schools for secondary education were approached and ten agreed to participate in the study. The first wave of data collection took place in 2008/2009 and the second wave in 2010/2011. In total, 615 adolescents (52% boys) participated fully in both waves of the study.

Three data sources from the SPAN project are used. A *self-report questionnaire* is used to measure delinquency, parenting, self-control, delinquent attitudes and delinquent peers. The questionnaire was individually conducted in groups of four adolescents during a school hour of about 45 minutes, supervised by a research assistant. In addition, *space-time budget interviews* combined with *systematic social observation* are used to measure time spent in criminogenic settings. The space-time budget interview is a structured personal interview, which was conducted individually and face to face with the respondents and is used to measure the social characteristics of time spent in criminogenic settings. The instrument was originally developed by Wikström and Butterworth (2006) in the Peterborough Youth Study and refined in its successor, the Peterborough Adolescent Delinquency Study (PADS+). During the interview, the activities of the adolescent during each hour of four recent days were recorded (always including the previous Friday and

Saturday), including the nature of the main activity (e.g., sports, learning), the function of the place (e.g., soccer field, school), persons present in the setting (e.g., teacher, parents), and the geographical location (see also Bernasco et al., 2013).

Additionally, to assess the level of the physical disorder of the settings where the adolescents spend time, systematic social observation was carried out during the first half of 2012. A grid of 200 by 200 meters that overlaid the maps of The Hague, on which the respondents indicated their locations, was used to select the street segments for the systematic social observation. As trained observers walked the street, they completed an observation checklist, which was based on the instrument used by Raudenbush and Sampson (1999), capturing physical disorder by 13 items (e.g. 'How much trash or broken glass is on the street or sidewalks?'). All items had three answering categories (none, one, and more); alpha was .62.¹ A setting was indicated as highly disordered as it belonged to the top 25 percent of locations with the highest scores on physical disorder (see also Janssen et al., 2014).²

Time spent in criminogenic settings could not be determined for all respondents as not all hours covered by the space-time budget are spent in the geographical study area.³ This resulted in a final sample of 603 respondents. The majority of the respondents are from Dutch origin (53%), the sample included a relative high proportion of respondents from non-Western origin (38%) and 9% of the respondents are from other Western origin.

Dependent variable

Self-reported delinquency was a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of 20 items asking how often the respondent committed various types of crimes during the past year. The offense types ranged from minor (e.g. vandalism) to serious offenses (e.g. robbery). For

¹ Ten percent of the grid cells that were observed was randomly selected to be observed twice by different observers. Comparing the scores in the disorder items for these double observed grid cells results in an inter-rater agreement of 72.3%.

² The geographical research area consisted of 4561 grid cells, of which a sample of 1422 grid cells was selected for observation. We used the geostatistical method of kriging to interpolate the level of physical disorder at the unobserved locations. The level of physical disorder at an unmeasured location is estimated using observed values at surrounding locations weighted according to the spatial covariance structure in the data and the distance between points (Bivand, 2008).

³ Considering the hours spent unsupervised and unstructured socializing with peers, 94% of the respondents at T1 and 89% of the respondents at T2 spent all these hours in the area covered by the systematic social observations. The range of relevant hours with missing information about the level of disorder ranges from 1 hour (1.9% (n=11) of the respondents at T1 and 5.2% (n=28) of the respondents at T2) to 15 hours (0.2% (n=1) of the respondents at T1 and T2).

each item, the following answering categories were used: 0 times; 1 time; 2 times; 3-5 times; 6-10 times; more than 10 times. These responses were coded 0 through 5, respectively and then summed up. The scale ranges from 0 (*i.e.* zero delinquent acts) to 100 (*i.e.* all 20 acts more than 10 times). Cronbach's alpha was .88 at T1 and .83 at T2. The scale ranges from 0 (*i.e.* zero delinquent acts) to 100 (*i.e.* all 20 acts more than 10 times). The percentage of respondents who reported to have committed zero acts of delinquency is 36.5% ($n=197$) at T1 and 29.8% ($n=173$) at T2.

To complement the frequency-based scale we also constructed a variety scale as recommended by Sweeten (2012). The variety scale is highly correlated with the frequency-based measure of delinquency ($\rho=.97$ at T1 and T2). The variety scale indicated the number of different types of delinquent behavior an individual reported to have committed. The variety scale ranges from 0 to 20, indicating how many of the 20 different delinquent acts the respondent reported to have committed at least once during the past year. Cronbach's alpha was .85 at T1 and .80 at T2. Supplemental analyses using this variety scale produced similar results to those obtained using the frequency scale. The results of the analysis with the variety scale are provided in Appendix B.

Independent variables

Parental monitoring was measured by the use of a summary construct based on the scale developed by Kerr and Stattin (2000; Stattin and Kerr, 2000) consisting of five items asking whether the adolescent has to inform his parents about his whereabouts (*e.g.*, "If I go out, my parents want me to tell them where I go, with whom and what I'm going to do") using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach's alpha was .77 at T1 and .82 at T2.

Parental limit-setting is a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of four items that reflect the extent to which parents intervene in rule-breaking behavior (*e.g.*, "If you had been beating up or threatening somebody at school, your parents would tell you off or punish you") using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach's alpha was .62 at T1 and .58 at T2.

The *quality of the parent-adolescent relationship* was based on the scale developed by Wikström and Butterworth (2006) and measured by seven items (*e.g.*, "Do you talk to your parents when you have a problem or feel sad about something?") using a four-point scale from 0 (*never*) to 3 (*every day*). Cronbach's alpha was .68 at T1 and .70 at T2.

Mediators

Self-control was measured by the use of a summary construct based on the scale developed by Grasmick et al. (1993) and consisted of 10 items asking about the respondents' general behavior (*e.g.* "I sometimes find it exciting to do things that

may be dangerous”) using a five-point scale from 0 (*totally agree*) to 4 (*totally disagree*). Cronbach’s alpha was .75 at T1 and .72 at T2.

Delinquent attitudes were operationalized as the adolescent’s beliefs about the acceptability of several delinquent acts. The construct was based on a scale that was developed by Loeber et al. (1998) and consisted of 16 items asking the respondent about how wrong it would be for someone his age to engage in the behavior (e.g. “Ride a bike through red light”) using a four-point scale from 0 (*not wrong at all*) to 3 (*very wrong*). The scale was reversed so that a higher score indicated more delinquent attitudes. Cronbach’s alpha was .91 at T1 and .88 at T2.

Peer delinquency was a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of 6 items asking about the amount of delinquent behavior of the adolescent’s peers (e.g. “How often do your friends steal something from others or from shops?”) using a four-point scale ranging from 0 (*(almost) never*) to 3 (*very often (each week)*). Cronbach’s alpha was .82 at T1 and .72 at T2.

Time spent in criminogenic settings was measured as the total number of hours (on the four days covered by the space-time budget interviews) spent unstructured socializing with peers, without adult supervision in settings with high disorder. For each respondent, we summed the number of hours that met all following conditions: (1) whether it was spent with at least one peer, (2) in the absence of authority figures, (3) included socializing or ‘hanging around’ as the main activity, and (4) whether it was spent outside a household setting in an area with high physical disorder.

Control variables

Following the definition of Statistics Netherlands (2014), *ethnicity* was measured by two dummy variables with Dutch as reference category indicating whether the respondent is of non-Western or Western origin. In the case of mixed ethnicity, the origin of the mother was conclusive determining the ethnicity of the respondent (Statistics Netherlands, 2014). *Gender* is measured with a dummy variable with girls as reference category, and *age* at T1 is measured in years. We also included two measures of household structure: a dummy variable that indicated whether the respondent lived in a *single headed household*, and a variable indicating *family size*.

Analytical approach

We applied multilevel structural equation modeling in Mplus (Version 7, Muthén and Muthén, 1998-2012). The multilevel structure consisted of two levels: time at Level 1 which is nested in persons at Level 2. The Level 1 model addressed within-person change in delinquency, whereas the Level 2 model explains time-stable differences between individuals. For each independent variable two variables were constructed: a between-person variable and a within-person variable. The between-person variables were computed by averaging the scores on the independent variables across both waves for each respondent. The within-person variables specify the

deviation from the score at T1 (Hoffman and Stawski, 2009; Snijders and Bosker, 1999). As standard practice in longitudinal multilevel analysis, a dummy variable for wave was included in the models, which indicates average change between the two occasions.

Because the dependent variable, total delinquency frequency, was a right skewed count variable, negative binomial models were estimated using maximum likelihood estimation with robust standard errors (Hox et al., 2010).

As a first step, we estimated a model predicting delinquency by including the three parenting variables and control variables (gender, age and ethnicity) as predictors (Model 1). This model tested the direct relations between (change in) parenting and (change in) delinquency.

In order to determine the relative contribution of the mediators, the analyses to examine the indirect effects were twofold.⁴ First, we estimated a single mediation model separately for all four mediators (see Figure 4.1). Model 2 included self-control as a mediator, Model 3 delinquent attitudes, Model 4 peer delinquency and Model 5 included time spent in criminogenic settings as a mediator. Second, we estimated a multiple mediation model that included all mediators simultaneously to examine their relative contribution (see Figure 4.2). In this model, a specific indirect effect represented the ability of the mediator to mediate the effect of parenting on delinquency while controlling for all other mediators (see Preacher and Hayes, 2008).

Results

Descriptive statistics

Means, standard deviations, stability coefficients, and Spearman's rank correlations between all variables are reported in the Appendix A. All correlations between the core theoretical variables were statistically significant and in the expected directions across both waves. Stability coefficients indicated moderate relative stability in all variables ranging from .254 to .567. Comparing the mean scores of both waves showed that overall, parental monitoring ($t=3.866$, $p<.000$) and delinquency ($t=2.475$, $p=.013$) decreased between both waves, whereas delinquent attitudes ($t= -7.771$, $p<.000$) and time spent in criminogenic settings ($t=-3.664$, $p<.000$) increased over time. There were no significant over time changes in Parental limit-setting, the quality of the parent-adolescent relationship, the level self-control, and peer delinquency.

⁴ To estimate the indirect effects, we followed the approach of Hayes (2009) which provides statistical tests of mediation. The standard errors of the indirect effects are estimated using the multivariate delta method (Bollen, 1987).

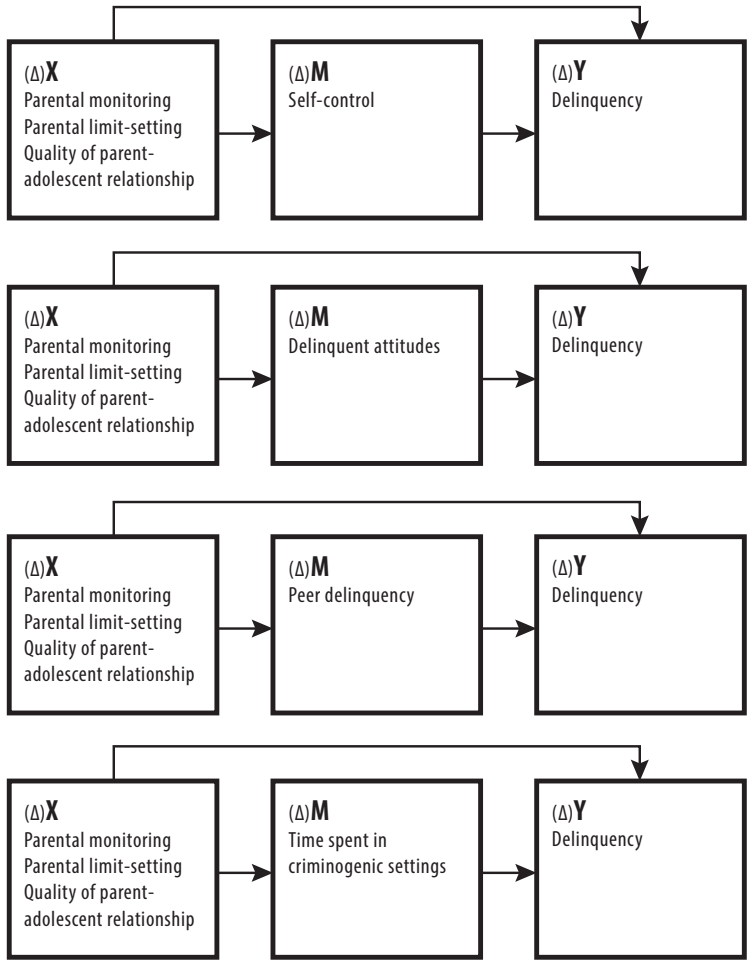


Figure 4.1 Single mediation models

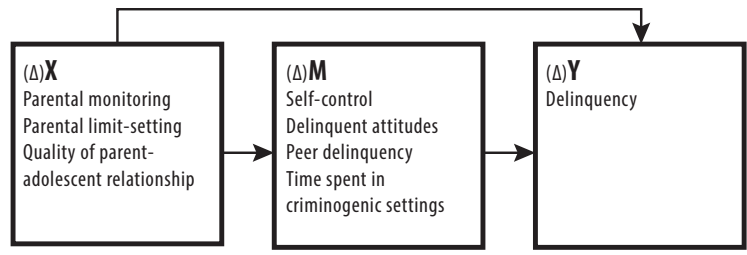


Figure 4.2 Multiple mediation model

Parenting and delinquency: direct effects

Results of the multilevel path model including parenting and control variables as predictors of delinquency are presented in Model 1 of Table 4.1. The between-person results indicated that adolescents who perceive more parental monitoring, more Parental limit-setting and a higher quality relationship with their parents reported to be less delinquent. The exponentiated value of the coefficient, the incidence rate ratio (*IRR*), for the between-person effect of parental monitoring is 0.92. This indicates that an increase of one unit in parental monitoring is related to an 8 percent decrease in the count of delinquency. The *IRR* for Parental limit-setting is 0.87, which indicates that a one unit increase in Parental limit-setting is related to a 13 percent decrease in the count of delinquency. The *IRR* for the quality of the parent-adolescent relationship is 0.90.

The within-person results show that decreases in Parental limit-setting (*IRR* = 0.92) and in the quality of the parent-adolescent relationship (*IRR* = 0.94) were related to increases in delinquent behavior over time. Decreases in parental monitoring were not related to change in delinquent behavior.

Single mediation models

Model 2 to Model 5 in Table 4.1 show the results of the single mediation models, in which only one mediator was included in the multilevel model. In all models, the between-person direct effects of all three parenting dimension remained significantly related to delinquency in all single mediation models, controlled for the respective mediator. The within-person direct effects indicated that decreases in Parental limit-setting and in the quality of the parent-adolescent relationship remained significantly related to increases in delinquent behavior, even when controlled for changes in the respective mediator. These findings show that none of the mediators are able to fully explain the associations between parenting and delinquency.

The between-person *indirect effects* of parenting on delinquency were statistically significant in all models, meaning that the associations between parenting and delinquency are partially mediated by self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings. The within-person *indirect effects* showed that the effects of change in parenting were partially mediated by change in self-control (except for change in parental monitoring), change in delinquent attitudes and change in peer delinquency. Change in the amount of time spent in criminogenic settings did not mediate the associations between change in parenting and change in delinquency. Gender was significantly related to delinquency in all models, indicating that boys reported higher levels of delinquency than girls. Age and ethnicity were only related to delinquency in some of the models. The measures for household structure were not related to delinquency. In all models the dummy variable for wave was negatively related to delinquency, meaning that on average adolescents reported less delinquency at wave 2 compared to wave 1.

Table 4.1 Single Mediation Multilevel Path Models Predicting Delinquency (N=603)

	Model 1 Direct Effects: Parenting		Model 2 Single Mediation: Self-Control		Model 3 Single Mediation: Delinquent Attitudes		Model 4 Single Mediation: Delinquent Peers		Model 5 Single Mediation: Criminogenic Settings	
	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Direct Effects										
Parental Monitoring	-.084*** (.019)	-.024 (.013)	-.069*** (.018)	-.017 (.013)	-.050** (.017)	-.021 (.012)	-.053*** (.016)	-.019 (.012)	-.069*** (.019)	-.024 (.013)
Parental limit-setting	-.142*** (.029)	-.085*** (.023)	-.109*** (.027)	-.064** (.022)	-.088*** (.027)	-.031 (.022)	-.052* (.026)	-.058** (.021)	-.125*** (.030)	-.079*** (.023)
Quality of Relationship	-.106*** (.019)	-.058*** (.017)	-.047* (.018)	-.040* (.017)	-.062*** (.019)	-.039* (.016)	-.046** (.016)	-.047** (.015)	-.099*** (.019)	-.057*** (.018)
Self-Control	-	-	-.107*** (.011)	-.044*** (.011)	-	-	-	-	-	-
Delinquent Attitudes	-	-	-	-	.077*** (.008)	.050*** (.007)	-	-	-	-
Delinquent Peers	-	-	-	-	-	-	.277*** (.023)	.094*** (.017)	-	-
Criminogenic Settings	-	-	-	-	-	-	-	-	.135*** (.029)	.002 (.021)
Indirect Effects										
Parental Monitoring	-	-	-.020** (.008)	-.001 (.003)	-.054*** (.009)	-.013*** (.004)	-.049*** (.010)	-.008** (.003)	-.013** (.004)	.000 (.002)
Parental limit-setting	-	-	-.034** (.013)	-.010 (.005)	-.038** (.013)	-.036*** (.009)	-.083*** (.016)	-.013* (.006)	-.015** (.006)	.000 (.001)
Quality of Relationship	-	-	-.056*** (.010)	-.016** (.005)	-.040*** (.010)	-.023*** (.007)	-.054*** (.011)	-.014** (.005)	-.006 (.003)	.000 (.004)
Control Variables										
Wave (Ref.=T1)	-	-.292*** (.066)	-	-.250*** (.065)	-	-.402*** (.065)	-	-.325*** (.062)	-	-.286*** (.068)
Gender (Ref.=Girl)	.591*** (.114)	-	.458*** (.104)	-	.467*** (.104)	-	.375*** (.098)	-	.589*** (.113)	-
Age T1	-.042 (.033)	-	.006 (.031)	-	-.034 (.031)	-	-.148*** (.031)	-	-.058 (.033)	-
Ethnicity (Ref.=Dutch Non-Western)	.165 (.116)	-	.115 (.106)	-	.453*** (.111)	-	.237* (.102)	-	.105 (.114)	-
Western	-.148 (.199)	-	-.218 (.077)	-	-.155 (.183)	-	-.166 (.158)	-	-.169 (.195)	-
Single Headed Household	.076 (.139)	-	.077 (.129)	-	.112 (.123)	-	.084 (.115)	-	.095 (.136)	-
Family Size	-.033 (.045)	-	-.049 (.040)	-	.027 (.040)	-	-.012 (.037)	-	-.029 (.045)	-

Note: Unstandardized coefficients. All coefficients of the direct paths to delinquency represent changes in the expected log count. Robust standard errors in parentheses.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Multiple mediation model

In Table 4.2 results of the multiple mediation model that included all mediators simultaneously are reported. The between-person *direct effects* of Parental limit-setting and the quality of the parent-adolescent relationship were no longer significantly related to delinquency. Together, self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings fully mediated the relations between these parenting dimensions and delinquency. Parental monitoring, however, remained directly related to delinquency ($IRR = 0.97$). The within-person *direct effects* of parental monitoring and Parental limit-setting were also no longer significantly related to changes in delinquency over time, indicating that changes in self-control, delinquent attitudes, peer delinquency and in time spent in criminogenic settings fully mediated these relationships.

The between-person *indirect effects* for self-control, delinquent attitudes and peer delinquency remain statistically significant when including all mediators simultaneously. Adolescent who perceived more parental monitoring, more Parental limit-setting and a relationship with their parents of higher quality were less involved in delinquent behavior. This could partially be explained by their higher levels of self-control, lower levels of delinquent attitudes and less delinquent peers. Controlling for all other indirect effects, time spent in criminogenic settings no longer mediated the relation between parenting and delinquency.

The within-person *indirect effects* showed that the association between change in parental monitoring and change in delinquency was mediated by change in delinquent attitudes and change in peer delinquency. The effect of change in Parental limit-setting and change in the quality of the parent-adolescent relationship were mediated by change in delinquent attitudes.

Table 4.2 Multiple Mediation Model Predicting Delinquency (N=603)

	Between	Within
Direct effects		
Parental monitoring	-.032* (.015)	-.014 (.012)
Parental limit-setting	-.031 (.026)	-.018 (.020)
Quality of relationship	-.007 (.016)	-.031* (.015)
Self-control	-.069*** (.010)	-.019 (.011)
Delinquent attitudes	.038*** (.009)	.037*** (.007)
Delinquent peers	.170*** (.025)	.055*** (.017)

Table 4.2 Continued

	Between	Within
Criminogenic Settings	.049 (.026)	-.008 (.017)
Indirect effects		
Parental monitoring → Self-control → Delinquency	-.013* (.005)	.000 (.001)
Parental limit-setting → Self-control → Delinquency	-.022** (.008)	-.004 (.003)
Quality of relationship → Self-control → Delinquency	-.036*** (.007)	-.007 (.004)
Parental monitoring → Delinquent attitudes → Delinquency	-.027*** (.007)	-.010** (.003)
Parental limit-setting → Delinquent attitudes → Delinquency	-.019** (.007)	-.027*** (.008)
Quality of relationship → Delinquent attitudes → Delinquency	-.020*** (.006)	-.017*** (.005)
Parental monitoring → Delinquent peers → Delinquency	-.030*** (.007)	-.005* (.002)
Parental limit-setting → Delinquent peers → Delinquency	-.051*** (.011)	-.008 (.004)
Quality of relationship → Delinquent peers → Delinquency	-.033*** (.008)	-.008 (.003)
Parental monitoring → Criminogenic Settings → Delinquency	-.005 (.003)	.001 (.001)
Parental limit-setting → Criminogenic Settings → Delinquency	-.006 (.003)	.000 (.001)
Quality of relationship → Criminogenic Settings → Delinquency	-.002 (.002)	.001 (.003)
Control variables		
Wave (Ref.=T1)	—	-.365*** (.064)
Gender (Ref.=Girl)	.306*** (.092)	—
Age T1	-.067* (.031)	—
Ethnicity (Ref.=Dutch) Non-western	.302** (.098)	—
Western	-.211 (.147)	—
Single Headed Household	.110 (.107)	—
Family Size	.003 (.033)	—

Discussion and conclusion

The main purpose of the present study was to examine how various aspects of parenting are related to adolescent offending. We used the most important mechanisms from three major criminological theoretical approaches to explain the relationship between parenting and delinquency. We used self-control theory (Gottfredson and Hirschi, 1990), differential association theory (Sutherland, 1947) and routine activity theory (Cohen and Felson, 1979). We examined the extent to which associations between parenting and adolescent offending are mediated by the level of self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings. Because these mediators are interrelated, it is important to determine their relative contribution to explaining the relationship between parenting and delinquency.

The findings of the present study have shown that the theoretical approaches contain some empirically supported propositions, but the explanatory power of any single mechanism tends to be limited. Pratt and Cullen (2000) have also observed in their meta-analysis that variables derived from differential association theory and self-control theory when included simultaneously both contributed to explaining delinquency. In addition to this, the present study indicated that these variables also contribute to explaining the relationship between parenting and delinquency. Whereas in the single mediation models the parenting dimensions remained directly related to delinquent behavior, results of the multiple mediation model, including all mediators simultaneously, suggest that the impact of these parenting dimensions was almost completely mediated. Although self-control theory and differential association theory are usually seen as competing theoretical frameworks (Pratt and Cullen, 2000), the findings of the present study suggest that they both partially explain the relationships between parenting and adolescent delinquency.

According to self-control theory, more effective parenting results in higher levels of self-control, which in turn is related to lower levels of delinquency (Gottfredson and Hirschi, 1990). The results of the present study support these propositions, as self-control continued to mediate the associations between parenting and delinquency when controlling for competing mechanisms derived from differential association theory and routine activity theory. The findings of the present study are also consistent with the mechanisms proposed by differential association theory (Sutherland, 1947). Adolescents who perceived more effective parenting were less likely to have delinquent attitudes and delinquent peers, and these adolescents were less likely to engage in delinquency. Controlling for the mechanisms proposed by self-control theory and differential association theory, time spent in criminogenic settings, derived from routine activity theory (Cohen and Felson, 1979) did not mediate the association between parenting and delinquency.

As adolescence is characterized by changes, in addition to differences between persons, we also examined the extent to which over time changes in parenting were related to changes in delinquency and the extent to which these relations could be

explained by changes in self-control, delinquent attitudes, peer delinquency and in time spent in criminogenic settings. The findings of the present study suggest that changes in delinquent attitudes mediated the effect of changes in parental monitoring, in Parental limit-setting, and in the quality of the parent-adolescent relationship, whereas over time changes in peer delinquency only mediated the effect of changes in parental monitoring. Changes in self-control and changes in time spent in criminogenic settings did not mediate the effect of changes in the parenting dimensions.

As any study, the present study has some limitations that need to be addressed. First, all of the measures, except for time spent in criminogenic settings, concern the adolescent's perception. Although adolescent perceptions of parenting are found to be better predictors of adolescent behavior than actual measurements of parenting (Abar et al., 2014), and adolescents are valid informants regarding their level of self-control (Duckworth and Kern, 2011) and delinquency (Thornberry and Krohn, 2000), there are certainly disadvantages of using perceptions of the adolescents. For example, it is possible that parents do not change their behavior, rather adolescents perceive less parental control as they begin to engage in delinquency and realize that they can get away with more than they originally thought. In addition, perceptions of peer delinquency might also be problematic. Recent studies have indicated that individuals tend to project their own attitudes and behavior onto their peers and that the effect of peer delinquency therefore is overestimated (Young and Weerman, 2013; Young et al., 2014; Haynie and Osgood, 2005). To overcome this same-source bias, as suggested by Haynie and Osgood (2005), different sources of information, including peers, parents, teachers, and direct observations, should be used to measure parenting and peer delinquency.

Second, the longitudinal data used in the present study consisted of two waves of panel data, with two years in between covering only part of the adolescent period. Future research could include more waves and smaller time intervals between the waves in order to explore development throughout adolescence in more detail.

Third, the alpha level of the Parental limit-setting is low, particularly at T2 (.58). Although low reliabilities reduce statistical power (see Bacon, 2004), the correlations as well as the path coefficients of parental limit-setting in its relationship with the other variables are in line with the expected direction and previous research (Luthar and Sexton, 2007; Lahey et al., 2008) However, for future research the scale can be improved and extended.

Fourth, we were not able to control for genetic factors in our models. Parenting and children's behavior could be associated because they are both influenced by genes or other biological factors (Wright and Beaver, 2005). The associations found in the present study may be confounded with genetic influences, and might therefore be overestimated.

Notwithstanding these limitations, a major strength of the present study is the unique dataset from the Study of Peers, Activities and Neighborhoods (SPAN). The

data included the most important concepts from self-control theory, differential association theory and routine activity theory. The space-time budget data enriched with systematic social observation data made it possible to examine with great detail and precision where and under which conditions adolescents spent their time. Furthermore, the data included multiple parenting dimensions which made it possible to examine constructs of parental control as well as the parent-adolescent relationship quality. Last, the use of longitudinal data made it possible to examine changes over time, which reflects the developmental nature of adolescence.

The findings offered useful insights for understanding the processes that may give rise to offending during adolescence. Adolescents, by increasing of age, become more oriented towards peers and spend more time outside the home (Sullivan, 2014; Keijsers et al., 2012). While during this developmental period adolescents gain greater freedom and independence from their parents, parents remain to be important for the continuing socialization of adolescents (Pardini et al., 2005; Halgunseth et al., 2013). The findings of the present study indicate that both aspects of parental control and parental support are important, and that parenting might indirectly be protective for involvement in delinquent behavior, by affecting self-control, delinquent attitudes and peer delinquency.

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Appendix 4A

Table 4.A1 Descriptive Statistics and Spearman's Correlations at T1 (n = 580) and T2 (n = 539)

	1	2	3	4	5	6	7	8	9	M	SD
1. Parental monitoring	.440	.438	.323	.232	-.465	-.366	-.223	-.388	-.221	17.35	4.05
2. Parental limit-setting	.433	.458	.223	.219	-.353	-.332	-.192	-.345	-.169	16.86	2.66
3. Quality of relationship	.179	.193	.557	.286	-.372	-.350	-.111	-.329	-.164	23.05	3.30
4. Self-control	.183	.231	.310	.548	-.281	-.393	-.209	-.472	-.016n.s.	29.74	6.35
5. Delinquent attitudes	-.358	-.355	-.274	-.303	.567	.502	.215	.450	.338	46.94	9.06
6. Delinquent peers	-.359	-.303	-.275	-.324	.514	.459	.315	.517	.431	8.64	3.17
7. Time spent in crim. settings	-.232	-.251	-.186	-.142	.234	.308	.254	.239	.215	.73	1.93
8. Delinquency	-.315	-.289	-.250	-.463	.460	.499	.215	.524	.058n.s.	5.50	9.00
9. Age T1	-.156	-.062n.s.	-.077n.s.	.079n.s.	.029n.s.	.263	.193	-.022n.s.	—	13.90	1.65
M	16.36	16.61	22.76	30.34	42.94	8.91	1.22	4.31	—	—	—
SD	4.56	2.25	3.42	5.76	8.17	2.85	2.43	7.15	—	—	—

Note: The values above the diagonal represent correlations and descriptive statistics at T1, the values below the diagonal represent correlations and descriptive statistics at T2, the values on the diagonal represent stability coefficients. All correlations are significant at $p < .01$, except where indicated with n.s. (not significant). ABBREVIATIONS: M = mean, SD = standard deviation

Table 4.A2 Single Mediation Multilevel Path Models Predicting Variety of Delinquency (N=603)

	Model 1 Direct Effects: Parenting		Model 2 Single Mediation: Self-Control		Model 3 Single Mediation: Delinquent Attitudes		Model 4 Single Mediation: Delinquent Peers		Model 5 Single Mediation: Criminogenic Settings	
	Between	Within	Between	Within	Between	Within	Between	Within	Between	Within
Direct Effects										
Parental Monitoring	-.071*** (.014)	-.022* (.010)	-.059*** (.013)	-.018 (.010)	-.047*** (.013)	-.018 (.010)	-.047*** (.012)	-.017 (.010)	-.059*** (.014)	-.020* (.010)
Parental limit-setting	-.102*** (.023)	-.059*** (.016)	-.076*** (.021)	-.045** (.015)	-.062** (.022)	-.023 (.016)	-.034 (.020)	-.045** (.015)	-.090*** (.023)	-.056*** (.016)
Quality of Relationship	-.076*** (.014)	-.034* (.014)	-.033* (.014)	-.019 (.013)	-.042** (.014)	-.020 (.013)	-.031* (.012)	-.023 (.012)	-.073*** (.014)	-.032* (.014)
Self-Control	–	–	-.080*** (.008)	-.033*** (.009)	–	–	–	–	–	–
Delinquent Attitudes	–	–	–	–	.056*** (.006)	.036*** (.006)	–	–	–	–
Delinquent Peers	–	–	–	–	–	–	.204*** (.017)	.061*** (.012)	–	–
Criminogenic Settings	–	–	–	–	–	–	–	–	.112*** (.022)	.006 (.017)
Indirect Effects										
Parental Monitoring	–	–	-.015** (.006)	-.001 (.002)	-.040*** (.007)	-.010*** (.003)	-.036*** (.007)	-.005** (.002)	-.011*** (.003)	-.001 (.001)
Parental limit-setting	–	–	-.025** (.009)	-.007 (.004)	-.028** (.009)	-.026*** (.007)	-.061*** (.011)	-.009* (.004)	-.013** (.005)	.000 (.001)
Quality of Relationship	–	–	-.042*** (.007)	-.012** (.004)	-.029*** (.007)	-.017*** (.005)	-.040*** (.008)	-.009** (.003)	-.005* (.003)	-.001 (.003)
Control Variables										
Wave (Ref.=T1)	–	-.261*** (.053)	–	-.225*** (.052)	–	-.328*** (.054)	–	-.273*** (.052)	–	-.260*** (.054)
Gender (Ref.=Girl)	.495*** (.089)	–	.395*** (.082)	–	.409*** (.084)	–	.335*** (.079)	–	.489*** (.087)	–
Age T1	-.027 (.026)	–	.008 (.024)	–	-.020 (.025)	–	-.112*** (.024)	–	-.047 (.026)	–
Ethnicity (Ref.=Dutch Non-Western)	.147 (.089)	–	.109 (.083)	–	.353*** (.088)	–	.190* (.080)	–	.091 (.088)	–
Western	-.005 (.162)	–	-.053 (.142)	–	-.010 (.153)	–	-.017 (.113)	–	-.025 (.158)	–
Single Headed Household	.072 (.105)	–	.087 (.100)	–	.118 (.099)	–	.088 (.091)	–	.079 (.103)	–
Family Size	-.007 (.034)	–	-.019 (.031)	–	.040 (.031)	–	.004 (.029)	–	-.006 (.034)	–

Note: Unstandardized coefficients. All coefficients of the direct paths to delinquency represent changes in the expected log count. Robust standard errors in parentheses.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 4.A3 Multiple Mediation Model Predicting Variety of Delinquency (N=603)

	Between	Within
Direct effects		
Parental monitoring	-.031** (.012)	-.014 (.010)
Parental limit-setting	-.014 (.019)	-.017 (.015)
Quality of relationship	.000 (.012)	-.011 (.012)
Self-control	-.052*** (.008)	-.015 (.008)
Delinquent attitudes	.026*** (.007)	.026*** (.006)
Delinquent peers	.128*** (.019)	.032** (.012)
Criminogenic Settings	.055** (.020)	-.003 (.014)
Indirect effects		
Parental monitoring → Self-control → Delinquency	-.010* (.004)	.000 (.001)
Parental limit-setting → Self-control → Delinquency	-.016** (.006)	-.003 (.002)
Quality of relationship → Self-control → Delinquency	-.027*** (.006)	-.005 (.003)
Parental monitoring → Delinquent attitudes → Delinquency	-.018*** (.005)	-.007** (.002)
Parental limit-setting → Delinquent attitudes → Delinquency	-.013* (.005)	-.019*** (.006)
Quality of relationship → Delinquent attitudes → Delinquency	-.014** (.004)	-.012** (.004)
Parental monitoring → Delinquent peers → Delinquency	-.023*** (.005)	-.003* (.001)
Parental limit-setting → Delinquent peers → Delinquency	-.038*** (.008)	-.005 (.003)
Quality of relationship → Delinquent peers → Delinquency	-.025*** (.006)	-.005* (.002)
Parental monitoring → Criminogenic Settings → Delinquency	-.005* (.002)	.000 (.001)
Parental limit-setting → Criminogenic Settings → Delinquency	-.006* (.003)	.000 (.000)

Table 4.A3 Continued

	Between	Within
Quality of relationship → Criminogenic Settings → Delinquency	-.003 (.002)	.001 (.003)
Control variables		
Wave (Ref.=T1)	–	-.292*** (.053)
Gender (Ref.=Girl)	.287*** (.075)	–
Age T1	-.052* (.024)	–
Ethnicity (Ref.=Dutch)		–
Non-western	.218** (.079)	
Western	-.054 (.125)	
Single Headed Household	.131 (.087)	–
Family Size	.018 (.027)	–

5 Gender differences in pathways from parenting to delinquency?

Gender differences in delinquency might exist because boys and girls receive different parenting, or because the impact of parenting is different for boys and girls. A longitudinal mediational model was tested in which three parenting dimensions (*i.e.* monitoring, limit-setting, and the quality of the parent-adolescent relationship) were hypothesized to influence adolescents' level of self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, which in turn, were hypothesized to affect delinquency. Using data of 603 adolescents (11-17 years of age at T1) we found that the direct and indirect effects of parenting were similar for boys and girls. This suggests that mechanisms derived from mainstream criminological theories explain involvement in delinquent behavior for both male and female adolescents.

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Gender is one of the strongest and most consistent predictors of delinquent behavior. Although it is well established that males are generally much more involved in delinquent behavior than females, the answer to the question *why* is this the case so called 'gender gap' , is less clear. The generality-specificity debate (Daigle, Cullen, & Wright, 2007) revolves around whether we need gender specific theories or whether traditional criminological theories are applicable to both female and male delinquency. Although mainstream criminological theories are put forward as general theories of crime, most of these theories have originally focused on explaining male delinquency (Bartusch & Matsueda, 1996). These traditional theories have been criticized for assuming that delinquent behavior of girls can be explained by the same model that explains delinquent behavior of boys.

There are three possible explanations for the gender gap in delinquency (Moffitt, Caspi, Rutter, & Silva, 2001). The first explanation entails that boys and girls may differ in the risk factors for delinquency. Wong, Slotboom, and Bijleveld (2010) in their review of 30 European studies found that females had a number of different risk factors for delinquency compared to boys, such as negative life events, physical abuse by parents, and internalizing problems. Overall, however, they found many similarities between males and females in the risk factors for delinquency. In addition, Hubbard and Pratt (2002) found that many of the predictors of female delinquency are the same as those for males, including antisocial attitudes, antisocial peers and antisocial personalities.

The second explanation entails that the same risk factors play a role in involvement in delinquent behavior for boys and girls, and that boys and girls differ in delinquency involvement because they are *differentially exposed* to the same risk factors (Moffitt et al., 2001). According to this approach gender differences in delinquency can be explained by differences in the mean levels of risk factors of delinquency (Mears, Ploeger, & Warr, 1998; Moffitt et al., 2001; Worthen, 2011).

The third explanation also entails that the same risk factors play a role in involvement in delinquent behavior for boys and girls, however, it suggests that boys and girls differ in their rates of delinquency because they are *differentially affected* by the same risk factors. This approach entails that gender differences in delinquency can be explained by differences in the effects of risk factors of delinquency, regardless of possible gender differences in the mean levels of these risk factors (Mears et al., 1998; Moffitt et al., 2001; Worthen, 2011).

When it comes to the gender gap in delinquency, it is often assumed that differences in parenting of boys and girls are an important explanation for differences in engagement in delinquency between boys and girls (Bartusch & Matsueda, 1996; Daigle et al., 2007; Fagan, Van Horn, Hawkins, & Arthur, 2007; Pauwels & Svensson, 2009).

With regards to differences in exposure to parenting practices between boys and girls, explanations for differences in parenting between boys and girls include that, in general, parents may be more concerned with effective socialization of

girls because the female role is more dependent on social approval (Tittle, Ward, & Grasmick, 2003). Whereas some studies reported few gender differences in mean-levels of parenting practices (see Lytton & Romney, 1991), other studies have found that girls are more monitored by their parents compared to boys (Svensson, 2003; Worthen, 2011). In addition, Higgins (2007) reported that girls received more supervision and discipline than boys.

With regards to the idea that boys and girls differ in how parenting is associated with delinquency, few studies found support for some gender-specific associations between parenting and delinquency (Griffin, Botvin, Scheier, Diaz, & Miller, 2000; Worthen, 2011). A large amount of empirical studies, however, indicated that the associations between parenting and delinquency are similar for boys and girls (see Hoeve et al., 2009). Thus, regarding parenting, gender differences in delinquency are expected to be the result of differences in mean levels of parenting between boys and girls, whereas the effects of parenting on delinquency are expected to be similar between boys and girls.

In addition to direct effect of parenting on delinquency, in the recent literature there has been increasing interest in explaining *how* parenting is indirectly related to delinquency. We derived the most important mechanisms from three major criminological theories (*i.e.* self-control theory, differential association theory, and routine activity theory) that might explain the relationship between parenting and delinquency. Gender differences in delinquency might be explained by differences in mean levels of the mediators derived from these theories (*i.e.* self-control, delinquent attitudes, delinquent peers, and time spent in criminogenic settings). However, although direct effects of parenting on delinquency are not expected to differ between boys and girls, whether the indirect pathways from parenting to delinquency differ for boys and girls is less clear.

According to self-control theory (Gottfredson & Hirschi, 1990), a large part of gender differences in delinquency can be explained by differences in self-control. As stated by Gottfredson and Hirschi (1990), a low level of self-control (*i.e.* being more impulsive, engaging in risk-taking activities and preferring immediate gratifications of desires) is the key cause of crime involvement. Thus, according to self-control theory gender differences in delinquency are a result of mean level differences in self-control. With regards to the association between self-control and delinquency, according to Gottfredson and Hirschi (1990) the mechanisms leading to delinquency are the same for boys and girls. The development of self-control, according to Gottfredson and Hirschi (1990) is a result of parental socialization during childhood. Parental monitoring, discipline and support are necessary to foster self-control in children and these differences in self-control are a result of differences in parenting. Differential socialization of boys and girls results in higher levels of self-control in females.

Several empirical studies examined the mechanism of self-control in explaining the gender gap in delinquency. For example, results of the study of Tittle et al. (2003) indicated that self-control indeed explained the association between gender

and crime. The study of Higgins (2007), which included parenting, also found support for the mechanisms proposed by self-control theory. Results indicated that the causal model is similar for boys and girls. That is, ineffective parenting led to low self-control, which explained deviance (including delinquent acts) for both genders (Higgins, 2007). These results indicate that gender differences can be explained by differences in mean levels of self-control, which in turn can be explained by differences in mean levels of parenting between boys and girls.

With regards to differences in effects, Burton, Cullen, Evans, Alarid, and Dunaway (1998) found that self-control was only related to delinquency for boys but not for girls. In contrast, Blackwell and Piquero (2005) found that self-control explained both male and female delinquency. However, they also found that the effect of parenting on self-control was complex and differed between boys and girls. This might indicate that boys and girls are differentially affected by parenting in the development of self-control, which is contradictory to what self-control theory assumes.

According to the differential association perspective, delinquent attitudes (*i.e.* views about whether delinquent acts are acceptable and unacceptable) and peer delinquency are the factors most important for explaining involvement in delinquent behavior. Following this theory, males are more delinquent because they are more exposed to delinquent peers and attitudes in their daily lives compared to females. Similar to self-control theory, differential association theory (Sutherland, 1947) assumes that the general process leading to delinquency is invariant across gender (Warr, 2002). Differential association theory also offers explanations for the associations between parenting and delinquency. Regarding parenting, according to differential association theory, individuals who receive less parental monitoring and control are more likely to acquire delinquent attitudes and engage with delinquent peers, and are therefore more likely to engage in delinquent behavior (Sutherland, 1947).

Previous studies have indeed shown that girls are less involved with delinquent peers (Mears et al., 1998; Piquero, Gover, MacDonald, & Piquero, 2005; Weerman & Hoeve, 2012) and have fewer delinquent attitudes (Mears et al., 1998; Piquero et al., 2005). In accordance with differential association theory, studies have shown similar effects of delinquent attitudes on delinquency across gender (Mears et al., 1998; Piquero et al., 2005). However, although most previous studies indicated that the association between delinquent peers and delinquent behavior are similar for boys and girls (see Hubbard & Pratt, 2002; Wong et al., 2010), few studies found gender differences in the effect of peer delinquency on delinquency (Mears et al., 1998; Piquero et al., 2005). Mears et al. (1998) found that boys were more strongly affected by delinquent peers than girls. Similarly, Piquero et al. (2005) found that delinquent peer association predicted delinquency among boys better than among girls. The results of these studies indicate that that boys and girls might be differentially affected by delinquent peers, which is conflicting with differential association theory.

According to the routine activity perspective (Cohen & Felson, 1979) higher levels of involvement in delinquency among boys might be the results of more exposure to criminogenic settings. According to the routine activity perspective, opportunities that arise in routine everyday life are central in explaining criminal behavior. The degree of involvement in delinquency depends on the amount of time that is spent in settings that provide opportunities for delinquent behavior. These criminogenic settings provide temptations, opportunities and lack of control that make delinquent behavior more attractive (Felson & Boba, 2010; Wikström, Oberwittler, Treiber, & Hardie, 2012). Spending time unsupervised and unstructured socializing with peers in settings with high levels of physical disorder is expected to be particularly conducive for adolescent delinquent behavior (Janssen, Deković, & Bruinsma, 2014). The presence of peers makes criminal behavior more rewarding, the absence of adult supervision indicated low social control and unstructured socializing leaves time available for delinquent behavior (Osgood, Wilson, O'Mally, Bachman, & Johnston, 1996). Higher levels of physical disorder might indicate low social control over the area, which might reduce the perceived risk of getting caught (Sampson & Raudenbush, 2004). In addition, the indications that norms and rules are violated might result in more violation of norms and values (Keizer, Lindenberg, & Steg, 2008). Although the role of parents is not directly elaborated in the routine activity perspective parents are expected to restrict their children from spending time in criminogenic settings in order to keep them out of trouble (Felson & Boba, 2010; Janssen et al., 2014).

Previous studies have found that boys spend more time with peers than girls (Mears et al., 1998; Weerman & Hoeve, 2012). Pauwels and Svensson (2009) examined gender differences in the link between parenting and life style risk, which included how often adolescents hang out in the city center, on street corners and parks. Their results indicated that parental control is similarly related to lifestyle risk between boys and girls.

Present study

Overall, according to the theoretical perspectives the pathways from parenting to delinquency are similar for boys and girls. Gender differences in delinquency are expected to be the result of differences in exposure to risk factors rather than differences in effects of these risk factors. However, the results of previous empirical tests are inconsistent.

The present study examines how mechanisms derived from mainstream criminological theories contribute to explaining the gender gap in delinquency. The first aim of the present study was to determine whether gender differences exist in the mean level of parenting, self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings exist (*i.e.* whether boys and girls are differentially exposed to the same risk factors). The second aim was to test whether the integrated model (see Figure 5.1) linking parenting to delinquency is

the same for boys and girls. We examined gender differences in the extent to which these parenting dimensions are related to self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings, and gender differences in the extent to which these mediators are in turn related to delinquency (*i.e.* whether boys and girls are differentially affected by those risk factors).

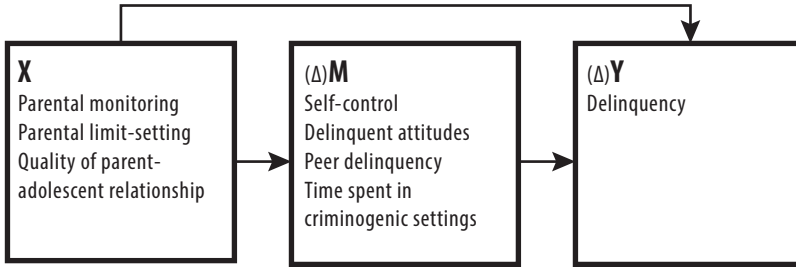


Figure 5.1 Mediation model.

The present study contributes to the literature in several ways. First, we examine mechanism derived from self-control theory, differential association theory and routine activity theory simultaneously to examine gender differences in pathways from parenting to delinquency. Although a fairly large number of studies have already examined the contribution of these mechanism to explaining the gender gap in delinquency, to our knowledge no study has examined these mechanisms simultaneously. Considering these mechanisms simultaneously could contribute to our understanding of whether and what mechanisms might explain delinquent behavior better for boys or for girls.

Second, in the present study we examined gender differences in mean levels and in effects of multiple parenting dimensions. Both parental control (*i.e.* parental monitoring and parental limit-setting) and parental support (*i.e.* quality of the parent-adolescent relationship) can be derived from the literature as important for adolescent development (Smetana, Campione-Barr, & Metzger, 2006; Wright & Cullen, 2001). Including multiple aspects of parenting might offer insight in whether parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship might be more important for boys or girls.

Third, we used a longitudinal study design in which we examine how parenting is directly and indirectly linked to delinquency two years later.

Method

Sample

We used data from the Study of Peers, Activities and Neighborhoods (SPAN), a longitudinal study conducted by the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR). The SPAN data consist of two waves of data collection among adolescents (11-17 years of age at T1) from The Hague and neighboring suburbs in The Netherlands. Forty schools for secondary education were approached and ten agreed to participate in the study. The first wave of data collection took place in 2008/2009 and the second wave in 2010/2011.

The sample used in the present study consisted of 603 adolescents (52% boys), 11-17 years of age at T1 from The Hague and neighboring suburbs in The Netherlands. No gender differences was found in age distribution ($F = .001, p = .975$).

Three data sources from the SPAN project were used. A *self-report questionnaire* was used to measure delinquency, parenting, self-control, delinquent attitudes and delinquent peers. The questionnaire was individually conducted in groups of four adolescents during a school hour of about 45 minutes, supervised by a research assistant. In addition, space-time budget interviews combined with systematic social observation were used to measure time spent in criminogenic settings. The *space-time budget interview* is a structured personal interview, which was conducted individually and face to face with the respondents and was used to measure the social characteristics of time spent in criminogenic settings. The instrument was originally developed by Wikström and Butterworth (2006) in the Peterborough Youth Study and refined in its successor, the Peterborough Adolescent Delinquency Study (PADS+). During the interview, the activities of the adolescent during each hour of four recent days were recorded (always including the previous Friday and Saturday), including the nature of the main activity (e.g., sports, learning), the function of the place (e.g., soccer field, school), persons present in the setting (e.g., teacher, parents), and the geographical location (see also Bernasco, Ruiter, Bruinsma, Pauwels, & Weerman, 2013).

Delinquency

The total *delinquency frequency* was a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of 20 items asking how often the respondent committed various types of crimes during the past year. The offense types ranged from minor (e.g. vandalism) to serious offenses (e.g. robbery). The following answering categories were used: 0 times; 1 time; 2 times; 3-5 times; 6-10 times; more than 10 times. Cronbach's alpha was .85 at T2.

Parenting

Parental monitoring was measured by the use of a summary construct based on the scale developed by Kerr and Stattin (2000; Stattin & Kerr, 2000) consisting of five items asking whether the adolescent has to inform his parents about his whereabouts

(e.g., “If I go out, my parents want me to tell them where I go, with whom and what I’m going to do”) using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s alpha was .77 at T1.

Parental limit-setting was a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of four items that reflect the extent to which parents intervene in rule-breaking behavior (e.g., “If you had been beating up or threatening somebody at school, your parents would tell you off or punish you”) using a five-point scale from 0 (*totally disagree*) to 4 (*totally agree*). Cronbach’s alpha was .62 at T1.

The *quality of the parent-adolescent relationship* was based on the scale developed by Wikström and Butterworth (2006) and measured by seven items (e.g., “Do you talk to your parents when you have a problem or feel sad about something?”) using a four-point scale from 0 (*never*) to 3 (*every day*). Cronbach’s alpha was .68 at T1.

Mediators

Self-control was measured by the use of a summary construct based on the scale developed by Grasmick, Tittle, Bursik, and Arneklev (1993) and consisted of 10 items asking about the respondents’ general behavior (e.g. “I sometimes find it exciting to do things that may be dangerous”) using a five-point scale from 0 (*totally agree*) to 4 (*totally disagree*). Cronbach’s alpha was .75 at T1.

Delinquent attitudes were operationalized as the adolescent’s beliefs about the acceptability of several delinquent acts. The construct was based on a scale that was developed by Loeber, Farrington, Stouthamer-Loeber, and Kammen (1998) and consisted of 16 items asking the respondent about how wrong it would be for someone his age to engage in the behavior (e.g. “Ride a bike through red light”) using a four-point scale from 0 (*not wrong at all*) to 3 (*very wrong*). The scale is reversed so that a higher score means more delinquent attitudes. Cronbach’s alpha was .91 at T1.

Peer delinquency was a summary construct based on the scale developed by Wikström and Butterworth (2006) consisting of 6 items asking about the amount of delinquent behavior of the adolescent’s peers (e.g. “How often do your friends steal something from others or from shops?”) using a four-point scale ranging from 0 (*(almost) never*) to 3 (*very often (each week)*). Cronbach’s alpha was .82 at T1.

Time spent in criminogenic settings was measured as the total number of hours (on the four days covered by the space-time budget interviews) spent unstructured socializing with peers, without adult supervision in settings with high disorder. To assess the level of the physical disorder of the settings where the adolescents spend time, *systematic social observation* was carried out during the first half of 2012. A grid of 200 by 200 m that overlaid the maps of The Hague, on which the respondents indicated their locations, was used to select the street segments for the systematic social observation. As trained observers walked the street, they completed an observation checklist, which was based on the instrument used by

Raudenbush and Sampson (1999), capturing physical disorder by 13 items (e.g. ‘How much trash or broken glass is on the street or sidewalks?’). All items had three answering categories (none, one, and more); alpha was .62. A setting was indicated as highly disordered as it belonged to the top 25 percent of locations with the highest scores on physical disorder (see also Janssen et al., 2014).

For each respondent, we summed the number of hours that met all following conditions: (1) whether it was spent with at least one peer, (2) in the absence of adults or any other authority figures, (3) included socializing or ‘hanging around’ as the main activity, and (4) whether it was spent outside a household setting in an area with high physical disorder.

Control variables

Minority background was determined by the birth country of both the parents and the adolescent (following definitions of Statistics Netherlands, 2014). If either the adolescent, or the mother or father, was born in Morocco, Turkey, Suriname or the Netherlands Antilles, the adolescent was considered belonging to an ethnic minority. *Age* at T1 is measured in years.

Analytical approach

First, we examined to what extent there is a gender gap in our data by using ANOVA. Second, to test whether boys and girls differ in the exposure to the parenting and mediators, we conducted multivariate analyses of variance (MANOVA) for each group of variables to test whether there are differences in the levels of parenting (i.e. parental monitoring, parental control, and the quality of the parent-adolescent relationship) and the mediating variables (self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings) including age as covariate.

Third, we inspected correlations to explore whether parenting, mediating variables and delinquency were differentially correlated between boys and girls. Fourth, to test whether the same model linking parenting to delinquency was applicable to both boys and girls, we applied multiple group structural equation modeling in Mplus (Version 7, Muthén & Muthén, 1998-2012). In order to examine whether the paths from parenting to delinquency differed between boys and girls, we compared a constraint model, in which all paths were set equal across the two groups, to an unconstrained model, in which all paths were estimated separately for boys and girls. Differences between the two groups were tested by comparing the Bayesian Information Criterion (BIC) from the constrained and the unconstrained model. Smaller values indicate better fit (Hilbe, 2011). Follow-up Wald tests were then conducted in Mplus to identify which paths differed significantly.

Because the dependent variable (i.e. total delinquency frequency), was a right skewed count variable, negative binomial models were estimated using maximum likelihood estimation with robust standard errors (Hox, Maas, & Brinkhuis, 2010; Yuan & Bentler, 1998). All indirect effects were estimated in Mplus, which uses the

product of coefficients method for testing mediation analyses. The standard errors of the indirect effects were estimated using the multivariate delta method (Bollen, 1987).

Results

Differences in mean scores

Table 5.1 shows the means and standard deviations of delinquency, parenting, and the mediators for boys and girls. As expected, results of the ANOVA indicated a main effect of gender on delinquency, with boys reporting more involvement in delinquency. Results of the MANOVA showed a main effect of gender on parenting. The univariate analyses indicated that boys reported less parental monitoring and less parental limit-setting compared to girls, whereas boys and girls did not differ in the quality of the parent-adolescent relationship. We also found a main effect of gender on the mediators. Univariate tests revealed that boys have lower levels of self-control, more delinquent attitudes and more delinquent peers compared to girls. Boys and girls did not differ in the amount of time spent in criminogenic settings. These results indicate that boys are more exposed to most of the risk factors for engagement in delinquent behavior than girls.

Differences in correlations

Correlations between all assessed variables are shown in the Appendix. Table 5.A1 shows the results for girls and Table 5.A2 for boys. For both boys and girls parental monitoring, parental limit-setting and the quality of the parent-adolescent relationship are negatively related to delinquency. Parenting is in the expected directions related to self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings for both boys and girls. However, parenting is more strongly related to peer delinquency and time spent in criminogenic settings among boys (r_s range $-.217$ to $-.426$) compared to girls (r_s range $.029$ to $-.161$). Regarding the associations between the mediators and delinquency, all associations, except for time spent in criminogenic settings, were of similar magnitude for both boys and girls. These results indicate that there are more similarities than differences between boys and girls in the relationships between parenting, the mediating variables, and delinquency.

Differences in direct effects from parenting to delinquency

The results of the constrained and unconstrained models that predicted delinquency at T2 with the three parenting variables at T1 as predictors indicated that these relationships were similarly for boys and girls. The Bayesian Information Criteria (BIC) indicated that the constrained model ($BIC=3814.412$) fits the data better than the unconstrained model ($BIC=3843.993$). Additional Wald tests confirmed that the effects did not differ significantly between boys and girls. All parenting dimensions

Table 5.1 Mean Scores, Standard Deviations and MANOVA Results of Boys and Girls on Delinquency, Parenting and All Mediators

	Girls (n=288)		Boys (n=315)		F
	Mean	SD	Mean	SD	
Delinquency (T2)	2.60	4.11	6.53	9.51	42.53***
Multivariate test					15.34***
Parental monitoring	18.34	3.70	16.27	4.15	44.16***
Parental limit-setting	17.06	2.55	16.27	2.75	13.86***
Quality of relationship	23.16	3.47	22.83	3.21	1.55
Multivariate test					10.36***
Self-control	31.07	6.13	28.42	6.22	27.63***
Delinquent attitudes	31.61	8.23	34.68	9.46	20.25***
Delinquent peers	8.14	2.76	9.27	3.49	23.05***
Time spent in crim. settings	0.59	1.60	0.87	2.14	3.41

Note: Age included as covariate.

were significantly related to delinquency two years later. For both boys and girls holds that adolescents who perceive less parental monitoring, less parental limit-setting and a lower quality of the relationship with their parents, are more involved in delinquency two years later.

Differences in indirect effects from parenting to delinquency

Results of the constrained and unconstrained models, and the corresponding Wald tests to test difference in the pathways between boys and girls, are reported in Table 5.2. The Bayesian Information Criterion (BIC) indicated that the constrained model fits the data better than the unconstrained model. This means that the same model linking parenting to delinquency is applicable to both boys and girls.

Regarding the indirect pathways from parenting to delinquency, the constrained model indicated that parental monitoring and the quality of the parent-adolescent relationship were indirectly related to delinquency two years later through affecting adolescents' level of self-control, delinquent attitudes and peer delinquency. Parental limit-setting was indirectly related to delinquency through affecting the adolescents' peer delinquency only. Time spent in criminogenic settings did not mediate any

Table 5.2 Test of Mediation Model for Boys and Girls

	Constrained Model		Unconstrained Model		Wald test χ^2
	Estimate	SE	Estimate	SE	
X → M (path a)			Girls (n=288)	Boys (n=315)	
Parental monitoring → Self-control	.171*	.079	.042	.325**	3.210
Parental limit-setting → Self-control	.139	.114	.287	.024	1.426
Quality of relationship → Self-control	.461***	.083	.620***	.242*	5.361*
Parental monitoring → Delinquent attitudes	-.700***	.103	-.611***	-.735***	0.372
Parental limit-setting → Delinquent attitudes	-.351*	.157	-.544**	-.179	1.398
Quality of relationship → Delinquent attitudes	-.535***	.127	-.385*	-.712***	1.804
Parental monitoring → Peer delinquency	-.156***	.035	-.083	-.205***	3.146
Parental limit-setting → Peer delinquency	-.269***	.062	-.272***	-.263***	0.005
Quality of relationship → Peer delinquency	-.194***	.046	-.154*	-.224***	0.595
Parental monitoring → Criminogenic settings	-.098**	.031	-.040	-.127**	2.495
Parental limit-setting → Criminogenic settings	-.041	.036	-.089*	.005	1.767
Quality of relationship → Criminogenic settings	-.064	.034	.004	-.135*	4.138*
M → Y (path b)					
Self-control → Delinquency (T2)	-.049***	.009	-.068***	-.039***	2.381
Delinquent attitudes → Delinquency (T2)	.025**	.009	.020	.029**	0.239
Peer Delinquency → Delinquency (T2)	.068**	.022	.081	.070**	0.044
Criminogenic Settings → Delinquency (T2)	.022	.028	.050	.013	0.312
X → Y (path c')					
Parental monitoring → Delinquency (T2)	-.015	.018	-.050*	.005	2.490
Parental limit-setting → Delinquency (T2)	-.015	.023	-.036	.003	0.652
Quality of relationship → Delinquency (T2)	.003	.020	.012	.006	0.022
Control variables					
Ethnic group (ref=Dutch) → Delinquency (T2)	.305*	.132	.265	.345*	0.091
Age → Delinquency (T2)	-.218***	.038	-.217***	-.222***	0.004

Table 5.2 Continued

	Constrained Model		Unconstrained Model		Wald test
	Girls (n=288)	Boys (n=315)	Girls (n=288)	Boys (n=315)	
Indirect effects X → M → Y (path a x b)					
Parental monitoring → Self-control → Delinquency (T2)	-.008*	.004	-.003	-.013*	1.041
Parental limit-setting → Self-control → Delinquency (T2)	-.007	.006	-.020	-.001	1.992
Quality of relationship → Self-control → Delinquency (T2)	-.023***	.006	-.042***	-.009	7.079**
Parental monitoring → Delinquent attitudes → Delinquency (T2)	-.017*	.007	-.012	-.022*	0.478
Parental limit-setting → Delinquent attitudes → Delinquency (T2)	-.009	.005	-.011	-.05	0.257
Quality of relationship → Delinquent attitudes → Delinquency (T2)	-.013*	.006	-.008	-.021*	1.110
Parental monitoring → Delinquent peers → Delinquency (T2)	-.011*	.005	-.007	-.014*	0.746
Parental limit-setting → Delinquent peers → Delinquency (T2)	-.018**	.007	-.022	-.019*	0.052
Quality of relationship → Delinquent peers → Delinquency (T2)	-.013**	.005	-.012	-.016*	0.102
Parental monitoring → Criminogenic Settings → Delinquency (T2)	-.002	.003	-.002	-.002	0.005
Parental limit-setting → Criminogenic Settings → Delinquency (T2)	-.001	.001	-.004	.000	0.971
Quality of relationship → Criminogenic Settings → Delinquency (T2)	-.001	.002	.000	-.002	0.172
BIC	17351.003			17439.694	

Note: Bayesian Information Criterion (BIC); smaller value indicates better fit. Constrained model: all paths were held equal across groups. Unconstrained model: all paths were estimated separately for the two groups.

of the relationships between parenting and delinquency controlling for all other indirect pathways.

Parenting is no longer directly related to delinquency two years later, which means that self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings together fully mediate the relationships between parenting and delinquency. The level of self-control, delinquent attitudes and peer delinquency are related to delinquency. Time spent in criminogenic settings, however, is, controlling for all other mediating variables, not related to delinquency two years later.

The results of the Wald tests confirm that the model linking parenting to delinquency is similar for boys and girls. Of all 33 effects, only 3 differ significantly between boys and girls. These results indicate that in general, boys and girls are similarly affected by the risk factors included in the present study.

Discussion and conclusion

The gender gap in delinquency is well established. Boys are generally much more involved in delinquent behavior compared to girls. In the present study we examined two possible explanations for this gender-gap in delinquency. The first explanation entails that boys and girls differ in the extent to which they are exposed to risk factors. The second explanation entails that boys and girls are differentially affected by these risk factors. Differences in parenting between boys and girls are often assumed to be important explanations for the gender gap in delinquency (Bartusch & Matsueda, 1996; Daigle et al., 2007; Fagan et al., 2007; Pauwels & Svensson, 2009). The aims of the current study were to (I) determine whether gender differences exist in the mean level of parenting, self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, and (II) test whether an integrated model linking parenting to delinquency through self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings is the same for boys and girls.

In line with previous research, the gender gap in delinquency was also observed in the current study with boys reporting two and a half times more involvement in delinquency than girls. Also consistent with previous work, we found significant gender differences in the mean levels of parenting (Svensson, 2003; Worthen, 2011). Girls reported significantly higher levels of parental monitoring and parental limit-setting. No gender differences, however, were found for the quality of the parent-adolescent relationship. With regards to mediators, girls reported to have higher levels of self-control, less delinquent attitudes and less delinquent peers, which is also in line with previous empirical studies (Higgins, 2007; Mears et al., 1998; Piquero et al., 2005; Weerman & Hoeve, 2012). These results offer support for the explanation that girls are less delinquent because they are less exposed to risk factors for delinquency. Differences between boys and girls in the mean levels of these risk factors might be the result of differences in mean levels of parenting.

The higher levels of parental control girls receive, is related to lower levels of self-control, less delinquent attitudes, and less delinquent peers, which in turn puts them to a lesser extent at risk for involvement in delinquent behavior.

A second possible explanation for the gender gap in delinquency is that boys and girls are differentially affected by risk factors (Moffitt et al., 2001). Overall, we found that the model linking parenting directly and indirectly to delinquency is remarkably similar for boys and girls. For both boys and girls, effective parenting was related to higher levels of self-control, less delinquent attitudes, less delinquent peers and less time spent in criminogenic settings. The results also indicated that these risk factors are similarly related to involvement in delinquency two years later across gender.

It should be noted, however, that time spent in criminogenic settings, derived from routine activity theory (Cohen & Felson, 1979), did not mediate the relationships between parenting and delinquency two years later, controlling for the mechanisms derived from self-control theory and differential association theory. Moreover, time spent in criminogenic settings was not related to delinquency, controlled for the other risk factors. These results offer little support for the routine activity perspective. However, results of a previous study have shown that time spent in criminogenic settings was relatively unstable over time (Janssen, Eichelsheim, Deković, & Bruinsma, forthcoming). The amount of time spent in criminogenic settings at T1 was not strongly related to the amount spent in criminogenic settings at T2. This might explain why spending time in criminogenic settings is only weakly related to delinquency two years later, but does not necessarily mean that time spent in criminogenic settings is unimportant in explaining delinquent behavior.

By including measures of parental control as well as a measure of the quality of the parent-adolescent relationship, we were able to examine whether certain parenting dimension might be more or less important for girls than for boys. The results indicated that all parenting dimensions were similarly directly and indirectly related to delinquency for both genders. However, whereas previous studies on parenting and delinquency usually focused on parental control, the results of the present study indicate that the quality of the parent-adolescent relationship is equally important in explaining adolescent delinquency. This finding is in line with studies in the parenting literature indicating that the quality of the parent-adolescent relationship is important for adolescent development (Deković, Janssens, & Van As, 2003; Wissink, Deković, & Meijer, 2006).

As with any study, the results of the present study should be interpreted in the light of some limitations. First, although delinquency is measured at T2, parenting and all mediators were measured at T1. Therefore, although longitudinal data was used in the present study, causality cannot be determined. For example, parenting may affect the amount of time spent in criminogenic settings, but the amount of time adolescents spend this way may affect the type of parenting they receive. Future research should include more waves, in order to examine these indirect parental influences in more detail.

Second, we examined how mechanism derived from mainstream criminological theories differed between boys and girls. The results indicated that the mechanism included in the present study (*i.e.* self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings) were similar for boys and girls. It is, however, possible that boys and girls differ in risk factors for delinquency that were not included in the present study. For example, previous research has indicated that negative life events, physical abuse by parents, and internalizing problems were risk factors for girls but not for boys (Wong et al., 2010).

Last, all the measures, except for time spent in criminogenic settings, concern adolescent's perceptions. Although perceptions of adolescents are found to be valid measures of parenting (Abar, Jackson, Colby, & Barnett, 2014), self-control (Duckworth & Kern, 2011), and delinquency (Thornberry & Krohn, 2000), there are certainly disadvantages of using perceptions of adolescents. For example, recent studies have indicated that individuals tend to project their own attitudes and behavior onto their peers and that the effect of peer delinquency is overestimated (Haynie & Osgood, 2005; Young, Rebellion, Barnes, & Weerman, 2014; Young & Weerman, 2013). To overcome this same-source bias, different sources of information, including peers, parents, teachers, and direct observations should be used (Haynie & Osgood, 2005).

The results of the present study indicated that the ways in which parenting is directly and indirectly, through self-control, delinquent attitudes, peer delinquency, related to delinquency are similar across gender. With regard to the generality-specificity debate (Daigle et al., 2007), the results of the present study suggest that mechanisms derived from mainstream criminological theories explain involvement in delinquent behavior for both male and female adolescents. Parenting is equally important in explaining female delinquency as it is in explaining male delinquency. That is, when adolescents are exposed to ineffective parenting, they are more likely to be involved in delinquency regardless of gender.

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Appendix 5A

Table 5.A1 Spearman's Correlations between All Assessed Variables for Girls ($n=288$)

	1	2	3	4	5	6	7	8
1. Parental monitoring								
2. Parental limit setting	.380***							
3. Quality of relationship	.176**	.110						
4. Self-control	.088	.181**	.312***					
5. Delinquent attitudes	-.413***	-.320***	-.305***	-.207***				
6. Delinquent peers	-.271***	-.252***	-.259***	-.323***	.449***			
7. Time spent in crim. settings	-.132*	-.161**	.029	-.165**	.094	.273***		
8. Delinquency (T2)	-.190***	-.174**	-.141*	-.373***	.193***	.216***	.172**	
9. Age	-.218***	-.101	-.047	-.007	.315***	.414***	.183**	-.108

Table 5.A2 Spearman's Correlations between All Assessed Variables for Boys ($n=315$)

	1	2	3	4	5	6	7	8
1. Parental monitoring								
2. Parental limit setting	.495***							
3. Quality of relationship	.412***	.300***						
4. Self-control	.264***	.178***	.235***					
5. Delinquent attitudes	-.459***	-.334***	-.415***	-.305***				
6. Delinquent peers	-.426***	-.370***	-.404***	-.402***	.541***			
7. Time spent in crim. settings	-.301***	-.217***	-.223***	-.210***	.312***	.353***		
8. Delinquency (T2)	-.204***	-.105	-.160**	-.317***	.252***	.245***	.098	
9. Age	-.275***	-.253***	-.260***	-.033	.381***	.488***	.274***	-.019

6 General discussion

The main aim of the current dissertation was to examine the relative contribution of the most important mechanisms from three major criminological approaches (*i.e.* self-control theory, differential association theory, and routine activity theory) to explaining the relationship between parenting and delinquency. We examined how various dimensions of parenting (*i.e.* parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship) are related to self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, and how these factors are in turn related to involvement in delinquency. Because it is reasonable to assume that these mediating mechanisms are interrelated, it is important to examine these mediators simultaneously in order to determine their relative contribution to explaining the relationship between parenting and delinquency. Since time spent in criminogenic settings is a relatively new concept used to explain adolescent engagement in delinquency, however, we first examined whether and how parenting is related to time spent in criminogenic settings. As a final step, we examined gender differences in the direct and indirect pathways from parenting to delinquency, derived from the various theoretical frameworks. The main findings of the present dissertation are summarized in Table 6.1.

Discussion of main findings

Parenting and delinquency: direct and indirect effects

In order to explain the link between parenting and delinquency, in criminological and parenting literature a variety of individual and contextual characteristics have been proposed as putative mediating mechanisms. Gottfredson and Hirschi (1990), for example, argued that parental monitoring and parental limit-setting are necessary to foster self-control in children, which, in turn, explains involvement in delinquent behavior. Whereas Gottfredson and Hirschi (1990) proposed that parental control is necessary for the development of self-control, the results of the present dissertation indicate that next to parental monitoring and parental limit-setting, the quality of the parent-adolescent relationship also predicts self-control. This finding is in line with studies indicating that the quality of the parent-adolescent relationship, in addition to parental control, is important for adolescent development (Deković, Janssens, & Van As, 2003; Wissink, Deković, & Meijer, 2006).

According to self-control theory, more effective parenting results in higher levels of self-control, which, in turn, is related to lower levels of delinquency (Gottfredson & Hirschi, 1990). The results of the present dissertation support these propositions, as self-control continued to mediate the associations between parenting and delinquency when controlling for competing mechanisms derived from differential association theory and routine activity theory. Whereas, according to self-control theory (Gottfredson & Hirschi, 1990), self-control is the most important – if not, the only-factor that mediates the effects of parenting on delinquency, the results of the present dissertation have shown that self-control by itself did not fully mediate the associations

Table 6.1 Overview of empirical chapters

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Title	Parenting and time spent in criminogenic settings	How is parenting related to time spent in criminogenic settings? The role of self-control and delinquent attitudes	How is parenting related to adolescent delinquency? The role of self-control, delinquent attitudes, having delinquent friends, and time spent in criminogenic settings	Gender differences in pathways from parenting to delinquency?
RQ	To what extent is (change in) parenting related to (change in) the amount of time adolescents spend in criminogenic settings?	To what extent are the associations between (change in) parenting and (change in) time spent in criminogenic settings mediated by (change in) self-control of (change in) delinquent attitudes?	To what extent are the associations between (change in) parenting and (change in) delinquency mediated by (change in) self-control, delinquent attitudes, peer delinquency and time spent in criminogenic settings?	To what extent differ direct and indirect pathways from parenting to delinquency between boys and girls?
Dependent Variable	Time spent in criminogenic settings	Time spent in criminogenic settings	Delinquency	Delinquency
Independent Variables	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality	Parental monitoring Parental limit setting Parent-adolescent relationship quality
Mediators		Self-control Delinquent attitudes	Self-control Delinquent attitudes Peer delinquency Time spent in criminogenic settings	Self-control Delinquent attitudes Peer delinquency Time spent in criminogenic settings
Statistical Technique	Longitudinal Multilevel Analysis	Longitudinal Multilevel Structural Equation Modeling	Longitudinal Multilevel Structural Equation Modeling	Multiple Group Structural Equation Modeling
Results	Adolescent who receive more parental monitoring, more parental limit-setting, and a relationship of higher quality with their parents, spent less time in criminogenic settings. Changes in parental-limit setting and in the quality of the relationship were related to changes in time spent in criminogenic settings.	Self-control and delinquent attitudes partially mediated between-person effects of parenting, and delinquent attitudes partially mediated both between- and within-person effects of parenting on time spent in criminogenic settings.	Self-control, delinquent attitudes, and peer delinquency mediated between-person effects of parenting, and delinquent attitudes and delinquent peers mediated both between- and within person effects of parenting on delinquency. Time spent in criminogenic settings, when examined simultaneously with self-control, delinquent attitudes and peer delinquency, did not mediate the effects of parenting.	The same model linking parenting directly and indirectly to delinquency applies to both boys and girls. There are gender differences in mean levels of parental monitoring, parental limit-setting, self-control, delinquent attitudes, and peer delinquency, but not in effects.

between parenting and delinquency. This indicates that self-control is not the only factor explaining the relationship between parenting and delinquency.

Similarly, the results of the present dissertation were also consistent with the mechanisms proposed by differential association theory (Sutherland, 1947). Adolescents who perceived more effective parenting were less likely to have delinquent attitudes, were less likely to be involved with delinquent peers, and moreover, these adolescents were less likely to engage in delinquency. However, delinquent attitudes and peer delinquency also did not fully mediated parental influences on delinquent behavior. Although self-control theory and differential association theory are usually seen as competing theoretical frameworks (Pratt & Cullen, 2000), the findings of the present dissertation suggest that mechanisms derived from both theories all partially explain the relationships between parenting and adolescent delinquency. Only a model that included self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings simultaneously fully mediated the associations between parental limit-setting and the quality of the parent-adolescent relationship, and delinquency. This underlines the importance of integrating multiple perspectives in order to explain the relationship between parenting and adolescent involvement in delinquency.

In addition to the mechanisms proposed by self-control theory and differential association theory, in the present dissertation we focused particularly on the role of time spent in criminogenic settings during adolescence. According to routine activity theory (Cohen & Felson, 1979), opportunities that arise in routine everyday life are central in explaining criminal behavior. The findings of Chapter 4 demonstrated that, when controlling for the mechanisms proposed by self-control theory (Gottfredson & Hirschi, 1990) and differential association theory (Sutherland, 1947), time spent in criminogenic settings did not mediate the association between parenting and delinquency. Parental control and parental support were directly and indirectly, through self-control, delinquent attitudes, and peer delinquency, but not through time spent in criminogenic settings, related to adolescent involvement in delinquency. This indicates that time spent in criminogenic settings, although related to delinquency (Chapter 4) and to parenting (Chapter 2 and 3), is a less important mediator once the effects of other mediators are taken into account.

In addition to differences between persons, we also examined how changes in parenting were related to changes in delinquency over time, and the extent to which these relationships could be explained by changes in self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings. The within-person results show some differences in indirect effects of the parenting dimensions. Changes in parental monitoring over time were indirectly related to changes in delinquency through changes in delinquent attitudes and peer delinquency. Effects of changes in parental limit-setting and in the quality of the parent-adolescent relationship were mediated by changes in delinquent attitudes only. Changes in self-control and in time spent in criminogenic settings did not mediate any of the effects of changes in parenting.

In sum, the current dissertation has shown that an integration of concepts from different theories in a joint mediation model sheds new light on how parenting is indirectly related to adolescent delinquency. Given the complex nature of human behavior, it is not surprisingly that none of the mechanism fully accounted for the relationship between parenting and delinquency, but that each mechanism explained a portion of this relationship.

Parenting and time spent in criminogenic settings: direct and indirect effects

In Chapter 2, it was shown that adolescents, who perceived more parental monitoring, more parental limit-setting and a higher quality of the parent-adolescent relationship spent less time in criminogenic settings. The results furthermore demonstrated that decreases over time in parental limit-setting and in the quality of the parent-adolescent relationship were related to increases in the amount of time spent in criminogenic settings. Decreases in parental monitoring over time, however, were not related to increases in the amount of time spent in criminogenic settings. This might indicate that decreasing parental monitoring is a way in which parents grant their children more freedom and independence, and might therefore be a normative development during adolescence and not a risk factor. The results are in line with the idea that during adolescence parenting is subjected to changes as parents have to learn to facilitate some level of independence in their children, and therefore decrease control while remaining supportive during this period (Galambos, Barker, & Almeida, 2003; Simons, Simons, Chen, Brody, & Lin, 2007).

In Chapter 3 it was furthermore shown that adolescents with lower levels of self-control and more delinquent attitudes spent more time in criminogenic settings. In accordance with recent studies (Bernburg & Thorlindsson, 2001; Simons, Burt, Barr, Lei, & Stewart, 2014; Wikström, Oberwittler, Treiber, & Hardie, 2012), we assume that individuals develop personal characteristics and preferences that influence their participation in criminogenic settings. In addition, self-control and delinquent attitudes partially mediated the effects of parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship. In addition, increases in delinquent attitudes over time predicted increases in the amount of time spent in criminogenic settings and partially mediated the effects of changes in parenting over time.

Together, the findings of these two chapters have provided some more insight into the determinants of time adolescents spend in criminogenic settings. The results indicate that parenting plays an important role when it comes to explaining the amount of time adolescents spend in criminogenic settings. In particular, it was shown that parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship are directly and indirectly through self-control and delinquent attitudes, related to the amount of time adolescents spend in criminogenic settings. It provided support for the idea that parents may function as access barriers

by directly restricting adolescents from spending time in criminogenic settings on the one hand, but also indirectly by fostering self-control and delinquent attitudes that prevent them from spending time in criminogenic settings on the other hand.

Gender differences and similarities

The gender gap in delinquent behavior has often been addressed in the literature. In order to examine whether the mechanisms that lead to delinquency involvement are similar to boys in girls, in Chapter 5 we examined gender differences in the pathways from parenting to delinquency. This chapter demonstrated that, in line with previous research, the gender gap in delinquency was also observed in the current dissertation with boys reporting two and a half times more involvement in delinquency than girls. Also consistent with previous work, we found significant gender differences in the mean levels of parenting (Svensson, 2003; Worthen, 2011). Girls reported significantly higher levels of parental monitoring and parental limit-setting. No gender differences, however, were observed for the quality of the parent-adolescent relationship. Girls furthermore reported to have higher levels of self-control, less delinquent attitudes, and less delinquent peers, which is also in line with previous empirical studies (Higgins, 2007; Mears, Ploeger, & Warr, 1998; Piquero, Gover, MacDonald, & Piquero, 2005; Weerman & Hoeve, 2012).

These results offer support for the idea that girls are less delinquent because they are less exposed to risk factors for delinquency (Moffitt, Caspi, Rutter, & Silva, 2001). Differences between boys and girls in the mean levels of these risk factors might be the result of differences in mean levels of parenting. The higher levels of parental control girls receive, is related to lower levels of self-control, less delinquent attitudes, and less delinquent peers, which in turn puts them to a lesser extent at risk for involvement in delinquent behavior.

Next to the fact that girls are possibly less exposed to risk factors, a possible explanation for the gender gap in delinquency is that boys and girls are differentially affected by risk factors (Moffitt et al., 2001). This idea, however, was not supported by the results of the current dissertation. Overall, we found that the model linking parenting directly and indirectly to delinquency is remarkably similar for boys and girls. For both boys and girls, effective parenting was related to higher levels of self-control, less delinquent attitudes, less delinquent peers and less time spent in criminogenic settings, which in turn were similarly related to involvement in delinquency two years later across gender. These findings suggest that mechanisms derived from mainstream criminological theories explain involvement in delinquent behavior for both male and female adolescents. Parenting is equally important in explaining female delinquency as it is in explaining male delinquency. That is, when adolescents are exposed to ineffective parenting, they are more likely to be involved in delinquency regardless of gender.

Directions for future research

Although the approach to study multiple explanations for the relationship between various parenting dimensions and adolescent delinquency and to study both between-person differences and within-person changes was a fruitful one, some questions still remain. Following from the findings and limitations of the studies in the current dissertation, we can provide some directions for future research.

Since self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings can be expected to be interrelated, we used a simultaneous approach. Only when examined simultaneously, the relative contribution of various intervening mechanisms to explaining the relationship between parenting and delinquency can be determined. The finding that time spent in criminogenic settings was not related to delinquency, and did not mediate the associations between parenting and delinquency, when controlled for other explanations, deserves further exploration. The explanation could possibly be a methodological one. Time spent in criminogenic settings was the only construct in the present dissertation that was not measured by the use of a self-reported questionnaire. The relatively stronger associations between parenting, delinquency, self-control, delinquent attitudes, and peer delinquency could possibly be due to same-source bias as they are all measured by the perception of the adolescent.

However, theoretical explanations should also be explored. Whereas time spent in criminogenic settings is examined in the present dissertation as a predictor of involvement in delinquency, we must not ignore the possibility that the reverse could also be true, that is, delinquency could (also) be seen as predictor of time spent in criminogenic settings. A possible explanation for the disappearance of the effect of time spent in criminogenic settings when peer delinquency was included in the model, might indicate that the peer factor in our measure of time spent in criminogenic settings is important. Our measure of time spent in criminogenic settings included the presence of peers. We were unable, however, to determine with what kind of peers –delinquent or not- these hours were spent. It is possible that time adolescents spend unsupervised and unstructured socializing in high levels of disorder more often takes place in the company of delinquent peers. This might also be an indication that more delinquent adolescents are more likely to spend their time in criminogenic settings. Future research should focus on disentangling the complex bidirectional nature of these effects and examine the extent to which time spent in criminogenic settings might be an outcome of delinquency, instead of a predictor.

In the current dissertation we have selected settings in which an individual was unsupervised and unstructured socializing with peers in high levels of physical disorder as criminogenic. We believe that these kinds of settings are conducive for involvement in adolescent delinquency. However, there are arguably many more features of settings that might be conducive for delinquent behavior. Whereas we, as previously mentioned, were only able to include whether peers are present or not,

characteristics of these peers (*e.g.* whether they are involved in delinquency) may be important. Furthermore, guided by the broken window perspective (Kelling & Wilson, 1982), we included the level of physical disorder as criminogenic feature, there are, however, other features of the physical environment (*e.g.* the presence of bars) that might be conducive for delinquency (Wikström, Ceccato, Hardie, & Treiber, 2010). Thus, although we believe that we used an adequate measure of criminogenic settings, the characteristics we included are by no means exhaustive, and future research should explore other kinds of settings that are conducive for delinquent behavior.

In the present dissertation we included multiple parenting dimensions which made it possible to examine dimensions of both parental control (*i.e.* parental monitoring and parental limit-setting) and parental support (*i.e.* the parent-adolescent relationship quality), in order to examine their relative contribution. We examined these parenting dimensions as if it were independent factors. It is, however, reasonable to assume that these dimensions are interdependent. For example, it is possible that parental monitoring and parental-limit-setting are more effective in reducing involvement in delinquent behavior if the relationship between parents and the adolescent is of good quality. If the relationship is characterized by high levels of conflict, adolescents might be more likely to react defiant to parental control. Future research should specifically focus on how parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship interact in explaining the amount of time spent in criminogenic settings and involvement in delinquent behavior.

The longitudinal data used in the present dissertation consisted of two waves of panel data, with two years in between covering only part of the adolescent period. Therefore, we were not able to examine actual development during adolescence. However, we took full advantage of the two waves of panel data by applying sophisticated analytical methods to explore both between- and within-individual effects. The between-person effects explain time-stable differences between individuals, whereas the within-person level addresses within-person changes (over time) by controlling for all stable individual differences. Future research could include more waves and smaller time intervals between the waves in order to explore whether the results hold when taking into account adolescent development.

Parent-adolescent interactions are bidirectional in nature. Although adolescents respond to the behavior of their parents, parents also react to the behavior of the adolescent (Gault-Sherman, 2012). Regarding the findings of the present dissertation, this implies that parenting may affect the amount of time adolescents spend in criminogenic settings and their delinquent behavior, but also vice versa, *i.e.* that the amount of time spent in criminogenic settings and delinquent behavior of adolescents may affect the parenting they receive. With regards to the parent-adolescent relationship, it is possible that as adolescents begin to engage in delinquent behavior, this has a negative effect on the relationship with increasing

conflicts between parents and the adolescent. Furthermore, parents of delinquent adolescents may find themselves discouraged in maintaining their efforts to monitor and set limits as they may get the idea that further attempts to control the adolescents behavior is ineffective. Thus, when adolescents begin to engage in delinquency parents might reduce the level of investment and control.

All of the measures, except for time spent in criminogenic settings, concern the adolescent's perception. Although adolescent perceptions of parenting are found to be better predictors of adolescent behavior than actual measurements of parenting (Abar, Jackson, Colby, & Barnett, 2014), and adolescents are valid informants regarding their level of self-control (Duckworth & Kern, 2011) and delinquency (Thornberry & Krohn, 2000), there are certainly disadvantages of using perceptions of the adolescents. For example, it is possible that parents do not change their behavior, rather adolescents perceive less parental control as they begin to engage in delinquency and realize that they can get away with more than they originally thought. In addition, adolescents' reports on peer delinquency might also be problematic. Studies have indicated that individuals tend to project their own attitudes and behavior onto their peers and that the effect of peer delinquency is, therefore, overestimated (Haynie & Osgood, 2005; Young, Rebellion, Barnes, & Weerman, 2014; Young & Weerman, 2013). To overcome this same-source bias, future studies should combine different sources of information, including peers, parents, teachers, and direct observations, to measure different concepts in this model.

There are some restrictions concerning the sample used in the present dissertation. As respondents were recruited at school, the most delinquent adolescents might be excluded as they are more likely to drop out of school. Furthermore, the sample is a non-random sample from adolescents in The Hague and might not be representative for all Dutch adolescents. However, the sample is highly diverse as regards to neighborhood context, educational level and ethnical background. Whereas this means that the results found in the present dissertation apply to a highly diverse group of adolescents, future research could explore whether the results hold when examined in a nationally representative sample or in various subsamples.

Practical implications

Fundamental research can provide insight into which processes are responsible for involvement in delinquent behavior. The results of the present dissertation might provide directions for possible interventions for the prevention of adolescent delinquent behavior. The finding that parental monitoring and parental limit-setting are related to delinquency, indicates that intervention strategies aimed at teaching parents adequate control techniques might be effective in preventing involvement in delinquency. In addition, the finding that the quality of the parent-adolescent

relationship is also important indicates that intervention strategies could also focus on the improvement of the bond between the parent and the adolescent. Improving parental control strategies and the quality of the parent-adolescent relationship might not only be directly protective for delinquency, but also indirectly, as the results of the current dissertation indicate that these dimensions of parent-adolescent interaction affected the adolescent's level of self-control, delinquent attitudes, peer delinquency, and the amount of time spent in criminogenic settings.

Particularly the within-person results found in the present dissertation provide indications that interventions aimed at improving parental monitoring, parental-limit-setting, and the parent-adolescent relationship are possibly effective in reducing involvement in delinquent behavior. Changes in these dimensions over time were related to changes in delinquent attitudes, peer delinquency, and in time spent in criminogenic settings. This indicates that, despite the fact that adolescents gain greater freedom and become more independent, parents remain to be important for the continuing socialization of adolescents (Halgunseth, Perkins, Lippold, & Nix, 2013; Pardini, Loeber, & Stouthamer-Loeber, 2005). Furthermore, the results of the present dissertation indicate that there were no gender differences in the assessed direct and indirect pathways from parenting to delinquency. That is, regardless of gender, when adolescents are exposed to ineffective parenting, they are more likely to be involved in delinquency.

To conclude, interventions aimed at improving the quality of the parent-adolescent relationship might be as important as interventions aimed at improving parental monitoring and parental limit-setting, and boys and girls may equally benefit from these interventions.

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Appendix

Table A1 Constructs and items

Parental monitoring	<ol style="list-style-type: none"> 1. I can just go out at night (after 7 pm), without having to tell my parents 2. If I come back later than an agreed moment, I have to tell my parents where I was and with whom 3. When I come home at night (after 7 pm) too late, my parents go out to find me 4. If I go out, my parents want me to tell them with whom and what I'm going to do 5. I have to tell my parents where I go to during weekends and what I'm going to do
<i>All items had 5 answering categories, ranging from 0 (totally disagree) to 4 (totally agree).</i>	
Parental limit-setting	<ol style="list-style-type: none"> 1. If you were skipping school, would your parents try to do something about it? 2. If you had spray painted graffiti on a wall, would your parents tell you off or punish you? 3. If you had been beating up or threatening somebody at school, would your parents tell you off or punish you? 4. If you showed any disrespect to one of your parents, would he or she tell you off or punish you?
<i>All items had 5 answering categories, ranging from 0 (totally disagree) to 4 (totally agree).</i>	
Quality of parent-adolescent relationship	<ol style="list-style-type: none"> 1. How often do you talk to your parents about how you do in school or get along with your friends? 2. Do you talk to your parents if you have a problem or feel sad about something? 3. How often do you do something nice or fun together with your parents? 4. How often do you eat evening meals together? 5. How often do you argue with or squabble with your parents? 6. I can notice that my parents love me 7. I rather be outside home or with someone else than with my parents
<i>All items had 4 answering categories, ranging from 0 (never) to 3 (every day).</i>	
Self-control	<ol style="list-style-type: none"> 1. I always say what I think, even if it is not nice or smart. 2. If I want something, I do it immediately. 3. When I have an argument with someone, I can talk calmly about it 4. I get angry very fast 5. When I am really angry, other people better stay away from me 6. I sometimes find it exciting to do things that may be dangerous 7. I often try to avoid things that I know will be difficult. 8. I get easily bored. 9. I often do things without thinking of the consequences. 10. Sometimes I will take a risk just for the fun of it.
<i>All items had 5 answering categories, ranging from 0 (totally agree) to 4 (totally disagree).</i>	

Delinquent attitudes	<p>How bad do you think it is when someone of your age does the following things?</p> <ol style="list-style-type: none"> 1. Ride a bike through red light 2. Skip doing homework for school. 3. Skip school or work without an excuse. 4. Lie, disobey or talk back to teachers 5. Go skateboarding in a place where skateboarding is not allowed 6. Tease a classmate because of the way he or she dresses 7. Smoke cigarettes 8. Get drunk with friends on a Friday evening 9. Hit another young person who makes a rude comment 10. Steal a pencil from a classmate 11. Paint graffiti on a house wall 12. Smash a street light for fun 13. Smoke cannabis 14. Steal a CD from a shop 15. Break into or try to break into a building to steal something 16. Use a weapon or force to get money or things from another young person <p><i>All items had 4 answering categories, ranging from 0 (not wrong at all) to 4 (very wrong). The scale was reversed so that a higher score indicated more delinquent attitudes.</i></p>
Peer delinquency	<p>How often do your friends</p> <ol style="list-style-type: none"> 1. Skip school without excuse 2. Get drunk 3. Use drugs 4. Steal something from others or from shops 5. Destroy things that do not belong to them 6. Beat up or get into fights with others <p><i>All items had 4 answering categories, ranging from 0([almost] never) to 3 (very often [each week]).</i></p>
Delinquency	<p>How often during the past school year have you</p> <ol style="list-style-type: none"> 1. defaced walls, doors or other objects with paint, pen or spray paint? 2. destroyed or damaged things such as bicycles, bus stops, street lights or something else? 3. set fire to something (for example in a building, a house, a bus or car)? 4. stolen something from a shop that was worth less than 5 euro for example candy, a pen or something else? 5. stolen something from a shop that was worth more than 5 euro, for example clothes, DVDs something else? 6. bought something of which you knew or thought it was stolen, for example a bicycle, clothes or something else? (we do NOT mean for playing or having a romp) 7. stolen a bicycle? 8. stolen a moped or scooter? 9. broken into a house to steal something? 10. broken into a car to steal something? 11. broken in somewhere else to steal something (for example in a shop, school, company)? 12. robbed someone? 13. stolen a hand-bag, wallet, mobile phone or something else from another person? 14. threatened someone to frighten him or her, or to make that person do something? 15. beaten up someone on the streets? (we do NOT mean for playing or having a romp) 16. beaten up someone so that this person got injured? 17. sold softdrugs like, for example, cannabis? 18. sold harddrugs like, for example, XTC? 19. carried a knife or other weapon? 20. used a knife or other weapon? <p><i>All items had 5 answering categories: 0 times, 1 time, 3-5 times, 6-10 times, more than 10 times.</i></p>

Summary

The main aim of the current dissertation was to examine the relative contribution of the most important mechanisms derived from different theoretical perspectives (*i.e.* self-control theory, differential association theory, and routine activity theory) to explaining the relationship between parenting and delinquency. First of all, we examined how various dimensions of parenting (*i.e.* parental monitoring, parental limit-settings, and the quality of the parent-adolescent relationship) are related to self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings, and how these factors are in turn related to involvement in delinquency. Because it is reasonable to assume that these mediating mechanisms are interrelated, it is important to examine these mediators simultaneously in order to determine their relative contribution to explaining the relationship between parenting and delinquency. Since time spent in criminogenic settings is a relatively new concept used to explain adolescent engagement in delinquency, however, we also examined whether and how parenting is related to time spent in criminogenic settings. As a final step, we examined gender differences in the direct and indirect pathways, derived from the various theoretical frameworks, from parenting to delinquency.

Data from the Study of Peers, Activities and Neighborhoods (SPAN) were used in the current dissertation. The SPAN study is a unique longitudinal study that aims to explain adolescent delinquency, consisting of two waves of data collection among adolescents who were between the ages of 11 and 17 at T1 ($M = 14.3$). In order to be able to examine both between-person differences as well as within-person changes simultaneously we proposed a multilevel modeling approach. This approach enables us to explain time-stable differences between individuals, as well as within-person change in the dependent variable, controlled for all stable individual differences.

The results of the present dissertation have shown that adolescents who perceived more parental monitoring, more parental limit-setting and a relationship with their parents of higher quality, are less involved in delinquency, and that this could partially be explained by adolescents' higher levels of self-control, lower levels of delinquent attitudes, and lower levels of peer delinquency (Chapter 4). Time spent in criminogenic settings, when controlling for the other mechanisms, did not mediate the association between parenting and delinquency. Only a model that included self-control, delinquent attitudes, peer delinquency, and time spent in criminogenic settings simultaneously fully mediated the associations between parental limit-setting and the quality of the parent-adolescent relationship. The results furthermore indicate that decreases in parental monitoring are indirectly related to increases in delinquency through increases in delinquent attitudes and peer delinquency. Decreases in parental limit-setting and in the quality of the parent-adolescent relationship are shown to be indirectly related to increases in delinquency through increases in delinquent attitudes only. Changes in self-control and in time spent in criminogenic settings did not mediate any of the effect of changes in the parenting dimensions.

In order to develop a thorough understanding of the role of time spent in criminogenic settings in explaining the relationship between parenting and delinquency, we first examined whether and how parenting is related to time spent in criminogenic settings (Chapter 2 and 3). The results have shown that adolescents, who perceived more parental monitoring, more parental limit-setting and a relationship with their parents of higher quality, spent less time in criminogenic settings. Furthermore, decreases in parental limit-setting and in the quality of the relationship were related to increased time spent in criminogenic settings. The level of self-control and delinquent attitudes also predicted time spent in criminogenic settings. Adolescents with lower levels of self-control and more delinquent attitudes spent more time in criminogenic settings. In addition, self-control and delinquent attitudes partially mediated the effects of parental monitoring, parental limit-setting, and the quality of the parent-adolescent relationship. Furthermore, increases in delinquent attitudes predicted increases in time spent in criminogenic settings, and partially mediated the effects of changes in parenting.

As a final step, we addressed the well known gender gap in delinquency and examined gender differences in the direct and indirect pathways from parenting to delinquency (Chapter 5). Although we found gender differences in the mean levels of parental monitoring, parental limit-setting, self-control, delinquent attitudes, and peer delinquency, the findings indicate that the model linking parenting directly and indirectly to delinquency is remarkably similar for boys and girls.

The current dissertation has shown that an integration of concepts from different theories in a joint mediation model, and by examining both between-person differences and within-person changes, provides insight into the ways in which various parenting dimensions might influence adolescent involvement in delinquency. Parental monitoring, parental limit-setting and the quality of the parent-adolescent relationship might indirectly be protective for involvement in delinquency, by affecting the adolescent's level of self-control, delinquent attitudes and peer delinquency. The present dissertation also provided some more insight into the determinants of time spent in criminogenic settings. Parents may function as access barriers by directly restricting adolescents from spending time in criminogenic settings on the one hand, but also indirectly by fostering self-control and delinquent attitudes that prevent them from spending time in criminogenic settings on the other hand. Furthermore the findings suggest that mechanisms derived from mainstream criminological theories explain involvement in delinquent behavior for both male and female adolescents.

To conclude, interventions aimed at improving the quality of the parent-adolescent relationship might be as important as interventions aimed at improving parental monitoring and parental limit-setting, and boys and girls may equally benefit from these interventions.

Samenvatting

(Dutch summary)

Opvoeding, criminogene settings en delinquentie

Het voornaamste doel van dit proefschrift was het verklaren van de relatie tussen opvoeding en delinquentie van adolescenten. Als mogelijke mediërende factoren werden de belangrijkste mechanismen uit verschillende theoretische perspectieven onderzocht (*i.e.* zelfcontrole theorie, differentiële associatie theorie en routine activiteiten theorie). We onderzochten hoe verschillende opvoedingsdimensies (*i.e.* monitoren van gedrag door ouders, het stellen van grenzen door ouders en de kwaliteit van de ouder-kind relatie) gerelateerd zijn aan zelfcontrole, delinquente attitudes, peer delinquentie en tijd die doorgebracht werd in criminogene settings, en hoe deze factoren op hun beurt gerelateerd zijn aan betrokkenheid bij delinquentie. Omdat het aannemelijk is dat deze mechanismen ook onderling met elkaar samenhangen, is het belangrijk om deze mediators tegelijkertijd te onderzoeken om zo hun relatieve bijdrage aan het verklaren van de relatie tussen opvoeding en delinquentie te kunnen vaststellen. Omdat tijd doorbrengen in criminogene settings een relatief nieuw concept is in het verklaren van betrokkenheid bij delinquentie van adolescenten, hebben we ook onderzocht of en hoe opvoeding gerelateerd is aan tijd die wordt doorgebracht in criminogene settings. Als laatste hebben we onderzocht of er verschillen zijn in de directe en indirecte paden van opvoeding naar delinquentie tussen jongens en meisjes.

In dit proefschrift is gebruik gemaakt van data van de Study of Peers, Activities and Neighborhoods (SPAN). De SPAN studie is een longitudinale studie met als doel het verklaren van delinquent gedrag van adolescenten en bestaat uit twee meetmomenten. De steekproef bestaat uit adolescenten die tijdens het eerste meetmoment tussen 11 en 18 jaar oud ($M = 14,3$) waren. Door gebruik te maken van multilevel analyse hebben we gekeken naar zowel verschillen tussen personen, als naar veranderingen binnen personen.

De resultaten van dit proefschrift laten zien dat adolescenten waarvan de ouders meer monitoren, meer grenzen stellen en waarvan de ouder-kind relatie van betere kwaliteit is, minder betrokken zijn bij delinquent gedrag, en dat deze relatie deels verklaard kan worden door hogere levels van zelfcontrole, lagere levels van delinquente attitudes, en lagere levels van peer delinquentie van deze adolescenten (Hoofdstuk 4). Tijd doorgebracht in criminogene settings medieerde de relatie tussen opvoeding en delinquentie niet, wanneer er gecontroleerd werd voor de andere mechanismen. Alleen wanneer zelfcontrole, delinquente attitudes, peer delinquentie en tijd doorgebracht in criminogene settings tegelijkertijd werden getoetst, werden de effecten van grenzen stellen en de relatie kwaliteit volledig gemedieerd. Tevens geven de resultaten aan dat een afname in monitoring indirect gerelateerd is aan een toename in delinquentie via een toename in delinquente attitudes en peer delinquentie. Afnames in het stellen van grenzen en in de relatie kwaliteit zijn indirect gerelateerd aan een toename in delinquentie enkel via een toename in delinquente attitudes. Veranderingen in zelfcontrole en in tijd doorgebracht in criminogene settings medieerden geen van de effecten van veranderingen in opvoeding.

Om inzicht te krijgen in de rol die tijd doorgebracht in criminogene settings speelt bij het verklaren van de relatie tussen opvoeding en delinquentie, hebben we onderzocht of en hoe opvoeding is gerelateerd aan de hoeveelheid tijd die adolescenten doorbrengen in criminogene settings (Hoofdstuk 2 en 3). De resultaten laten zien dat adolescenten waarvan de ouders meer monitoren, grenzen stellen en die een goede relatie hebben met hun ouders, minder tijd doorbrengen in criminogene settings. Verder was een afname in het stellen van grenzen door ouders en een afname in de kwaliteit van de relatie gerelateerd aan een toename in de tijd doorgebracht in criminogene settings. Zelfcontrole en delinquente attitudes voorspelden ook de hoeveelheid tijd die adolescenten doorbrachten in criminogene settings. Adolescenten met lagere zelfcontrole en meer delinquente attitudes brachten meer tijd door in criminogene settings. Daarnaast medieerden zelfcontrole en delinquente attitudes gedeeltelijk de effecten van monitoren, grenzen stellen en de relatie kwaliteit. Een toename in delinquente attitudes voorspelde bovendien een toename in tijd doorgebracht in criminogene settings, en medieerde gedeeltelijk de effecten van veranderingen in opvoeding.

Als laatste hebben we getoetst of de directe en indirecte paden van opvoeding naar delinquentie verschilden tussen jongens en meisjes (Hoofdstuk 5). Hoewel we verschillen vonden in de gemiddelde levels van monitoren, grenzen stellen, zelfcontrole, delinquente attitudes en peer delinquentie, laten de resultaten zien dat de directe en indirecte paden van opvoeding naar delinquentie hetzelfde waren voor jongens en meisjes.

Dit proefschrift heeft aangetoond dat het integreren van concepten van verschillende theoretische perspectieven meerwaarde heeft en inzicht biedt in de manieren waarop verschillende aspecten van ouder-kind interactie mogelijk betrokkenheid bij delinquentie kunnen verklaren. Monitoren, grenzen stellen, en de relatie kwaliteit zijn mogelijk indirect beschermend voor delinquent gedrag, doordat ze zelfcontrole, delinquente attitudes en peer delinquentie beïnvloeden. De bevindingen van dit proefschrift geven ook meer inzicht in de mogelijke oorzaken van tijd doorbrengen in criminogene settings. Opvoeding kan de tijd die adolescenten doorbrengen in criminogene settings direct beperken, maar ook indirect, doordat opvoeding zelfcontrole en delinquente attitudes kan bevorderen. Daarnaast hebben de resultaten laten zien dat de mechanismen die we ontleend hebben aan verschillende criminologische theorieën, in staat zijn om delinquent gedrag van zowel meisjes als jongens verklaren.

Concluderend, als mogelijke aanbeveling kunnen we stellen dat interventies gericht op het verbeteren van de kwaliteit van de ouder-kind relatie mogelijk net zo belangrijk zijn als interventies gericht op het verbeteren van monitoren en het stellen van grenzen door ouders, en jongens en meisjes zijn mogelijk beide gebaat bij deze interventies

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Curriculum Vitae

Heleen Janssen (1987) received her Master's degree in Sociology at Tilburg University in June 2010. From December 2010 until September 2015 she conducted her PhD research at the Netherlands Institute for the Study of Crime and Law Enforcement (NSCR) and Utrecht University. Her doctoral research was part of the Study of Peers, Activities and Neighborhoods (SPAN). Subsequently, she worked from June to November 2015 as postdoctoral researcher on the SPAN project at the NSCR. As of December 2015 she is employed as research associate at the Max Planck Institute for Foreign and International Criminal Law in Freiburg.

