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Does Self-Control Influence Maternal Attachment? A Reciprocal Effects Analysis from Early Childhood Through Middle Adolescence

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Abstract
Objectives The purpose of this study is twofold. First, this study assesses the extent to which self-control and maternal attachment mutually influence one another. Second, it investigates whether this process continues to occur during adolescence. To date, studies of the etiology of self-control have yet to adequately address these issues, despite the fact that a number of theoretical perspectives emphasize the reciprocal nature of the parent-child relationship.
Methods The current study seeks to shed light on these issues by examining the relationship between self-control and maternal attachment using structural equation modeling for eight waves of data spanning a period of time that encompasses early childhood through middle adolescence.
Results The results yield two findings bearing on the adequacy of Gottfredson and Hirschi's model of self-control development. First, measures of self-control and maternal attachment were found to mutually influence one another during childhood. Second, these effects were reduced to nonsignificance during adolescence.
Conclusions This study finds that self-control emerges during childhood in a complex manner in which it both shapes and is shaped by parental attachment.

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Gottfredson and Hirschi's (1990) general theory of crime is arguably the most widely tested, debated, and scrutinized theory in the field of criminology (Goode 2008), and a large body of research supports the primary claim that self-control is a significant predictor of delinquent and criminal behavior (e.g., Hay and Forrest 2008; Meldrum et al. 2009; Pratt and Cullen 2000; Tittle et al. 2003; Vazsonyi and Belliston 2007). While much research has examined outcomes associated with self-control, a growing number of studies have examined the sources of self-control. Guided by Gottfredson and Hirschi's argument that the main cause of self-control is effective parenting, several studies have investigated this relationship, with many providing evidence of a significant association between various dimensions of parenting and self-control (e.g. Burt et al. 2006; Hay 2001; Meldrum 2008; Nofziger 2008; Perrone et al. 2004; Unnever et al. 2003; cf. Wright and Beaver 2005).

Importantly, this research has been interpreted almost entirely from a "parent effects" perspective—the socialization practices of parents have been interpreted as influencing a child's level of self-control. A "child effects" perspective (see Holden 1997), however, also could be relevant—a child's level of self-control could influence parental socialization, such that children with high self-control experience more positive forms of parenting, including attachment and consistent monitoring and discipline (Kandel and Wu 1995; Kent and Pepler 2003). From this perspective, even if very early parental socialization practices with infants contribute to the initial development of self-control, self-control may partially shape a child's later interactions with parents. Although this possibility was not emphasized by Gottfredson and Hirschi (1990), they did acknowledge its relevance, noting that "… individual differences [in self-control] may have an impact on the prospects for effective socialization" (p. 96). And yet, past research has focused on the influence of parenting on self-control and neglected the possible effects of self-control on parental attachment, monitoring, and discipline. Research in this area may therefore be incomplete in its assessment of the general theory of crime and its arguments about the links between parenting and self-control.

Indeed, there may be good reason to expect that the association between parenting and self-control is reciprocal to some degree. Several prominent criminological perspectives anticipate reciprocal effects between parenting and child outcomes, including Patterson's (1982) coercive family process theory and Thornberry's (1987) interactional theory. Likewise, Moffitt's (1993) discussion of evocative person-environment interactions suggests reciprocal effects between parents and children, such that child behavior can prompt reactions from parents, which then leads children to react back. In support of these theoretical perspectives, a growing body of literature provides evidence of reciprocal effects between different parenting dimensions and deviant behavior (see, for example, Laird et al. 2003; Pardini et al. 2008; Snyder et al. 2005; Thornberry et al. 1991).

Given this emergent line of research, it is important not only to empirically assess the validity of Gottfredson and Hirschi's (1990) statements surrounding the potential influence of self-control on parental attachment, monitoring, and discipline, but to also investigate the extent to which they are reciprocally related. Because the general theory of crime largely specifies a unidirectional relationship between parenting and self-control, it neglects the potential complexities inherent in the parent-child relationship that have been recognized by and incorporated into other theoretical perspectives. This potentially limits

the overall contribution of the general theory of crime for understanding child and adolescent development. Moreover, because past research testing the general theory of crime has been directed at investigating the influence of parenting on self-control, the true nature of the relationship between parenting and self-control may have been specified incorrectly, particularly in cross-sectional studies. As Pardini et al. (2008:661) recently commented, "Although theoretical models suggesting that problem youth tend to elicit increases in dysfunctional parenting practices have been around for decades, researchers continue to interpret cross-sectional associations between parenting practices and conduct problems as evidence that parents influence children's problem behavior." An empirical examination of the possible reciprocal relationship between parenting and self-control may yield a more comprehensive understanding of the development of self-control, and therefore suggest ways to refine this particular aspect of the theory. Importantly, such refinements could be made without having to alter the fundamental assumptions that underlie the development of self-control. Thus, the study of reciprocal effects between self-control and parenting can lead to theoretical elaboration as opposed to challenging the core assumptions of the theory.

In an effort to provide greater insight into the relationship between parenting and self-control, we investigate the presence of reciprocal effects between the specific dimension of maternal attachment and self-control from early childhood through middle adolescence. Further, given that Gottfredson and Hirschi suggest that parental socialization should be relevant for the development of self-control only during the first decade of life, we also assess how the strength of these effects varies over time. Our analysis is conducted with data from the Study of Early Child Care and Youth Development, a longitudinal, multi-site study that followed a sample of US. families from the birth of a child through middle adolescence. The data are particularly appropriate for assessing reciprocal effects, as the study contains repeated measures of maternal attachment and self-control that were collected eight times during the study period.

The General Theory of Crime and the Parental Management Thesis

In *A General Theory of Crime*, Gottfredson and Hirschi (1990) claim to have located a single explanation for variation in delinquent and criminal behavior: self-control. According to the authors, individuals who are high in self-control possess the ability to delay gratification, are sensitive to the interests and desires of others, are more willing to accept restraints on activity, and are less likely to use force or violence to attain ends. In contrast, individuals who lack self-control will tend to be "impulsive, insensitive, physical (as opposed to mental), risk-taking, short-sighted, and nonverbal, and they will tend therefore to engage in criminal and analogous acts" (1990:90). Consistent with these statements, a large body of research finds an inverse relationship between self-control and crime across different populations employing various modeling strategies (e.g. Hay and Forrest 2008; Pratt and Cullen 2000; Meldrum et al. 2009; Tittle et al. 2003; Vazsonyi et al. 2001).

Given the significance attributed to self-control as a major explanation of deviant and criminal behavior (Akers 2008; Pratt and Cullen 2000), it is important to understand how self-control develops. According to Gottfredson and Hirschi (1990:96), "Two general sources of variation [in self-control] are immediately apparent… The first is the variation among children in the degree to which they manifest such traits to begin with. The second is the variation among caretakers in the degree to which they recognize low self-control

and are willing and able to correct it." In particular, Gottfredson and Hirschi argue that, "in order to teach the child self-control, someone must (1) monitor the child's behavior; (2) recognize deviant behavior when it occurs; and (3) punish such behavior…All that is required to activate the system is affection for or investment in the child" (p. 97). Put differently, Gottfredson and Hirschi argue that parents who are strongly attached to their children will be more likely to engage in effective monitoring and disciplinary practices. They then go on to state that these processes should be influential in the development of self-control up to approximately age 10, and thereafter individual differences in self-control should be unaffected by subsequent attempts by parents to alter it. Thus, Gottfredson and Hirschi (1990) present a model whereby a strong attachment between parent and child leads to effective monitoring and disciplining of behavior during the first decade of life, which results in the acquisition of self-control (see also Hirschi and Gottfredson 2003).

A number of studies have empirically examined the link between parenting and self-control, and most find that various dimensions of effective parenting, including attachment, are positively related to child and adolescent self-control (Burt et al. 2006; Feldman and Weinberger 1994; Gibbs et al. 1998; Hay 2001; Hay and Forrest 2006; Hope et al. 2003; Meldrum 2008; Perrone et al. 2004; Phythian et al. 2008). For example, using data from the National Longitudinal Study of Adolescent Health, Perrone et al. (2004) found that measures of parental attachment and discipline are important precursors to self-control. Similarly, using data from the National Longitudinal Survey of Youth, Hay and Forrest (2006) found that parental socialization was not only related to self-control, but that it continued to influence self-control well into adolescence. For the purposes of the current study, it is also important to note that research indicates that attachment continues to be related to self-control even after controlling for monitoring (e.g., Phythian et al. 2008), again demonstrating the importance of attachment regardless of the other parenting practices emphasized by Gottfredson and Hirschi.

It also bears emphasizing that most of these studies have revealed a link between parenting and self-control even after accounting for background or temperamental characteristics of children that could influence the quality of parental socialization to which they are exposed. Importantly, however, there is a difference between controlling for such effects and actually estimating their magnitude and how they may influence the quality of the parent-child relationship. Thus, the common theme in the literature examining the relationship between parenting and self-control has been a focus on the effect of parenting on self-control without much attention to estimating the influence of self-control on parenting.

Reciprocal Effects Models of Parental Socialization

Despite the growing body of evidence which finds that measures of parental attachment, discipline, and monitoring are related to the development of self-control, research on this issue has neglected the possibility that the relationship between such parenting dimensions and self-control may be more complex than what has been offered theoretically. Gottfredson and Hirschi (1990) clearly state that the two things are related, but they focus primarily on the influence of parenting on self-control, only briefly allude to the idea that self-control may influence parenting, and elect not to discuss the possibility that this relationship is reciprocal in nature. Research clearly shows that parenting may influence self-control, but self-control might also influence parenting, impacting the future

development of self-control. For example, children who are impulsive, impatient, and restless should be more difficult to care for, and may therefore provoke frustration and hostility from their parents (Kent and Pepler 2003; Tremblay 1995). In such situations, parents may feel less attached to such children, which could result in harsh or erratic discipline and inconsistent monitoring of behavior. In this scenario, then, parenting is seen as endogenous to the development of self-control, whereas past research on this issue has treated it as exogenous, which might have masked important dynamics.

Research on the development of self-control has understandably focused on the influence of parenting on self-control, as Gottfredson and Hirschi give this direction of influence the greatest amount of attention. Yet, it is important to recognize that several theorists contend there are reciprocal effects between various dimensions of parenting and child misbehavior. For example, Thornberry's (1987) interactional theory, like the general theory of crime, recognizes that weak parental attachment is related to antisocial behavior, but it also suggests that involvement in delinquency can lead to a deterioration of attachment between parent and child, resulting in a higher probability of future delinquency involvement. Likewise, Patterson's (1982) coercive family process theory specifies a reciprocal effect between problematic child behavior and associated negative parental reactions. According to Patterson, negative responses from parents to a child's problematic behavior can lead to future misbehavior. Bell's (1979, 1980) control system model of socialization also recognizes the dynamic nature of the parent-child relationship. According to Bell, when behavioral expectations between parents and children are incongruent, overreactions and anger are likely to occur. Such reactions are likely to result in poor parenting practices and increases in oppositional and aggressive child behavior. Thus, models like those proposed by Thornberry (1987), Patterson (1982), and Bell (1979, 1980) suggest that parents not only shape the behavior of their children, but that child behavior also influences the quality of parenting to which children are exposed.

Several studies provide evidence in support of the contention that the relationship between parental socialization and antisocial behavior is reciprocal in nature (e.g. Gault-Sherman 2012; Laird et al. 2003; Mcleod et al. 1994; Pardini et al. 2008; Snyder et al. 2005; Thornberry et al. 1991). For example, using data from the Pittsburgh Youth Study, Pardini et al. (2008) found that the influence of conduct problems on changes in parenting was as strong as the influence of parenting behaviors on changes in conduct problems. In another study, Laird et al. (2003) found that poor parental monitoring was predictive of increased delinquency, and that increased delinquency also predicted higher levels of poor monitoring. Most recently, Gault-Sherman (2012), using data from the Add Health study, finds that parental attachment is reciprocally-related to various forms of delinquency during adolescence. In addition to this line of research, it should also be noted that some studies not only provide evidence that antisocial behavior influences parental socialization, but that this effect is stronger than that of parenting on child behavior (Beaver and Wright 2007).

This research has significantly advanced our understanding of the complex nature of the parent-child relationship, but it still leaves important gaps in knowledge. Most notably, this research has focused principally on the relationship between different dimensions of parenting and *delinquent behavior*. In the context of the general theory of crime, however, the key relationship in question involves the link between parenting and *self-control*. To date, researchers have yet to investigate the possibility that parenting and self-control may be reciprocally related. In addition, prior research examining reciprocal effects between parental socialization processes and child outcomes has been limited by standard methodological and analytical shortcomings, including such things as the use of male-only

samples (Pardini et al. 2008), inconsistency in measures across study periods (Beaver and Wright 2007), and a focus on short spans of time (Laird et al. 2003). Thus, although this line of research suggests a more complex relationship between parenting and child outcomes than what Gottfredson and Hirschi (1990) propose, there nevertheless is a need for new research that can improve upon those efforts.

The Present Study

The purpose of the present study is to examine the longitudinal relationship between parenting and self-control in a way that explicitly emphasizes the possibility of reciprocal effects and addresses limitations of prior research. Specifically, we examine the link between the parenting dimension of maternal attachment and self-control over an 11-year period from childhood through adolescence using eight waves of data drawn from a large and relatively diverse sample of US youths. Moreover, we consider this issue with measures that are internally consistent across the study period, and we use indicators of self-control that correspond closely to those used in prominent studies of the general theory of crime (e.g., Chapple 2005; Hay and Forrest 2006; Pratt et al. 2004).

In considering this issue we recognize that it would be ideal to examine a more comprehensive measure of parenting that includes components of monitoring and discipline in addition to our focus on attachment. However, measures of monitoring and discipline appeared only in later waves of the study. It also bears emphasizing that a focus on attachment is appealing in important respects. First, parent-child attachment has long been a variable of central importance in the study of the family environment (Hirschi 1969; Cernkovich and Giordano 1987; Loeber and Loeber 1986; Thaxton and Agnew 2004; Thornberry 1987). Much of this work was motivated by social bond theory and its argument that strong parent-child attachment encourages norm internalization and stakes in conformity (Hirschi 1969). Consistent with these arguments, prior research has found a consistent negative association between attachment and delinquency (Cernkovich and Giordano 1987; Sampson and Laub 1993).

Second, the child effects literature described earlier highlights the importance of attachment as central to the etiology of youth behavior in influencing the ability and desire of parents to engage in effective parenting practices (Gault-Sherman 2012). Furthermore, as noted above, attachment is of central importance to self-control theory because of Gottfredson and Hirschi's (1990:97–98) argument that attachment encourages effective rule-setting, monitoring, and discipline—for parents to be willing to do the hard work of parenting, there must be strong bonds of attachment with the child. Thus, attachment should be strongly related to other forms of effective parenting, including monitoring and supervision. This pattern has been observed in many studies. Cernkovich and Giordano (1987), for example, found that attachment variables (including the degree of caring/trust and intimate communication between parents and children) had correlations with control/supervision that ranged from 0.28 to 0.39. Wright and Cullen (2001) and Van Voorhis et al. (1988) similarly found positive associations between parent-child attachment and supervision.

These positive correlations likely reflect the fact that supervising children, monitoring their behavior, and detecting their wrongdoing are easier with strong parent-child bonds because the child cooperates with these efforts from parents. As Warr (2007) found, children who are attached to parents aid their supervisory efforts by being more honest about where they are and who they are with when away from home. Indeed, in connection

to this, Kerr and Stattin (2000) argued for a reinterpretation of the effects of monitoring and supervision—they argue that these variables are unusually reliant on parent-child attachment because, in practice, successful monitoring efforts often result from a child's spontaneous disclosure of information. Thus, while attachment does not constitute good parenting *by itself*, it does overlap greatly with the other forms of effective parenting also emphasized by Gottfredson and Hirschi. In light of these arguments, and given that identical, repeated measures of attachment are available across eight waves of data that span 11 years, we focus on this dimension of parenting. Nonetheless, we do comment in later sections about supplementary analyses conducted with later waves of data, which include additional indicators of parenting, including monitoring.

Based on the theoretical and empirical research reviewed earlier, our primary hypothesis is that maternal attachment and self-control will be reciprocally related. Consistent with Gottfredson and Hirschi's discussion of the relationship between attachment and self-control, we anticipate that attachment will influence the development of self-control. We also expect, however, that self-control will influence attachment levels, a hypothesis that is consistent with other theoretical perspectives and research (Bell 1980; Patterson 1982; Thornberry 1987). It is important to emphasize that results indicating a reciprocal relationship between attachment and self-control would not run counter to the general theory of crime, because Gottfredson and Hirschi do not deny the existence of a reciprocal relationship. However, such results would provide a more nuanced and complete understanding of the development of self-control and, subsequently, should point to the need for an elaborated model of self-control development that more explicitly incorporates the influence of self-control on parenting.

A second hypothesis involves Gottfredson and Hirschi's (1990) arguments surrounding the timing of parental influence in the development self-control. As discussed, Gottfredson and Hirschi contend that parental socialization should matter principally during the first decade of life, and that individual differences in self-control should be unaffected by subsequent attempts by parents to alter it after or around age 10. Given that we are able to examine the relationship between maternal attachment and self-control over an 11-year span of time that begins in early childhood at age 4 and ends in middle adolescence at age 15, we can assess the extent to which this theoretical position is supported. Based on Gottfredson and Hirschi's argument about the anticipated timing of parental influence, we hypothesize that parental attachment will be significantly related to the development of self-control during childhood, but that this effect will be reduced to nonsignificance during adolescence. Findings in support of this hypothesis would lend greater support to Gottfredson and Hirschi's contention that parenting is consequential for self-control primarily during the first decade of life. At the same time, if attachment continues to influence self-control during adolescence, this would call into question their theoretical position, and support recent research indicating that parenting continues to influence self-control well into adolescence (Hay and Forrest 2006).

Data

The data used in this study come from the National Institute of Child Health and Human Development's Study of Early Child Care and Youth Development (SECCYD) that was conducted from 1991 through 2007. The main purpose of the SECCYD was to examine how variations in early childcare are related to developmental outcomes. However, as the study progressed, significant attention was also given to the collection of data on child behavioral development and family socialization processes. As such, the data are

well-suited for investigating the longitudinal relationship between parenting and self-control; indeed, the data from this project have been used effectively in several studies of child and adolescent development (e.g., Dearing et al. 2006; Miner and Clarke-Stewart 2008).

Study families were recruited for inclusion in the SECCYD at hospitals in ten cities that were selected after the lead investigators reviewed applications submitted by researchers at major universities across the continental United States. The sites were selected on the basis of the quality of the applications received and not as a part of a random sampling procedure. Although the data cannot be considered nationally-representative, the selected sites represent a diverse set of cities: Little Rock, AR; Irvine, CA; Lawrence, KS; Wellesley, MA; Philadelphia, PA; Pittsburgh, PA; Morganton, NC; Charlottesville, VA; Seattle, WA; and Madison, WI.

Recruitment of the study families in 1991 focused on roughly 5,400 eligible families who were identified based on recent births at hospitals in the ten cities. Of the families eligible for inclusion in the study, 3,015 were conditionally, randomly sampled and contacted for an interview 2 weeks after the birth of the child.[1] Some families could not be reached or refused to participate, and others experienced circumstances that interfered with their ability to participate in the study (e.g., the child remained in the hospital for an extended period). Thus, the total number of families eligible for inclusion and willing to participate in the study was 1,526. One month after the birth of the child, these families were contacted for the first major interview. Of the 1,526 families, 1,364 (89 %) completed the one-month interview and were enrolled in the long-term study. The resulting sample was relatively diverse: 20 % of the children were non-white, 10 % had mothers who had not completed high school, and 13 % of the mothers were not married at the time of the child's birth.

Data were then collected from the study child, parents, and other individuals, such as child care workers and teachers, a total of 12 times in the ensuing years, with the final assessment occurring when the study children were 15 years old.[2] In examining the longitudinal relationship between maternal attachment and self-control, we use data collected when the study children were 4, 5, 7, 9, 10, 11, 12, and 15 years old.[3] Readers interested in additional information about the SECCYD are referred to a report from the National Institute of Child Health and Human Development Early Child Care Research Network (2001).

Measures

Self-Control

Measures of self-control have varied across prior studies, and much of the focus with this issue has been on the distinction between attitudinal measures and behavioral measures. For example, Akers (1991) contends that the relationship between behavioral measures of

[1] The conditioning assured representation (at least 10 % marginally) of single parent households, mothers with less than a high school education, and ethnic minority mothers.

[2] There were 12 separate assessments, but the information collected at each assessment was not consistent in most cases. This, in part, guided the research design of the current study and limited our focus to the relationship between maternal attachment and self-control and not a broader array of parenting measures.

[3] Given that recruitment and enrollment of study families spanned from January, 1991 to November, 1991 there were slight variations in age across study children at each assessment.

self-control and crime is tautological. Despite such arguments, research provides evidence that behavioral measures of self-control are no more strongly related to measures of criminal behavior than attitudinal ones (Pratt and Cullen 2000; Tittle et al. 2003). In addition, research also suggests that self-reported indicators of self-control are capturing to some degree an influence of self-control on self-report response patterns (Piquero et al. 2000), which suggests the need to obtain measures of self-control from other sources, such as parents or teachers (Piquero 2008).

The measure of self-control used for this study relies on behavioral indicators, but the selected behaviors correspond to the elements of self-control (e.g., risk-seeking, impulsivity, and temper) that have been the focus of attitudinal measures. Specifically, we use 9 survey items answered by mothers at each wave of data that are similar or identical to the measures of self-control used in a number of recent studies (Chapple 2005; Hay and Forrest 2006; Pratt et al. 2004; Turner and Piquero 2002).[4] Mothers were asked to respond to various statements by indicating whether currently or during the past year it was "not true" (coded 0), "somewhat true" (coded 1), or "very" or "often" true (coded 2) of their child. The list of statements included such things as the child "destroys his or her own things," "is disobedient at home," "is impulsive or acts without thinking," and "cannot sit still, is restless, or is hyperactive." All items were reverse-coded so that higher values reflect greater self-control (maximum and minimum α values across all waves = 0.82 and 0.79, respectively).[5]

As Hay and Forrest (2006) have commented, such items have strong face validity as measures of self-control because they involve behaviors Gottfredson and Hirschi (1990) explicitly identify as likely outcomes of low self-control. These include impulsivity (those low in self-control have "a concrete 'here and now' orientation" [89]); self-centeredness ("people with low self-control [are] self-centered, indifferent, or insensitive to the needs of others" [89]); and an inability to regulate attention and emotions (those low in self-control are prone to "sudden changes of plan and loss of temper in response to what appear to others as minor frustrations" [93]). Descriptive statistics for self-control are shown in Table 1.

Maternal Attachment

A 6-item indicator of maternal attachment is used in this study. At each of the eight waves of data, mothers of the study children were asked to respond to a series of statements regarding the quality of their relationship with the study child. The items included, "I share affection and have a warm relationship with my child," "I am easily in tune with what my child is feeling," "If upset my child seeks comfort from me," "My child values his/her relationship with me," "My child spontaneously shares information with me," and "My child openly shares feelings and experiences with me." Given that Gottfredson and Hirschi (1990:98) argue that, "parental concern for the welfare or behavior of the child is a necessary condition for successful child-rearing," such items seem to be particularly important for evaluating the relationship between parenting and antisocial behavior (see also Hirschi and Gottfredson 2003). Response categories for each of the items ranged from "definitely does not apply" (coded 1) to "definitely applies" (coded 5). Higher values indicate greater levels of maternal attachment. Readers are referred to Table 1 for the full

[4] An additional consideration worth noting is that attitudinal, self-reported indicators of self-control may be highly unreliable at young ages. Thus, information from a parent is a practical necessity.

[5] The individual wave alpha values for self-control and maternal attachment are reported in Appendix.

Table 1 Descriptive statistics

	Wave 1 (age 4)			Wave 2 (age 5)			Wave 3 (age 7)			Wave 4 (age 9)		
	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD
Self-control												
Child is impulsive or acts without thinking	1,057	1.501	0.552	1,045	1.546	0.556	1,008	1.563	0.561	1,005	1.595	0.548
Child throws temper tantrums or is hot tempered	1,053	1.427	0.620	1,045	1.477	0.591	1,008	1.565	0.592	1,007	1.614	0.567
Child cannot sit still, is restless, or is hyperactive	1,057	1.398	0.633	1,043	1.514	0.626	1,008	1.496	0.622	1,005	1.548	0.602
Child is stubborn, sullen, or irritable	1,054	1.377	0.592	1,045	1.515	0.569	1,009	1.547	0.547	1,005	1.546	0.565
Child cannot concentrate or pay attention for long	1,056	1.504	0.566	1,046	1.607	0.561	1,009	1.537	0.609	1,007	1.525	0.620
Child destroys his or her own things	1,056	1.769	0.459	1,044	1.805	0.428	1,006	1.831	0.422	1,005	1.868	0.355
Child is disobedient at home	1,057	1.266	0.510	1,045	1.357	0.534	1,009	1.434	0.536	1,007	1.473	0.532
Child is disobedient at school	1,057	1.803	0.402	1,044	1.799	0.425	1,009	1.767	0.443	1,006	1.795	0.415
Child is cruel, bullies, or is mean to others	1,053	1.785	0.424	1,046	1.811	0.407	1,008	1.847	0.383	1,007	1.857	0.353
Maternal attachment												
I share affection and have a warm relationship with my child	1,077	4.924	0.314	1,043	4.914	0.325	1,009	4.919	0.326	1,008	4.888	0.343
If upset, my child seeks comfort from me	1,076	4.815	0.546	1,045	4.820	0.512	1,009	4.854	0.403	1,008	4.739	0.535
My child values his/her relationship with me	1,076	4.845	0.472	1,043	4.894	0.391	1,008	4.916	0.333	1,008	4.892	0.377
My child spontaneously shares information with me	1,074	4.375	0.820	1,045	4.612	0.668	1,009	4.630	0.655	1,007	4.420	0.717
I am easily in tune with what my child is feeling	1,076	4.383	0.685	1,045	4.500	0.749	1,009	4.498	0.704	1,008	4.360	0.760
My child openly shares feelings and experiences with me	1,077	4.482	0.697	1,044	4.655	0.651	1,009	4.624	0.634	1,006	4.491	0.719
Two-parent household	1,084	0.683	0.466	1,067	0.678	0.468	1,048	0.675	0.469	1,076	0.648	0.478
Sex	1,364	0.517	0.500									
Non-white	1,364	0.196	0.397									

Table 1 continued

	Wave 5 (age 10)			Wave 6 (age 11)			Wave 7 (age 12)			Wave 8 (age 15)		
	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD
Self-control												
Child is impulsive or acts without thinking	992	1.620	0.532	995	1.629	0.551	987	1.659	0.515	930	1.713	0.501
Child throws temper tantrums or is hot tempered	992	1.667	0.520	993	1.678	0.537	987	1.693	0.542	931	1.802	0.441
Child cannot sit still, is restless, or is hyperactive	990	1.595	0.588	992	1.635	0.576	986	1.683	0.551	931	1.728	0.508
Child is stubborn, sullen, or irritable	989	1.559	0.530	994	1.614	0.520	987	1.590	0.531	931	1.625	0.544
Child cannot concentrate or pay attention for long	992	1.524	0.617	993	1.610	0.600	986	1.644	0.577	930	1.629	0.587
Child destroys his or her own things	990	1.897	0.322	992	1.905	0.319	986	1.921	0.283	931	1.929	0.280
Child is disobedient at home	992	1.526	0.544	992	1.597	0.528	986	1.605	0.525	930	1.669	0.507
Child is disobedient at school	989	1.838	0.394	990	1.850	0.386	985	1.846	0.395	931	1.860	0.373
Child is cruel, bullies, or is mean to others	991	1.867	0.350	992	1.892	0.332	986	1.906	0.314	931	1.911	0.294
Maternal attachment												
I share affection and have a warm relationship with my child	992	4.862	0.412	991	4.867	0.360	988	4.832	0.439	931	4.679	0.587
If upset, my child seeks comfort from me	992	4.699	0.586	992	4.620	0.577	988	4.525	0.665	927	4.169	0.833
My child values his/her relationship with me	992	4.855	0.466	992	4.809	0.485	988	4.814	0.499	928	4.671	0.597
My child spontaneously shares information with me	991	4.377	0.803	992	4.336	0.776	988	4.288	0.793	929	3.948	0.971
I am easily in tune with what my child is feeling	992	4.389	0.754	992	4.304	0.794	988	4.295	0.745	931	4.015	0.901
My child openly shares feelings and experiences with me	991	4.463	0.764	992	4.419	0.739	987	4.366	0.716	928	4.082	0.879
Two-parent household	1,059	0.645	0.479	1,030	0.620	0.486	1,025	0.614	0.487	979	0.581	0.494

listing of the items used (maximum and minimum α values across all waves = 0.79 and 0.73, respectively).

It should be noted that the items used to measure attachment are imperfect. As one point of emphasis, some of the items used to measure attachment may partially reflect attachment of child to parent rather than *vice versa*. Importantly, on this issue factor analysis revealed that all 6 items loaded well onto one factor. Furthermore, we conducted supplementary analyses using a measure of attachment that only included items 1, 2, and 5, which appear to have the greatest face validity as indicators of maternal attachment. The results of these additional analyses produced results identical to those presented and discussed based on all 6 items. An additional concern is that some of the items may be more appropriate at later ages than others. As one anonymous reviewer noted, a maternal report of the extent to which "my child values his or her relationship with me" assumes that mother's can accurately assess what the child is thinking or feeling, which may not be the case during the earliest waves of data. These limitations should be kept in mind when interpreting the results.

It also bears repeating that although a strong feature of the data is the availability of the measure for maternal attachment at each of the eight waves, we are unable to consider the relationship between parental monitoring/discipline and self-control across the full duration of the study period due to an absence of consistent measures. Since these dimensions of parenting are expected to be more proximally related to self-control (Gottfredson and Hirschi 1990), we might expect to find a weaker relationship between maternal attachment and self-control than if we were able to consider the relationship between monitoring/discipline and self-control.[6] It is also worth noting that, when considering the effect of self-control on parental socialization, attachment would seem to be an important focus—attachment should be the dimension of parenting that is most directly influenced by self-control. The parent of the child who is exhibiting behavior that is characteristic of low self-control should become less attached, less attentive, and, as a consequence, be less willing or interested in monitoring and disciplining future behavior.

Control Variables

For the present analysis we included controls for sex (Male = 1), race (Nonwhite = 1; White = 0), and whether the target child lives in household with both biological parents (two-parent traditional = 1; all others = 0) at each wave of data. Descriptive statistics for these variables are shown in Table 1.

Analytic Method

To examine the relationship between self-control and attachment we use structural equation modeling with latent variables, and we estimate reciprocal paths between self-control and maternal attachment over 8 waves of data. All models are estimated using EQS 6.1 (Bentler 1985). To evaluate model fit in the measurement model portion of the analysis, we use the likelihood ratio x^2, root mean squared error of approximation (RMSEA) (Steiger

[6] We did estimate second-order latent factor models using measures of parental monitoring and hostility, in addition to attachment, that were available at waves 7 and 8. This analysis indicated significant overlap exists between the indicators of attachment and the other dimensions of parenting, demonstrating that attachment is a valid indicator of parenting. Moreover, when we restricted model estimation to these two waves alone as opposed to all eight waves we found results that were substantively identical to those presented here.

1990), the non-normed fit index (NNFI) (Bentler and Bonett 1980), the comparative fit index (CFI) (Bentler 1990), the standardized root-mean residual (SRMR), and Aikaike's information criteria (AIC). Since violations of multivariate normality can produce distortions in model adequacy (Yuan and Bentler 1998; Bentler and Yuan 1999), we use the Satorra and Bentler (1994) scaled test statistic to correct the normal theory statistics. This statistic has been shown to perform well under a variety of distributional violations (see Hu et al. 1992; Chou et al. 1991; Curran et al. 1996). All parameters were estimated using maximum likelihood with robust standard errors.

Missing Data

Incomplete information is a common problem with survey data, particularly for longitudinal designs. Deleting cases with incomplete data removes important information and poses serious problems to statistical inference (Graham 2009). Alternatively, imputing the mean to cases that are missing data fails to take into account the uncertainty in data collection (Hoff 2009). To account for missing data, we estimate missing values using normal theory maximum likelihood. We employ the expectation maximization (EM) algorithm (Dempster et al. 1977) for mean and covariance structure models proposed by Jamshidian and Bentler (1999), which computes maximum likelihood estimates. This methodology rebuilds the covariance matrix and the sample means estimates with the EM algorithm leading to more accurate results compared to traditional missing data imputation methods (Peugh and Enders 2004).[7]

Results

Measurement Model

The measurement portion of the model specifies that self-control and maternal attachment are latent variables that generate nine and six indicators, respectively. Each indicator of the corresponding latent variable is a linear function of the latent variable plus random measurement error. Table 2 shows the model fit for three different measurement models. Model 1 estimates the covariance for each factor of maternal attachment and of self-control, but assumes that the covariance between these constructs is zero. That is, model 1 assumes that self-control and maternal attachment are uncorrelated. Model 2 allows serial correlation between the error terms, but maintains the assumption that self-control and maternal attachment are uncorrelated. Model 3 relaxes this assumption and estimates the covariance between the latent factors for maternal attachment and self-control. As Table 2 indicates, model 3 provides the best fit to the data among the models specified, and we use this model to examine reciprocal effects between parenting and self-control. Furthermore, the Lagrange Multiplier Test for adding parameters to the model indicates that no

[7] Differences in the N sizes in Table 1 for the race and sex variables relative to the items used to measure household type, self-control, and attachment should be explained. The information on child race and sex was obtained at the outset of the SECCYD and therefore no data is missing on these two variables. However, from the outset of the SECCYD to the assessment at age 4 approximately 20 % of the original study families dropped out of the study. To consider whether sample attrition was selective, we examined the sample's composition with respect to five demographic/social status variables—sex, race, mother's education, family structure, and family income—for which data were collected during the first interview when the study children were 1 month old. We uncovered no evidence of selective sample attrition.

Table 2 Model fit comparisons for different measurement models of self-control and maternal attachment (n = 1,364)

	Model 1 Same factor covariances only	Model 2 Serial correlated errors added	Model 3 Full model
Goodness of fit indicators			
Likelihood Ratio χ^2 (df)	21,674.214 (4,360)	15,323.041 (4,276)	13,780.095 (4,212)
Root mean-square error of approximation (RMSEA) w/ 90 % CI	0.047 (0.046–0.048)	0.035 (0.033–0.037)	0.029 (0.028–0.030)
Bentler-Bonett non-normed fit index (NNFI)	0.841	0.874	0.876
Comparative fit index (CFI)	0.801	0.872	0.887
Standardized root-mean residual (SRMR)	0.097	0.082	0.051
Aikaike's information criterion (AIC)	12,478.239	6,584.054	6,250.059

reasonable improvements can be made to the fit of the model. Figure 1 shows a truncated illustration of the full model that is estimated in Model 3. Due to space constraints, not all years are shown.

Table 3 reports the variances and covariances estimated in the measurement model shown in Fig. 1,[8] and the Appendix reports the factor loadings and variances for this model.[9] Several things should be noted from Table 3. First, for self-control, the covariance between temporally distal factors is lower than it is for temporally proximate factors. This suggests that there are important changes occurring to self-control over the length of the study period. However, this pattern is not as strongly observed for maternal attachment, although the covariances still differ. Table 3 also shows that the factor variance for self-control does not increase over time.[10] However, for maternal attachment the factor variance increases over time and constraining the variances to be equal across the waves significantly impairs the fit of the model ($x^2_{(7)}$ change = 135). Finally, Table 3 shows that self-control and maternal attachment covary over the eight waves of data. This provides initial support for our main hypothesis that self-control and maternal attachment mutually influence each other. However, it remains to be shown whether the covariance between self-control and attachment is the product of a unidirectional or reciprocal process.

Structural Model

The structural portion of the model specifies that maternal attachment at t is a function of maternal attachment at $t - 1$ and self-control at $t - 1$ (i.e. lagged effects). Figure 2 provides an illustration of the model. It is important to note that the model with both

[8] The serial correlations shown in Fig. 1 are not presented due to space constraints. The correlations varied from a minimum of 0.07 to a maximum of 0.4. No discernable pattern was apparent in the estimates, although constraining them to be zero substantially reduces the fit of the model.

[9] The reader may notice that some of the factor loadings are less than the traditional 0.7 rule of thumb. We tested whether separating items with weaker loadings into different latent factors provided a better fit to the model; but, these tests did not provide any significant evidence to support this approach.

[10] In fact, a model where the variance in self-control is constrained to be equal across the waves provides a better fit to the data ($x^2_{(7)}$ change = 11).

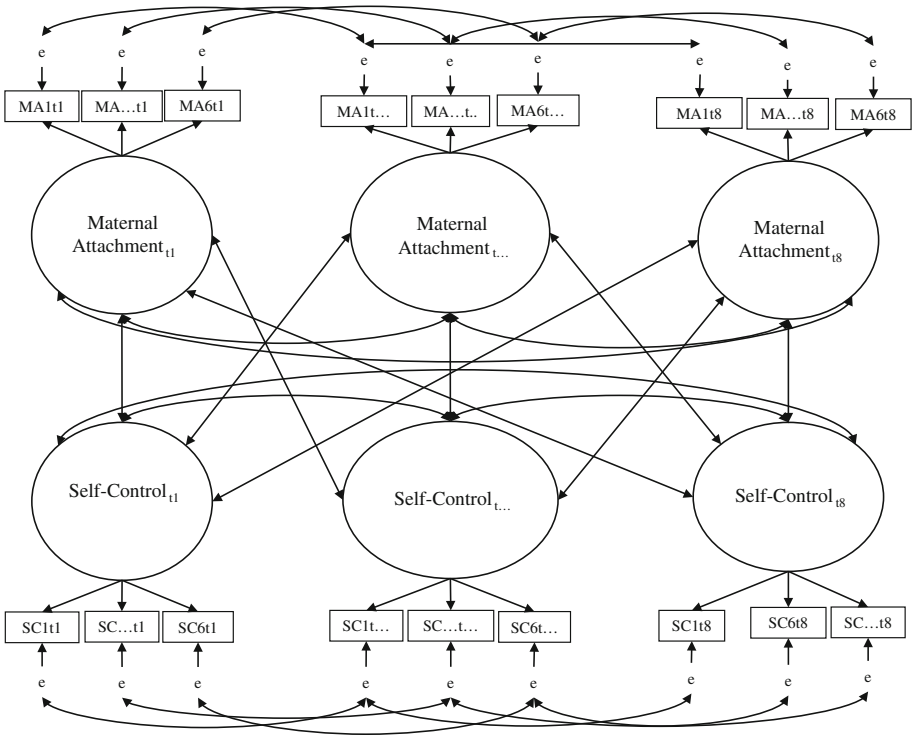

Fig. 1 Measurement model of maternal attachment and self-control

contemporaneous and lagged effects is unidentified.[11] We exclude contemporaneous effects and only estimate lagged effects to identify the model. The model we estimate is preferable to a model that only estimates contemporaneous effects due to the assumptions made about the effects of the latent variables. The model similarly posits that self-control at t is influenced by self-control at $t - 1$ and maternal attachment at $t - 1$. That is, self-control at t is a function of past levels of self-control and maternal attachment. The same assumption holds for maternal attachment. In contrast, the contemporaneous effects model (without lagged effects) holds that self-control at t is only influenced by maternal attachment at $t - 1$ through maternal attachment at t. We believe that this assumption is more restrictive and less realistic. To minimize potential bias, we allow the disturbances for the contemporaneous factors to correlate. This procedure is common under such circumstances (e.g., Matsueda and Anderson 1998).

Table 4 displays the parameter estimates for the relationships between the latent factors estimated in the structural model. In particular, the table shows the unstandardized coefficients and robust standard errors in parentheses, followed by the standardized coefficients. Looking first at the same factor estimates, there is a high level of construct validity for the indicators of both self-control and maternal attachment over the study period. Specifically, for self-control, these estimates often exceed 0.90, while for maternal attachment the estimates often exceed 0.80.

[11] This model can be identified using an instrumental variable approach. However, we are unable to locate a variable in our data set for which there is a correlation with either self-control or maternal attachment, but not the other construct. As a result, we must impose restrictions on the model for identification.

Table 3 Robust maximum likelihood estimates of variances and covariances for latent factors in measurement model of self-control and maternal attachment (n = 1,364)

	Self-control							
Self-control	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 8 (age 15)
Factor variances and covariances								
Age 4	0.083	–	–	–	–	–	–	–
Age 5	0.061	0.085	–	–	–	–	–	–
Age 7	0.078	0.073	0.096	–	–	–	–	–
Age 9	0.069	0.082	0.082	0.116	–	–	–	–
Age 10	0.071	0.076	0.089	0.102	0.108	–	–	–
Age 11	0.069	0.078	0.087	0.099	0.095	0.110	–	–
Age 12	0.064	0.068	0.076	0.091	0.097	0.097	0.094	–
Age 15	0.049	0.055	0.065	0.078	0.079	0.082	0.075	0.107

	Maternal attachment							
Maternal attachment	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 8 (age 15)
Age 4	0.014	–	–	–	–	–	–	–
Age 5	0.011	0.027	–	–	–	–	–	–
Age 7	0.011	0.018	0.020	–	–	–	–	–
Age 9	0.011	0.016	0.017	0.033	–	–	–	–
Age 10	0.016	0.025	0.024	0.035	0.054	–	–	–
Age 11	0.012	0.017	0.018	0.024	0.032	0.033	–	–
Age 12	0.014	0.017	0.020	0.028	0.037	0.031	0.051	–
Age 15	0.012	0.018	0.019	0.028	0.039	0.037	0.045	0.120

Table 3 continued

	Maternal attachment							
Self-control	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 8 (age 15)
Covariances between constructs								
Age 4	0.009	0.015	0.014	0.012	0.017	0.012	0.013	0.011
Age 5	0.012	0.017	0.015	0.017	0.020	0.014	0.016	0.020
Age 7	0.011	0.016	0.021	0.016	0.027	0.019	0.021	0.022
Age 9	0.008	0.014	0.016	0.024	0.028	0.015	0.020	0.017
Age 10	0.012	0.013	0.017	0.019	0.032	0.017	0.018	0.016
Age 11	0.007	0.013	0.016	0.017	0.028	0.022	0.017	0.014
Age 12	0.007	0.012	0.014	0.017	0.024	0.019	0.024	0.013
Age 15	0.008	0.013	0.012	0.014	0.021	0.015	0.019	0.033

All variances and covariances are significant at the $p \leq 0.05$ level

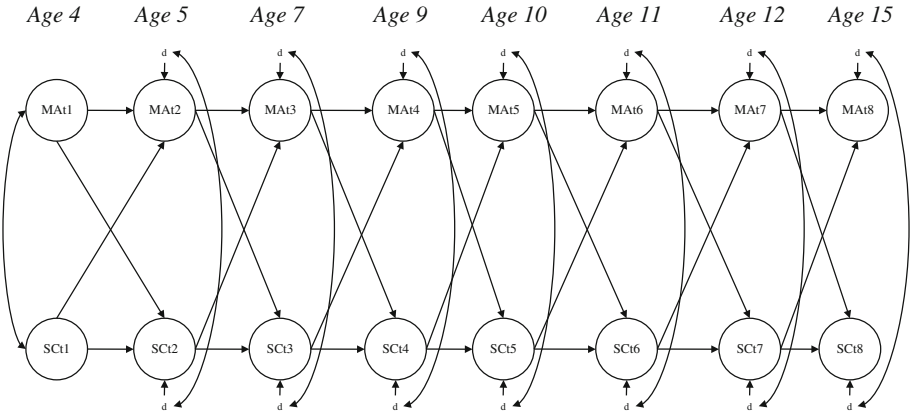

Fig. 2 Structural model of maternal attachment (MA) and self-control (SC)

Turning attention to our research questions, the cross-factor coefficients reveal support for the first hypothesis that self-control and maternal attachment have reciprocal effects on one another during childhood. Indeed, in seeking to explain levels of self-control and attachment at ages 5, 7, 9, and 10, all estimated relationships (for the effects of attachment on self-control and *vice versa*) are statistically significant. Thus, during this critical stretch of childhood, maternal attachment helps improve a child's self-control, but the child's self-control also influences subsequent maternal attachment to the child. Indeed, an examination of the standardized coefficients reveals that the effects of the child's self-control on maternal attachment are stronger than the influence of maternal attachment on self-control, especially when predicting outcomes at ages 5 and 7. For example, the standardized effect of maternal attachment at age 5 on self-control at age 7 is $\beta = 0.048$, whereas the standardized effect of self-control at age 5 on maternal attachment at age 7 is $\beta = 0.108$). Taken together, these results provide evidence in favor of reciprocal causation between attachment and self-control, but suggest that self-control is the more consequential factor, especially in the earliest years of the study period.[12]

A key question that remains is whether a similar pattern continues into adolescence. This brings us to our second hypothesis. The results from Table 4 generally reveal that this process does *not* continue into adolescence—the cross-factor effects between self-control and maternal attachment decay over time and, between age 10 and 11, the effects are no longer significant.[13] That is, self-control and maternal attachment do not appear to influence each other past the age of 10. We probed this issue further to increase our confidence in this result. Specifically, we evaluated the strength of the cross-factor effects over time by

[12] Although a discussion of relative standardized effect sizes is informative, we should note that there is a known bias with the standardized effects of self-control on maternal attachment—because the standardized coefficients come from weighting the unstandardized coefficients by the ratio of the variances, the standardized coefficients for self-control predicting maternal attachment will get smaller due to the fact that the variances for maternal attachment increase over time. As such, the effect size of self-control on attachment in later waves of data are biased toward zero.

[13] We also examined these relationships using a second-order, dual-process latent growth curve model. If there is variation between individuals with respect to the intercept and slope for maternal attachment and self-control, then these properties will not be correctly examined with the current approach since the structural equation model examines the covariance matrix. We do not find any evidence of a substantial variance for the intercept or slope for either of these factors.

Table 4 Unstandardized coefficients with robust standard errors in parentheses and standardized coefficients for structural equation model of self-control and maternal attachment (n = 1,364)

	Independent variables													
	Self-control							Maternal attachment						
Dependent variables	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)
Self-control														
Age 5	**0.784*** **(0.054)** **0.802**	–	–	–	–	–	–	**0.158*** **(0.061)** **0.069**	–	–	–	–	–	–
Age 7	–	**1.107*** **(0.055)** **0.897**	–	–	–	–	–	–	**0.117*** **(0.051)** **0.048**	–	–	–	–	–
Age 9	–	–	**1.003*** **(0.047)** **0.913**	–	–	–	–	–	–	**0.141*** **(0.059)** **0.062**	–	–	–	–
Age 10	–	–	–	**0.931*** **(0.043)** **0.945**	–	–	–	–	–	–	**0.091*** **(0.042)** **0.046**	–	–	–
Age 11	–	–	–	–	**0.974*** **(0.063)** **0.961**	–	–	–	–	–	–	0.013 (0.031) 0.011	–	–
Age 12	–	–	–	–	–	**0.838*** **(0.023)** **0.927**	–	–	–	–	–	–	0.025 (0.038) 0.012	–
Age 15	–	–	–	–	–	–	**0.825*** **(0.036)** **0.789**	–	–	–	–	–	–	0.006 (0.042) 0.004

Table 4 continued

	Independent variables													
	Self-control							Maternal attachment						
Dependent variables	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)
Maternal Attachment														
Age 5	**0.057* (0.019) 0.111**	–	–	–	–	–	–	**0.805* (0.060) 0.615**	–	–	–	–	–	–
Age 7	–	**0.049* (0.016) 0.108**	–	–	–	–	–	–	**0.726* (0.038) 0.754**	–	–	–	–	–
Age 9	–	–	**0.038* (0.012) 0.081**	–	–	–	–	–	–	**0.764* (0.045) 0.686**	–	–	–	–
Age 10	–	–	–	**0.031* (0.010) 0.050**	–	–	–	–	–	–	**1.156* (0.050) 0.842**	–	–	–
Age 11	–	–	–	–	0.004 (0.014) 0.008	–	–	–	–	–	–	**0.652* (0.028) 0.836**	–	–
Age 12	–	–	–	–	–	0.030 (0.016) 0.026	–	–	–	–	–	–	**0.896* (0.041) 0.787**	–
Age 15	–	–	–	–	–	–	0.021 (0.031) 0.019	–	–	–	–	–	–	**0.894* (0.054) 0.569**

Bold indicates a statistically significant effect

* $p < 0.05$ level

testing the following constraints: the difference between the effect of a factor at t on a factor at $t + 1$ and a factor at $t + 1$ on a factor at $t + 2$ is equal to zero. This constraint will provide a better model fit if the magnitude of the effect does not change across the waves.[14] Tests of these constraints, however, indicated that the declines in the magnitude of the coefficients across waves were significantly different from zero up to a certain wave. As such, each of these tests failed to meet the critical value for one degree of freedom (i.e. all constraints have $x^2_{(1)}$ change < 3.84) with an important exception. Constraining the effect of self-control at age 10 on maternal attachment at age 11 to be equal to the effect of self-control at age 11 on maternal attachment at age 12 provides a better fit to the data ($x^2_{(1)}$ change $= 8$). Past the age of 10, the model where these effects are constrained to be zero provides a slightly better fit to the data ($x^2_{(6)}$ change $= 13.4$), therefore suggesting no effect. This makes sense because the test above indicated that the model where these effects are constrained to be zero provided a slightly better fit to the data. This same finding holds for the other non-significant effects estimated in Table 4.

In sum, these tests support the general conclusion that the cross-factor (i.e. reciprocal) effects between self-control and maternal attachment decline over time, and that beginning at age 10, the effects are not statistically different from zero.[15] These results support hypothesis two and are consistent with Gottfredson and Hirschi's (1990) claim that parental socialization is consequential for the development of self-control only during the first decade of life. Indeed, it appears that the influence of self-control on maternal attachment also is limited to the first decade of life. These patterns therefore are consistent with the idea that key parent-child dynamics can become entrenched to some degree even before the child reaches adolescence.

Discussion

The study of the etiology of self-control has received significant attention in recent years, and many researchers have focused on the influence of parental socialization processes highlighted in *A General Theory of Crime*. Yet, several questions remain unresolved. In this paper, we focused on two issues that are particularly relevant to the development of self-control. First, we examined the extent to which self-control and maternal attachment are reciprocally related. Given that Gottfredson and Hirschi (1990:96) leave open the possibility for child self-control to influence parenting, this is an important issue to consider in seeking a more comprehensive understanding of the adequacy of Gottfredson and Hirschi's arguments. Moreover, such a consideration is consistent with a number of theoretical perspectives (Bell 1980; Moffitt 1993; Patterson 1982; Thornberry 1987) that

[14] Note that we are not testing the constraint that the effect of self-control at t on maternal attachment at $t + 1$ is equal to the effect of maternal attachment at t on self-control at $t + 1$ (i.e. cross-factor equality). Since the metrics for the items are not identical we cannot compare the unstandardized coefficients. Furthermore, since the variance for maternal attachment increases over time, the standardized coefficient for maternal attachment on self-control will be biased downward.

[15] Estimates for the effects of gender, race, and household type on self-control and maternal attachment showed little consistent effects on self-control or maternal attachment and thus were excluded from Table 4. In addition, we estimated the contemporaneous correlation between self-control and parental attachment. The correlation between the two latent factors is 0.2, 0.4 and 0.3 for waves 2, 3, and 4 respectively. These correlations represent the contemporaneous correlation between self-control and parental attachment after accounting for the cross-lagged and stability effects. Consistent with the estimates for the lagged effects, the contemporaneous correlation between the two latent factors for waves 5 through 8 are all less than 0.1 and are not significantly different from zero.

emphasize reciprocal effects between child behavior and various dimensions of parenting such as attachment, and a growing number of studies provide empirical evidence for these positions (Beaver and Wright 2007; Gault-Sherman 2012; Laird et al. 2003; Pardini et al. 2008; Snyder et al. 2005). Our second focus related to how this pattern of reciprocal association may unfold over time as children advance from childhood into adolescence. This sheds light on Gottfredson and Hirschi's contention that parenting should only be consequential for self-control during the first decade of life. Given the unique nature of the data available for this study, we were able to consider this issue in a way that goes beyond what the majority of past research has been able to achieve.

Two main findings emerged from our analysis of an 11-year period in which study children aged from roughly 4 to 15 years old. These conclusions are elaborated upon below, noting how each has theoretical implications for the general theory of crime. The first main finding of this study was that self-control and maternal attachment mutually influence one another during childhood. This finding not only provides evidence in support of Gottfredson and Hirschi's statements regarding the potential influence of self-control on parenting, but also provides support for other theoretical perspectives that emphasize reciprocal effects between child behavior and parenting. The analysis also indicated that the influence of self-control on attachment is slightly greater in magnitude than the influence of maternal attachment on self-control, something which is consistent with past research examining reciprocal effects between other dimensions of parenting and child behavior (Beaver and Wright 2007).

The second main finding to emerge was that reciprocal effects between maternal attachment and self-control varied across time. Specifically, the analysis revealed that the strength of the effect sizes not only diminished over time, but that they were reduced to nonsignificance starting in early adolescence. This finding is consistent with both our stated hypothesis and Gottfredson and Hirschi's position that parenting should only be consequential for self-control during the first decade of life. It is also interesting to note that the influence of self-control on maternal attachment, what we have referred to as a "child effect," also decayed over time and was not significantly different from zero during adolescence. It may be that maternal attachment patterns emerge primarily during childhood and are—on average—unaffected by child behavior during adolescence. Thus, while a child's self-control and a mother's attachment are still correlated beyond the first decade of life, this covariance is no longer causal in nature in these data beyond age 10. Instead, it reflects in large part the patterns that were established in the first decade of life.

We see these findings as having important theoretical implications for the general theory of crime. Most notably, the consistent effect of maternal attachment on self-control during the first decade of life supports Gottfredson and Hirschi's emphasis on the importance of parenting during this critical developmental period. At the same time, however, the consistent and substantively larger effects of self-control on attachment suggest the need for an elaborated understanding of the link between parental socialization and self-control. Parenting influences child development, but children also partially shape the parenting that they receive, even if the initial development of self-control is rooted in parenting practices during infanthood. The idea that individual self-control during childhood can shape parenting at the same time that parenting shapes the child's self-control should be more systematically incorporated into the general theory of crime. We believe that doing so is consistent with an important, often-neglected point made by Gottfredson and Hirschi (1990:96): "[I]ndividual differences may have an impact on the prospects for effective socialization…Effective socialization is, however, always possible whatever the configuration of individual traits." In short, child effects are likely, but parenting effects

should be present as well. This nuanced view has not typically been emphasized in the interpretation and testing of the general theory of crime, but that need not be the case moving forward.

It bears emphasizing that our findings and their theoretical implications should be considered in the context of study limitations. First, this study was only able to focus on the particular dimension of attachment. According to Gottfredson and Hirschi, parental attachment should only be consequential for the development of self-control insofar as it impacts parental monitoring and disciplinary practices. Unfortunately, the study data did not allow for a consideration of the relationship between self-control and these particular dimensions of parenting for the full duration of the study period. Further, it is possible that the reduction of the effect sizes for self-control and attachment during adolescence could have been the result of focusing on this dimension in particular. It is reasonable to consider that attachment would be influential for the development of self-control during childhood, as children spend a large amount of time in the presence of their parents. However, would this necessarily be the case during adolescence? Given that as children enter into adolescence they spend an increasing amount of time away from parents, it may be that monitoring and disciplinary practices emerge as the parenting dimensions that are most consequential for self-control during this period of development. We should note, however, that as we outlined in an earlier footnote, we were able to consider this issue for the last two waves of data, and produced results that were substantively the same as those presented in the paper—neither parental attachment, monitoring, nor hostility was reciprocally related to self-control during the final two waves of the study.

An additional limitation was that mothers provided the information used to measure both self-control and attachment. Given this, the results might be biased due to shared method variance stemming from the fact that a single informant was used to measure key study variables. However, there was reason to use mother reported indicators of self-control, as research provides evidence that self-control itself influences survey response (Piquero et al. 2000). This suggests that external reports of self-control provided by mothers or teachers might be preferable. In addition, the items used to measure self-control in this study closely parallel those used in previous studies. There is also good reason to believe that maternal reports of attachment are more appropriate for examining the influence of self-control on attachment—a maternal report of maternal attachment should be more valid than a child report of maternal attachment because the former provides a direct measure of attachment, whereas the latter would only provide a perceived measure of maternal attachment.

A final limitation worth considering is that although the design of our study enabled us to assess the reciprocal relationship between attachment and self-control across childhood and adolescence, we can make no claims to establishing how initial variation in self-control in the earliest years of life is related to parenting practices. That being said, Gottfredson and Hirschi (1990:96) contend that there likely is natural variation in self-control from birth, and the reciprocal processes examined here likely begin at ages earlier than what we were able to assess. Therefore, future research might examine reciprocal dynamics between very early child/infant self-control and parenting practices.

These limitations notwithstanding, this study draws attention to neglected aspects of the general theory of crime, and we hope that future research can improve upon our efforts. In particular, we see a number of ways in which additional work can be done in this area. First, although the data used for this study was collected from families located from around the United States, the data cannot be considered to be representative. Therefore, future research should seek to replicate our findings using data that is more representative of American youth. Second, researchers should seek to investigate whether self-control and

dimensions of parenting not included in this study (monitoring, discipline, hostility, and warmth) are reciprocally related during childhood. As has been discussed, it is quite possible that the strength of the associations between self-control and parenting might depend upon the specific dimension of parenting being considered.

In concluding, we note that, as with past research, this study provides evidence that parenting plays an important role in the development of self-control. At the same time, however, this study draws needed attention to the fact emphasized by other theoretical perspectives that the relationship between parenting and child development appears to be far more complex than what has been revealed by past research on the general theory of crime. Continued investigation on this issue should yield significant insight into the ways in which self-control develops over time.

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Appendix

See Table 5.

Table 5 Robust maximum likelihood estimates for measurement model of self-control and maternal attachment (n = 1,364)

Factor loadings								
	Self-control							
Construct indicators	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 8 (age 15)
Child is impulsive or acts without thinking	0.582	0.579	0.592	0.625	0.604	0.622	0.608	0.655
Child throws temper tantrums or is hot tempered	0.487	0.489	0.501	0.478	0.519	0.468	0.514	0.551
Child cannot sit still, is restless, or is hyperactive	0.663	0.642	0.672	0.665	0.656	0.640	0.608	0.607
Child is stubborn, sullen, or irritable	0.510	0.536	0.524	0.499	0.436	0.501	0.476	0.525
Child cannot concentrate or pay attention for long	0.579	0.621	0.615	0.624	0.580	0.652	0.0.628	0.654
Child destroys his or her own things	0.456	0.521	0.602	0.453	0.484	0.484	0.529	0.583
Child is disobedient at home	0.627	0.637	0.615	0.684	0.645	0.674	0.631	0.675
Child is disobedient at school	0.622	0.613	0.642	0.585	0.542	0.522	0.584	0.619
Child is cruel, bullies, or is mean to others	0.616	0.617	0.621	0.595	0.588	0.619	0.612	0.594
Alpha reliability	0.801	0.812	0.824	0.816	0.795	0.813	0.790	0.816

Table 5 continued

Construct indicators	Maternal attachment							
	Wave 1 (age 4)	Wave 2 (age 5)	Wave 3 (age 7)	Wave 4 (age 9)	Wave 5 (age 10)	Wave 6 (age 11)	Wave 7 (age 12)	Wave 8 (age 15)
I share affection and have a warm relationship with my child	0.401	0.503	0.479	0.517	0.592	0.527	0.493	0.568
If upset, my child seeks comfort from me	0.371	0.385	0.507	0.500	0.521	0.612	0.617	0.709
My child values his/her relationship with me	0.420	0.491	0.524	0.516	0.585	0.496	0.576	0.593
My child spontaneously shares information with me	0.552	0.622	0.631	0.587	0.649	0.709	0.712	0.640
I am easily in tune with what my child is feeling	0.554	0.644	0.617	0.563	0.673	0.561	0.631	0.639
My child openly shares feelings and experiences with me	0.656	0.597	0.723	0.680	0.743	0.721	0.798	0.729
Alpha reliability	0.763	0.751	0.732	0.741	0.776	0.759	0.791	0.795

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