PUBERTAL TIMING AS A MODERATOR OF THE ASSOCIATIONS BETWEEN PARENTAL RESTRICTIVENESS AND ADOLESCENT ALCOHOL ABUSE

by

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ABSTRACT

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Adolescent alcohol abuse increases across the adolescent years. If left unchecked, alcohol abuse can give rise to delinquency, poor grades, and risky sexual behavior (Stueve & O'Donnell, 2005; Ellickson, Tucker, & Klein, 2003). Past research suggests that minimal parental oversight increases the risk for adolescent alcohol abuse. There is also evidence, however, that parents withdraw from oversight in the face of adolescent problem behaviors (Barber & Olsen, 1997; Hafen & Laursen, 2009). Each may vary according to the child's physical development. Parents may respond to pubertal maturation with reduced supervision and early maturing girls may be sensitive to parent supervision because of the additional pressures and attention they receive from older, possibly deviant, peers (Stattin, Kerr, & Skoog, 2011).

The present investigation will test parent-driven and child-driven models of associations between parental restrictiveness and adolescent alcohol abuse. The parent-driven model assumes that parental restrictiveness predicts changes in adolescent alcohol abuse. The child-driven model assumes that adolescent alcohol abuse predicts changes in parental restrictiveness. Moderated models will be considered, whereby parent-driven and child-driven effects are moderated by pubertal timing.

Trajectories of parental restrictiveness and adolescent alcohol abuse were explored in a community sample of Swedish adolescent girls across grades 7 to 10. Parallel process growth curves were used to determine if the initial level of parental restrictiveness predicted the rate of change in adolescent alcohol abuse and if the initial level of adolescent alcohol abuse predicted the rate of change in parental restrictiveness. Multiple group analyses determined if patterns of associations were stronger among early maturing girls than among on-time and late maturing girls.

Results revealed that from grade 7 to grade 10, parental restrictiveness linearly decreased and adolescent alcohol abuse linearly increased. For all girls, higher initial alcohol abuse predicted greater declines in parental restrictiveness over time. For early maturing girls (only), lower initial parental restrictiveness predicted greater increases in alcohol abuse over time. Implications of this study are framed in terms their potential contributions to theories of female pubertal maturation. Low parental restrictiveness early in adolescence appears to be a risk factor for the development of alcohol abuse throughout adolescence among early maturing girls. Non-restrictive parents may fail to prevent early maturing girls from socializing with deviant peers - a mechanism that may drive the growth of alcohol abuse.

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INTRODUCTION

Alcohol abuse in adolescence is a pervasive problem with unfortunate consequences. Alcohol use increases across the adolescent years (Stattin & Magneusson, 1990; Rohde, Lewinsohn, Kahler, Seeley, & Brown, 2001) with the most consistent indicator of current use being the age at first use (Rohde et al., 2001). The earlier in life an adolescent begins to regularly abuse alcohol, the greater the amount of alcohol he or she will consume in late adolescence (Hawkins, Catalano, & Miller, 1992; Rohde et al., 2001). The negative consequences of alcohol abuse in early adolescence extend well beyond adolescence. Youth who first consume alcohol before age 15 are at four-times greater risk to later develop a dependence on alcohol than those who first consume alcohol in early adulthood (Grant & Dawson, 1997). According to data from the National Longitudinal Alcohol Epidemiologic Study (Grant & Dawson, 1997), 40.6% of adolescents who were 12 years old or younger when they first consumed alcohol developed a dependence on alcohol during adulthood. This rate falls to 16.6% if the age at first consumption was 18. Alcohol abuse in early adolescence has also been linked increased rates of risky sexual behavior (Stueve & O'Donnell, 2005), higher levels of delinquent behaviors (Ellickson, Tucker, & Klein, 2003), and poorer academic performance (Grunbaum, Kann & Kinchen, 2004) in mid- and late adolescence. Early adolescent alcohol abuse has also been associated with elevated levels of adult employment problems, substance abuse, and criminal behaviors (Ellickson et al., 2003).

Parental behaviors have been linked to adolescent alcohol use. There is some evidence to suggest that low levels of parental rule setting and supervision can promote the growth of adolescent alcohol abuse. For example, parents who fail to supervise adolescent activities, and parents who do not restrict risky adolescent behavior, tend to encourage negative child outcomes (Barber & Olsen, 1997; Galambos, Barker, & Almeida, 2003). But other evidence suggests that parents grow discouraged in attempts to control adolescent behavior in reaction to patterns of adolescent alcohol use. For example, parents of children who abuse alcohol become less knowledgeable of adolescent behaviors (Stavrinides, Georgiou, & Demetriou, 2010), and make fewer attempts to supervise children over time (Clark, Kirisci, Mezzich, & Chung, 2008). Thus, parenting behaviors may shape and be shaped by adolescent behavior problems.

Child characteristics such as pubertal timing may moderate the influence that parents and adolescents exert over one another. In particular, early pubertal timing has been linked to noticeable and problematic changes in how parents and adolescents interact with each other (Huddleston & Ge, 2003; Weichold, Silbereisen, & Schmitt-Rodermund, 2003). Some studies find that early pubertal timing heightens the risks associated with ineffective parenting to increase rates of negative adolescent outcomes (Costello, Sung, Worthman, & Angold, 2007; Westling, Andrews, Hampson, & Peterson, 2008). As such, it is not unreasonable to postulate that parent-adolescent influence varies as a function of adolescent pubertal timing. Parent-driven effects may be amplified by pubertal timing because early maturing adolescents may have coping mechanisms that are not commensurate with their apparent maturity, leaving them vulnerable to the ill-effects of ineffective or poor parenting practices (Ge, Conger, & Elder, 1996). Child-

driven effects may be amplified by pubertal timing because parents inclined to react to difficulties by withdrawing supervision may be further encouraged to do so by the child's adult-like appearance. By comparing parent-driven and child-driven effects across families with adolescents who differ in pubertal timing, the ways in which pubertal timing impacts parent-child influence can be isolated.

The present study will examine changes in parental restrictiveness and adolescent alcohol abuse across the adolescent years. Growth curve analyses will identify concurrent and prospective associations between initial levels and rates of change in adolescent alcohol abuse and initial levels and rates of change in adolescent perceptions of parental restrictiveness. Child-driven and parent-driven models will be tested. To explore child-driven influence, analyses will examine over-time associations from adolescent alcohol abuse in the seventh grade to changes in perceived parental restrictiveness across the seventh to tenth grades, testing the hypothesis that high initial alcohol abuse will be associated with declines in parental restrictiveness. To explore parent-driven effects, analyses will examine over-time associations from perceived parental restrictiveness in seventh grade to changes in adolescent alcohol abuse across seventh to tenth grades, testing the hypothesis that low initial restrictiveness will be associated with greater increases in adolescent alcohol abuse. Multiple group analyses will determine if pubertal timing moderates over-time associations between adolescent alcohol abuse and parental restrictiveness, testing the hypothesis that associations will be stronger for early maturing adolescents than for on-time and late maturing adolescents.

Parent-driven Models of Change

In parent-driven models, child behaviors are assumed to be the product of socialization efforts by parents. In such models, initial parent behaviors predict changes in child behaviors over time. Optimal parental behaviors are those thought to promote positive child outcomes or are those that protect children against negative influences in their social environment. Positive child outcomes imply proper socialization, wherein children acquire the skills, behaviors, and motivations necessary to adapt to, and function within, the surrounding culture (Maccoby, 2007). Positive child outcomes may be promoted when a given parenting behavior is high, whereas negative child outcomes may occur when such behavior is low or is not apparent. For example, parents who are unwilling or unable to supervise and regulate children's behavior fail to prevent children from engaging in delinquent behaviors. In contrast, parents who are firm in maintaining limits, yet fair in how they respond to children, successfully undercut the formation of unhealthy behaviors. As such, effective parenting is likely a combination of multiple strategies including emotional responsiveness, parental awareness, the establishment of rules and curfews, and defining what is, or is not, an acceptable behavior (Kakihara et al., 2010).

Parent-driven models explore how variation in a given parenting behavior is associated with variation in one or more child outcomes. Parent-driven models are best demonstrated in a longitudinal framework in which temporal casual assumptions (i.e., from parent to child) can be inferred. In order to demonstrate influence over time, several conditions should be met. First, the initial relationship between the parenting characteristic or behavior of interest and the child behavior must be estimated (i.e.,

correlated). Next, both parent and child behaviors must be associated with themselves over time, either with stability paths, or a modeling of their trajectories. Finally, the initial level of the parenting behavior must be associated with the child's behavior at a later time point. This association between the initial level of a parenting variable and the later child outcome represents parental influence, or the effect the parent has on changes in a child's behavior over time. If the data support the a priori hypothesized association, the researcher can then draw conclusions about mechanisms responsible for such influence.

Parental restrictiveness is well suited for predicting later changes in adolescent alcohol abuse. When children enter adolescence, most parents still exercise substantial control over when and where adolescents socialize with friends. As such, parents are equipped to identify and prevent their children from associated with troubled peers (Dishion & McMahon, 1998). This is critical considering that deviant behaviors such as alcohol abuse are often learned from delinquent adolescent friends (Dishion, Andrews, & Crosby, 1995). If parents fail to maintain adequate levels of restrictiveness, many children will have more opportunities to engage in problem behaviors. Thus, parent-driven effects are supported by a negative association between initial restrictiveness and later adolescent delinquency. In other words, less restrictive parents promote greater increases in adolescent misbehavior. Non-linear effects are possible. Excessive levels of restrictiveness may interfere with adolescents' growing demands for autonomy, resulting in conflict and a disruption of parent-child relationships. This disruption, in turn, may also promote increases in adolescent misbehavior. In this case, both low and high levels of restrictiveness result in negative outcomes. Thus, parent-driven effects would be

identified with a curvilinear association between parental restrictiveness and adolescent misbehavior.

It is important to note that the definition of parental restrictiveness varies across studies. Some researchers equate it with behaviors in which parents actively set rules and require children to ask permission to engage in unsupervised activities (i.e., behavioral control). Restrictiveness has also been defined as instances when parents force obedience through coercive means (i.e., psychological control). For the purposes of the current study, restrictiveness will be operationalized as parental regulation of adolescents' free-time activities and who they socialize with. According to Kakihara and colleagues (2010), restrictiveness likely taps the domains of both behavioral and psychological control. It could be interpreted as a form of behavioral control because it limits adolescents' behavior. Alternatively, it could be interpreted as a form of psychological control because it interferes with adolescents' autonomy.

Research on parent-driven models. There is evidence to support the proposition that parents foster negative child outcomes by failing to place restrictions and limitations on children's behaviors. Importantly, when researchers compare multiple parental behaviors (e.g., psychological control, behavioral control, social support, etc), restrictiveness has the strongest negative concurrent association with adolescent adjustment problems such as antisocial behavior, substance use, and delinquency (Barber & Olsen, 1997). Longitudinal associations have been identified as well. Low levels of parental restrictiveness (defined as behavioral control) have been linked to stronger than normative growth in externalizing behaviors, which typically increase across adolescence (Galambos, Barker, & Almeida, 2003).

Nonrestrictive parents may also indirectly encourage negative child outcomes by failing to regulate adolescents' experiences with peers. For example, in one study, adolescents whose parents maintained low levels of involvement, monitoring, and expectations formed more relationships with friends who consumed alcohol throughout adolescence, and therefore were more likely to consume more alcohol as they aged (Simons-Morton & Chen, 2005). In another study, seventh and eighth graders more often engaged in binge drinking when compared to other adolescents if their parents did not restrict their nightly activities or monitor their affiliations (Guilamo-Ramos, Jaccard, Turrisi, & Johansson, 2005). Thus parental restrictiveness may be key in limiting the negative influence of troubled peers have on adolescent alcohol abuse. Further research has found that adolescents with unrestrictive parents (e.g., children did not need permission to go out at night) report greater increases of alcohol consumption over the following year when compared to adolescents with restrictive parents (van der Zwaluw et al., 2008). Taken together these findings suggest that lax parenting can serve as a risk factor in the development of adolescent alcohol abuse.

Child-driven Models of Change

In child-driven models, the behaviors, conduct, or characteristics of children are assumed to elicit changes in parental behaviors over time (Laursen & Collins, 2009). Children who avoid engaging with parents, or those who are not receptive to parental inquiries, may exercise a fair degree control over the expression of parenting behaviors (Kerr, Stattin, & Pakalniskiene, 2008). Theorists have proposed several mechanisms underlying such effects. Some have suggested that parents change or adapt parenting strategies based on the degree to which their children's behaviors or characteristics meet

with their expectations (Bell, 1968). The effects may begin early in a child's life. For example, parents may more often attend to and interact with easy-going infants when compared to infants with difficult temperaments (Lytton, 1990). Over time, parents may also respond differently depending on a child's physical characteristics, such as physical attractiveness (Ritter, Casey, & Langlois, 1991), physical health (Quittner & Opipari, 1994), phonotypic similarity to themselves (Alvergne, Faurie, & Raymond, 2007), and perceived maturity (Lerner, Lerner, & Finkelstein, 2001). Other models describe how child behaviors evoke similar parent behaviors. Positive parenting practices may, in actuality, be a reflection of positive child behaviors. For example, the child's willing disclosure of his or her own activities may explain much of the variance in parental monitoring (Kerr, Stattin, & Pakalniskiene, 2006). In contrast, oppositional child behaviors may elicit coercive parental behaviors. Thus, parents may respond to positive child behaviors with affection and attention, just as they may respond to problem behaviors by reducing affection and withdrawing from the children.

With the onset of adolescence, most parents begin to withdraw from supervision and support as offspring are expected to adopt responsible adult-like behaviors (Pagani, Tremblay, Vitaro, Kerr, & McDuff, 1998; Hafen & Laursen, 2009). In this case, adolescents influence the timing and rate of the parental withdrawal and the expansion of autonomy granting. Some theorists have suggested that parents withdraw from important responsibilities earlier than is typical if adolescents consistently demonstrate troubled behaviors. It is often presumed that such behavior reflects parents who relinquish responsibility in response to complications in parent-child interactions. Specifically, the negative reinforcement trap describes how child problem behaviors and parental

disengagement are reinforced (Patterson, 1982). Thus, parents are rewarded for relenting in the face of difficulties in handling adolescents.

Research on child-driven models. Several studies suggest that early adolescent maladjustment can precipitate changes in parental behaviors, which persist across adolescence. Disruptive child behaviors inhibit optimal parental discipline strategies (Simons, Chao, Conger, & Elder, 2001). Parental strategies may also be undermined by a lack of parental knowledge. For example, parents of highly delinquent adolescents become less knowledgeable of adolescents' activities over time (Laird, Pettit, Bates, & Dodge, 2003). Other parental behaviors may be negatively affected as well. In particular, parents respond to elevated levels of adolescent externalizing problems by withdrawing social support and reducing attempts to control adolescents' behaviors (Hafen & Laursen, 2009; Stice & Barrera, 1995). In one study, high levels of substance abuse on the part of daughters were associated with subsequent withdrawals of support and control on the part of parents (Huh, Tristan, Wade, & Stice, 2006). In another study, adolescents' socializations with deviant peers at age 15-16 predicted greater than normative declines in constraints on adolescent autonomy two years later (Dishion, Nelson, & Bullock, 2004). A similar withdrawal of parental monitoring has been reported in response to earlier avoidant adolescent behaviors (Kerr & Stattin, 2003). Most interestingly, a follow up study suggested that parental withdrawal of supervision may not be motivated by the presence of problem behaviors themselves, but by parents' acquiescence to adolescent refusals to communicate about their activities (Kerr et al., 2008).

The association between adolescent alcohol abuse and subsequent changes in parental regulation is less well established. A few studies suggest that parents withdraw from supervising and regulating their children's behaviors in response to adolescent alcohol abuse. Recent findings indicate that alcohol use in early adolescence anticipates less effective parental supervision later in adolescence (Clark et al., 2008). One recent study found that children who showed signs of alcohol dependence in early adolescence were less likely to disclose information to parents three months later when compared to other adolescents (Stavrinides et al., 2010).

Pubertal Timing as a Moderator of Parent-driven and Child-driven Models of Change.

The onset of pubertal maturation corresponds with an immediate shift in many aspects of the parent-daughter relationship. The daughter's perceptions of her parents, and the parent perceptions of the daughter changes following menarche and the development of secondary sexual characteristics. According to Hill (1988), when compared to physically immature girls, postmenarchal girls perceived mothers as less accepting and less influential. Importantly, the relative timing of children's pubertal maturation may give rise to additional changes in parent-child relationships. For example, when compared to on-time and late maturers, early maturing girls report more conflict with and more distance from parents (Huddleson & Ge, 2003; Weichold et al., 2003). Changes in parent-child relationships that result from early pubertal timing may well increase the risks associated with early adolescent alcohol abuse and low parental supervision during early adolescence.

Pubertal timing can also correspond with a shift in peer relationships that may increase opportunities for alcohol consumption, and may effect changes in the dynamics between parents and adolescents. With newfound changes to their physical appearance, early maturing girls begin to experience increased attention from older males (Stattin et al., 2011). Additionally, by recognizing that they are no longer physically similar to their same age peers, early maturing girls will seek out and form friendships with older, more physically developed, peers (Kandel, 1985). Given that older adolescents are more delinquent on average (Laub & Sampson, 2003), particularly those who choose to affiliate with younger peers (Stattin & Magneusson, 1990), early maturing girls' chances of forming a friendship with a deviant youth are elevated. Not surprisingly, a number of studies have found that adolescents are more likely to abuse alcohol if their friends abuse alcohol as well (Ary, Tildesley, Hops, & Andrews, 1993; Sieving, Perry, & Williams, 2000; Stice, Barrera, & Chassin, 1998). Because of this, parenting strategies which fail to prevent opportunities to socialize with deviant peers may encourage earlier maturers' alcohol abuse. Also, early maturing girls may well learn how to better manage their parents from their more experienced friends.

Theoretical rationales underlying differential risks associated with pubertal timing. Five developmental theories discuss why early pubertal maturation may exacerbate parent-driven and child-driven effects. First, according to the "off-time" hypothesis, early and late maturing adolescents face emotional distress due to greater dissimilarity between themselves and their same-age, same-sex cohorts (Caspi & Moffitt, 1991). Under this hypothesis, if maturation is early, adequate levels social support may not be available, thereby resulting in adjustment difficulties for girls. The risks associated

with off-time development is especially acute for early maturing girls because boys mature later, meaning early maturing girls are further physically distinguished within the peer group as a whole. Possibly as a result, early maturing girls are often dissatisfied with their physical appearance, and therefore experience lower self-esteem and elevated stress (Gatti, Ionio, Traficante, & Confalonier, 2014). Those suffering from low self-esteem may choose to avoid discussing their problems and issues with parents. As such, the risk that parents may withdrawal from engaging and monitoring their children may be elevated. Additionally, early maturing girls struggling with a poor self-image may react poorly to parent's haphazard attempts to provide suitable support. In response, early maturing girls may resort to abusing alcohol as a coping mechanism.

Second, according to the early-maturation hypothesis (Livson & Peskin, 1980), early pubertal maturation results in the premature termination of skill-acquisition during childhood. Specifically, early maturers have less time to develop the social skills required to gracefully transition into adolescence (Graber, Brooks-Gunn, & Archibald, 2005). Early maturing girls also face heightened expectations to act in a more mature fashion than would normally be expected (Susman & Dorn, 2009). As a consequence, early maturers are ill-prepared for coping with these additional social complexities and demands (Brooks-Gunn & Reiter, 1990). Ineffective coping, therefore, may translate into increased vulnerability to negative peer and parental influence (Ge et al., 1996) which may lead to the growth of problem behaviors. For example, cold and distant parenting, in particular, has been linked to poorer adaptability among early maturing girls (Ge et al., 2002). Therefore, in terms of parent-driven effects, early pubertal timing may increase the risk that poor or negative parenting behaviors promote increases in adolescent alcohol

abuse. In terms of child-driven effects, early pubertal timing promotes the risk that parents may respond to adolescents' ineffective coping strategies by withdrawing sooner than is normal.

Third, the expectancy violation realignment model proposes that a mismatch between parenting practices and adolescent pubertal timing may also result in negative adolescent outcomes (Collins, 1995; Laursen & Collins, 2009). According to this theory, parent-child interactions are mediated by cognitive/emotional processes that are sensitive to expectations (Collins & Madsen, 2003). Parental expectations are challenged when early maturing adolescents act in a manner consistent with their physical, but not chronological, development. Parents who are either unable, or unwilling, to adjust behavior to meet the needs of an early maturing adolescent, or parents who do so to an excessive degree, may encourage emotional separation (Laursen & Collins, 2009). Emotional separation may, in turn, hasten parents' disengagement from supervision and rule setting. In terms of child-driven effects, emotionally distant parents of early maturing girls may be at a greater risk for withdrawing parental responsibilities when challenged by adolescent problem behaviors. In terms of parent-driven effects, early maturing girls may respond to emotional separation and lack of parental supervision by further integrating with their peer network. Consequently, this scenario heightens the likelihood that early maturing girls will abuse alcohol with peers.

Fourth, according to the contextual-amplification hypothesis (Ge, Natsuaki, Jin, & Biehl, 2011), well-established social contexts in the lives of adolescent girls moderate the relationship between pubertal timing and adolescent problem behaviors. As such, early maturing girls who already struggling with entering adolescence may face additional

adversities such as coping with poor parenting (Ge et al., 1996), living in disadvantaged neighborhoods (Ge et al., 2002), navigating school transitions (Simmons & Blyth, 1987) or socializing with deviant peers (Ge et al., 2002; Obeidallah, Brennan, Brooks-Gunn, & Earls, 2004). Individually, or taken together, these stressful social environments have the potential to overwhelm early maturing girls' underdeveloped coping resources (Ge & Natsuaki, 2009). In their attempts to manage this stress, early maturing girls become more sensitive to variations in parenting behaviors. If parenting is less than optimal, early maturers may find refuge by engaging in delinquent behaviors with peers. However, the exact mechanism underlying this process is not yet clear. Early maturers may actively seek out such peer relationships in response to home stressors, or alternatively, preexisting associations with deviant peers may only exacerbate negative outcomes due to poor parenting (Ge & Natsuaki, 2009). In either scenario however, accumulated stressors make youth more vulnerable to the risks of poor parenting. Poor parenting, in turn, may foster the development of adolescent alcohol abuse. In terms of child-driven effects, parents may respond to early maturing girls' difficulties in managing stress by withdrawing from important parental responsibilities. In this manner, early pubertal timing is a risk factor for faster rates of parental withdrawal over time.

Fifth, according to the peer socialization hypothesis, peer influence drives the association between early pubertal timing and elevated problem behaviors among girls. Because adolescents tend to establish and maintain friendships with those whom they share similarities with (Kandel, 1985), early maturing girls will seek out and form relationships with older peers who are at the same level of physical development. This increases the chance that they will form friendships with delinquent adolescents (Laub &

Sampson, 2003; Stattin & Magneusson, 1990). While exposure to older, delinquent, peers means more access to alcohol, it also likely means more access to models who withhold information from parents. Early maturing girls may, as a result, gain knowledge and experience in how to best manage their parents' behaviors. In terms of child-driven effects, early pubertal timing may increase the risk that alcohol abuse will lead to parental withdrawal of responsibilities. In addition, because early maturing girls have more opportunities to abuse alcohol with deviant peers, parental behaviors which limit such opportunities may hold greater influence on the development of alcohol abuse than would be normal. As such, in terms of parent-driven effects, early pubertal timing may increase the risk that lax parenting promotes increases in adolescent alcohol abuse.

Research on early maturing girls and parental restrictiveness. Early pubertal maturation may be a risk factor for low levels of parental restrictiveness. Past research has found that parents tend to give more leeway to early maturing adolescents. For example, parents of early maturing girls are more willing to give permission to begin dating, and expect more responsible behavior when compared to adolescents who mature on-time (Lerner et al., 2001). Parents and teachers are more inclined to remove supervisory constraints on early maturing adolescents than late maturing adolescents (Silbereise, & Kracke, 1997). These findings are consistent with the notion that parents expect early maturing girls to act in a socially mature fashion, and as such, grant them greater freedom to do so. However, it is important to note that parent expectations may be independent of the extent to which early maturing girls are emotionally prepared to handle such opportunities.

Research on early maturing girls and alcohol abuse. Several studies have found that early pubertal maturation is a risk factor for heightened levels of adolescent alcohol abuse. Among girls, early pubertal timing has been linked to earlier onset of consuming alcohol (Dick, Rose, Viken, & Kaprio, 2000; Deardorff, Gonzales, Christopher, & Roosa, 2005) and to elevated levels of alcohol abuse throughout adolescence (Stattin & Magneusson, 1990; Tschann, Adler, Irwin, Millstein, Turner, & Kegeles, 1994). These findings have been replicated across a multitude of countries and cultures (Biehl, Natsuaki, & Ge, 2007). Additionally, the trajectory of growth of adolescent alcohol abuse is steeper among early maturing girls (Biehl et al., 2007). The negative consequences of alcohol abuse among early maturing girls also have been found to persist into early adulthood (Dick et al., 2000).

Pubertal timing as a moderator of parent-driven effects. Research has indicated that early pubertal timing may increase girls' sensitivity to parent-driven effects. Early maturing girls tend to experience greater psychological stress across adolescence. Some evidence suggests that this trend may be a result of increased vulnerability to negative family factors such as parental hostility (Ge et al., 1996). For example, early maturing boys and girls are more likely to develop externalizing problems and associate with deviant peers if parents are non-supportive, harsh, and inconsistent (Ge, Brody, Conger, Simons, & Murry, 2002). Less is known about the interaction of pubertal timing and parental behavior on adolescent alcohol abuse. Most studies are cross-sectional. Logistic regression models have revealed that poor parental supervision was uniquely associated with a greater likelihood of alcohol use among early maturers of both genders (Costello et al., 2007). Parents mediated the concurrent association between

early pubertal maturation and alcohol abuse by being more willing to relax alcohol-specific rules for early maturers (Schelleman-Offermans, Knibbe, Engels, & Burk, 2011). In one longitudinal study, parent reports of monitoring in sixth and seventh grade moderated the effects of affiliation with deviant peers on adolescent alcohol use one year later. Early pubertal timing predicted a greater likelihood of alcohol use if parents were low or moderate in monitoring, but not if they were high (Westling et al., 2008). Thus, it appears that early pubertal timing may be a risk factor the development of adolescent alcohol abuse over time, possibly because parents fail to maintain rules and prevent the formation of associations with deviant peers.

Pubertal timing as a moderator of child-driven effects. Few studies have examined the potential moderating effects of pubertal timing on associations between adolescent adjustment and subsequent parenting. One study found that early maturing males, but not females, experienced increasing levels of conflicts with mothers over time (Steinberg, 1987). In another study, early maturing girls reported higher levels of conflict with parents, who reported higher levels of stress and anxiety than those with later maturing offspring (Savin-Williams & Small, 1986). No studies of parenting behaviors have been conducted, so although it is possible that parents respond to early maturing girls in a different manner when compared to on-time and late maturing adolescents, differential changes in parenting in response to problem behaviors have not been documented.

Modeling Parent-driven and Child-driven Effects across Adolescence

The goals of the present study are to examine longitudinal associations between parental restrictiveness and adolescent alcohol abuse, and to determine if these associations are moderated by pubertal timing. To this end, latent growth curve modeling (LGCM) will explore concurrent and prospective associations between parent behaviors and child behaviors over time. Growth curve modeling is a powerful tool that can be used to investigate inter-individual (i.e., within-person) trajectories of a behavior over time. In LGCM, both the initial level (i.e., intercept), and the growth of a variable over time (i.e., slope) are fitted as latent variables. With three time points, linear rates of change can be estimated, with four time points, non-linear (i.e. quadratic) rates of change can be estimated. Importantly, means and variances of these slopes can be estimated, allowing for the prediction of individual differences in change over time via the addition of exogenous predictors (Curran, 2000).

In a parallel process growth curve model, two growth curves are included that can be linked to each other in order to determine if initial levels of one variable account for individual differences in growth of the other variable and vice versa. Such a model is well-suited for the study of parent-child relationships over time. For example, parallel process modeling can be used to determine if relatively lower or higher levels of a given parental behavior result in steeper increases in a child's problem behavior over time, and if relatively lower or higher levels of a given child behavior result in steeper declines in a parent's behavior over time.

Parallel process modeling has advantages over other bidirectional models such as cross lagged panel modeling. Cross-lagged models typically only identify fixed effects over two-wave segments, and can only describe changes in participants' scores in relation to the entire sample, not in relation to their own previous scores (Curran, 2000). Because of this limitation, cross lagged models may give the false impression that a participant's stable score is *decreasing* over time, when in actuality, a majority of the sample is *increasing* over time. As growth curve modeling tracks inter-individual change, not changes in relative standing over time, directionality of change is easily interpreted. In addition, cross lagged models may artificially inflate parent-driven and child-driven associations as they do not appropriately account for overlapping trajectories of change from parents and children. Such correlated changes may be a consequence of shared environmental or genetic factors, or they may represent smaller scale parent-child interactions wherein the agent of influence is obscured. In parallel process modeling, correlations between the slopes of parents and children are partitioned from over-time, parent-driven, and child-driven effects. Given these advantages, parallel process models are better suited for investigating parent-driven and child-driven effects in tandem across adolescence. For the present study, parallel process modeling can determine if initial levels of parental restrictiveness influence the slope of adolescent alcohol abuse and can determine if initial levels of adolescent alcohol abuse influence the slope of parental restrictiveness. Multiple group models will determine if these associations differ as a function of adolescent pubertal timing.

Hypotheses for the Proposed Study

The proposed study will test over time associations between parental restrictiveness and alcohol abuse across the adolescent years in a large community sample of female adolescents. Three hypotheses will be tested.

The first hypothesis will test a parent-driven model in which parenting predicts adolescent alcohol abuse. Consistent with past research identifying the negative influence of lax parenting on adolescent problem behaviors (Galambos et al., 2003), I predicted that lower levels of parental restrictiveness in early adolescence will predict increases in adolescent alcohol abuse from age 13 to 16.

The second hypothesis will test a child driven model in which child behavior predicts parenting. Consistent with past research linking adolescent problem behaviors to later parental withdrawal (Hafen & Laursen, 2009; Kerr et al., 2008), I predicted that higher levels of adolescent alcohol abuse in early adolescence will predict decreases in parental restrictiveness from age 13 to 16.

The third hypothesis will test whether pubertal timing moderates child-driven and parent-driven effects. Consistent with contextual-amplification hypothesis (Ge et al., 2011), I predicted that the association from parental restrictiveness to changes in adolescent alcohol abuse will be stronger for early maturing girls than on-time or late maturing girls, because early maturing girls may be more sensitive to the negative effects of lax parenting. Given the absence of theoretical justifications or empirical support, I did not make specific predictions concerning moderated associations between initial alcohol abuse and changes in parental restrictiveness.

METHOD

Participants

Participants included 957 girls from the *10 to 18 Project*, a longitudinal study of Swedish adolescents conducted from 2002 to 2007. Participants included students enrolled in five public middle schools in a central Sweden community. The present investigation included students who were in the 7th, 8th, or 9th grades at the outset. Seventh graders ranged in age from 12 to 15 (M = 13.21, SD = 0.43). Eighth graders ranged in age from 13 to 16 (M = 14.23, SD = 0.45). Ninth graders ranged in age from 14 to 17 (M = 15.23, SD = 0.47). Over 91% of the sample were ethnic Swedes (n=877). Of the parents who reported their work status, 58.7% (n = 314) of mothers indicated full-time employment, 35.3% (n = 189) indicated half-time employment, and 6.0% (n = 32) were not employed; 93.9% (n = 463) of fathers indicated full-time employment, 2.6% (n = 13) indicated half-time employment, and 3.5% (n = 17) were not employed.

Procedure

Students were recruited in classrooms during school hours. They were informed that participation was voluntary and were assured that answers would not be shared with parents, teachers, or police. Parents were informed about the study through community and school meetings, and through the mail. Parents received a postage-paid card to return if they did not wish to have their child participate in the study and approximately 1% did so. Parents and students were informed that they were free to end participation in the study at any time. The study was approved by a local human subjects review board.

Data were collected in the spring for five consecutive years from all middle school girls (*n*=1211) in the community. A total of 254 girls did not provide retrospective reports of age at menarche and were omitted from the study. A total of 165 girls (17.2%) participated in four waves of data collection, 349 girls (36.5%) participated in three waves of data collection, 326 girls (34.1%) participated in two waves of data collection, and 117 girls (12.2%) participated in one wave of data collection. There were no differences on any study variables between those included in the investigation and those excluded because participants did not provide reports of age of menarche.

Instruments

Participants completed questionnaires at annual intervals.

Adolescent reports of parental restrictiveness. At each wave of data collection, participants completed a 6-item questionnaire assessing perceptions of freedom and responsibility granted by parents (Kakihara, Tilton-Weaver, Kerr, & Stattin, 2010; See Appendix A). Items were rated on a scale ranging from 1 *(never)* to 3 *(most often)*. Items were reverse coded so that higher values indicate greater restrictiveness. Responses were averaged across items. Internal reliability was adequate (α = .78-.82).

Adolescent reports of alcohol abuse. At each wave of data collection, participants completed a 3-item measure assessing the frequency of alcohol intoxication during the past month or year (Laursen, Hafen, Kerr, & Stattin, 2012; See Appendix B). Items were scored on a 1 (*no, it has not happened*) to 3 (*several times*) scale. Responses were averaged across items. Internal reliability was good (α = .82-.89).

Pubertal timing. At the first, second, and fifth waves of data collection, participants aged 13 and older were asked to report age at first menstruation (Dick et al., 2000; See Appendix C). Participants were categorized as early maturing (*n*=184, menarche before age 12), on-time (*n*=587, menarche between ages 12 and 13), and late maturing (*n*=186, menarche after age 13). Participants aged 13 or older who were still premenarcheal were categorized as late maturing.

Control Variables

Household structure. At the first wave of data collection, participants described their household living arrangements. A dummy coded variable was created based on participants' responses (See Appendix D). Participants who lived with two biological parents or with adoptive parents were coded as 1, participants who lived with one or fewer biological or adoptive parents were coded as 0.

Adolescent reports of parental warmth. At each wave of data collection, participants completed a 12-item questionnaire assessing adolescent perceptions of parental warmth (Persson, Stattin, & Kerr, 2004; See Appendix E). Items were rated on a scale ranging from 1 *(never)* to 3 *(often)*. Responses were averaged across items. Internal reliability was adequate (α = .70-.78).

Plan of Analysis

Separate growth curves for parental restrictiveness from grade 7 to grade 10 and adolescent alcohol abuse from grade 7 to grade 10 were created within a structural equation modeling framework, using Mplus v7.12 (Muthen & Muthen, 2012) with MLR estimation. Each growth curve modeled intra-individual change in parental restrictiveness and intra-individual change in adolescent alcohol abuse. The latent factors of the

intercept (mean levels) and the slope (change over time) for each variable were modeled with factor loadings at each time point. The latent constructs were based on four annual measurements.

Next, a parallel process growth curve model examined associations between parental restrictiveness and adolescent alcohol abuse. Figure 1 presents this parallel process measurement model. Intercept loadings were set at 1 and slope loadings were set at fixed intervals (0, 1, 2, 3). The model included one intercept-to-intercept path (a), two intercept-to-slope paths (b3 and b4), and one slope-to-slope path (c). The intercept to intercept path (a) represents the association between initial levels of parental restrictiveness and initial levels of adolescent alcohol abuse. The first intercept to slope path (b3) represents the association between initial levels of parental restrictiveness and the change in adolescent alcohol abuse from grades 7 to 10. The second intercept to slope path (b4) represent the association between initial levels of adolescent alcohol abuse and the change in parental restrictiveness from grades 7 to 10. The slope to slope path (c) represents the association between changes in adolescent alcohol abuse from grades 7 to 10 and changes in parental restrictiveness from grades 7 to 10. Results are described in terms of standardized beta weights. Although associations between the intercept and the slope of the same variable cannot be interpreted, they must be included in the model to calculate intercept values (Ram & Grimm, 2007).

To test the hypothesis that pubertal timing moderates associations between parental restrictiveness and adolescent alcohol abuse, multiple group models contrasted paths across pubertal maturation groups. Separate models were initially constructed for early, on-time, and late maturing groups. The first group consisted of early maturing girls

(i.e., first menarche occurred before age 12; *n*=184), the second group consisted of on-time maturing girls (i.e., first menarche occurred between ages 12 and 13; *n*=587), and the third group consisted of late maturing girls (i.e., first menarche occurred after age 13; *n*=186). For each path in the model, scaled chi-square difference tests were conducted to determine if associations significantly differed across the three groups. There were no statistically significant differences between on-time and late maturing girls on any paths. Therefore, the on-time and late maturing groups were combined into a single on-time/late maturing group.

Additional analyses were conducted to determine if results varied as a function of demographic or parenting variables. To this end, household structure and grade 7 adolescent reports of parental warmth were entered into the model as a control variables with correlated paths to the initial levels and rates of change of parental restrictiveness and adolescent alcohol abuse.

Statistically significant intercept-to-slope associations were followed with simple slopes analyses to estimate the slope of the outcome variable at different initial levels of the predictor variable (Preacher, Curran, & Bauer, 2006). Slopes for outcome variables will be estimated at low (1 *SD* below the mean), medium (the mean), and high (1 *SD* above the mean) conditional intercept values for parental restrictiveness. For adolescent alcohol abuse, slopes will be estimated at zero alcohol abuse (-0.35 *SD* below the mean), medium alcohol abuse (the mean), and high alcohol abuse (1 *SD* above the mean) conditional intercept values.

Missing data came from one of two sources: wave-level (i.e., planned missingness) and attrition. Wave-level missing data were, by definition, missing completely at random. On average, 66.8% (*Range*: 46.3%-92.5%) of missing data were wave-level. Rates of missing data due to attrition varied across cohorts. The first cohort began the five-year study at grade 4 and concluded the study at grade 8. Within this cohort, an average of 4.9% of data was missing due to attrition (*Range*: 0.0%-12.2%). The second cohort began the five-year study at grade 5 and concluded the study at grade 9. Within this cohort, an average of 7.7% of data was missing due to attrition (*Range*: 1.4%-8.8%). The third cohort began the five-year study at grade 6 and concluded the study at grade 10. Within this cohort, an average of 13.5% of data was missing due to attrition (*Range*: 0.0%-32.1%). The fourth cohort began the five-year study at grade 7 and concluded the study at grade 11. Within this cohort, an average of 24.9% of data was missing due to attrition (*Range*: 10.0%-50.5%). The fifth cohort began the five-year study at grade 8 and concluded the study at grade 12. Within this cohort, an average of 15.9% of data was missing due to attrition (*Range*: 6.1%-30.0%). The sixth cohort began the five-year study at grade 9 and concluded the study at grade 12. Within this cohort, an average of 31.5% of data was missing due to attrition (*Range*: 26.0%-40.5%). Taken together, an average of 17.4% (*Range*: 4.6%-36.7%) of the data were missing due to attrition. Little's MCAR test indicated that data missing due to attrition were missing completely at random, $\chi^2(59) = 55.57$, $p > .05$. Missing data was handled with FIML which is a robust and accurate estimator of results when up to 50% of data are missing completely at random (Graham, 2009).

RESULTS

Preliminary Analyses

Table 1 presents correlations between study variables. Adolescent alcohol abuse and perceived parental restrictiveness were stable across adjacent annual assessments. Adolescent alcohol abuse and perceived parental restrictiveness were concurrently correlated at grades 7 and 8, but not at grades 9 and 10. Pubertal timing was inversely related to perceived parental restrictiveness at grade 7 and to adolescent alcohol abuse at grades 7, 8, and 9.

Univariate Growth Curve Models

Separate univariate growth curves were conducted to identify changes in parental restrictiveness from grades 7 to 10 and changes in adolescent alcohol abuse from grades 7 to 10.

Parental Restrictiveness. A univariate growth curve was conducted to model intra-individual change in perceived parental restrictiveness over time. The univariate growth curve model fit the data, $\chi^2(5, N=927)=21.76$, $p<.05$; CFI=.95, RMSEA=.06. Table 2 describes means and variances for the intercept and slope parameters. The means of the intercept (M=1.77, SE=.02) and the slope (M=-0.05, SE=.01) were statistically significant ($p<.01$); restrictiveness decreased from grade 7 to 10. There was also significant variability around the intercept (variance=0.08, SE=.01, $p<.01$) and the slope (variance=0.01, SE=.01, $p<.05$) of parental restrictiveness.

A quadratic growth curve was also conducted to examine possible non-linear intra-individual change in perceived parental restrictiveness over time. The univariate nonlinear growth curve model fit the data, $\chi^2(1, N=927)=0.46$, $p=.50$; CFI=1.00, RMSEA=.00. Table 3 describes means and variances for the intercept and slope parameters. The mean of the quadratic slope was statistically significant ($M=-0.03$, $SE=.01$, $p<.01$), but the variance of the quadratic function did not reach conventional levels of statistical significance (variance=.01, $SE=.01$, $p>.05$). As a consequence, the quadratic slope function was not included.

Adolescent Alcohol Abuse. A univariate growth curve was conducted to model intra-individual change in adolescent alcohol abuse over time. The univariate growth curve model fit the data, $\chi^2(5, N=957)=11.31$, $p<.05$; CFI=.99, RMSEA=.04. Table 2 describes means and variances for the intercept and slope parameters. The means of the intercept ($M=1.14$, $SE=.01$) and the slope ($M=0.21$, $SE=.01$) were statistically significant ($p<.01$); adolescent alcohol abuse increased from grade 7 to 10. There was also significant variability around the intercept (variance=0.10, $SE=.01$, $p<.01$) and the slope (variance=0.03, $SE=.01$, $p<.01$) of adolescent alcohol abuse.

A quadratic growth curve was also conducted to examine possible non-linear intra-individual change in adolescent alcohol abuse over time. The model did not fit the data, $\chi^2(1, N=957)=6.99$, $p<.05$; CFI=.99, RMSEA=.08. Therefore, the quadratic function was not included in the final model.

Parallel Process Growth Curve Model

A parallel process growth curve model was conducted to explore associations between the intercepts and slopes of parental restrictiveness and adolescent alcohol abuse. The results are depicted in Figure 2.

The parallel process model fit the data, $\chi^2(22, N=957)=61.83$, $p<.05$; CFI=.96, RMSEA=.04. The intercept-to-intercept association was statistically significant (β=.36, $p<.01$), such that greater initial levels of adolescent alcohol abuse corresponded with greater initial levels of parental restrictiveness. The slope-to-slope association (β=.08, $p=.59$) did not reach conventional levels of statistical significance. There was a statistically significant association between the intercept of adolescent alcohol abuse and the slope of parental restrictiveness (β=-.43, $p<.01$), such that greater initial levels of adolescent alcohol abuse predicted greater decreases in parental restrictiveness from grades 7 to 10. The association between the intercept of parental restrictiveness and the slope of adolescent alcohol abuse (β=-.09, $p=.31$) did not reach conventional levels of statistical significance.

Multiple Group Parallel Process Growth Curve Model

A two-group parallel process growth curve model examined whether pubertal maturation moderated associations between parental restrictiveness and adolescent alcohol abuse. Figure 3 depicts the results.

The multiple group parallel process model fit the data, $\chi^2(56, N=957)=87.24$, $p<.01$; CFI=.97, RMSEA=.03. When compared to the original parallel process model, the addition of pubertal timing as a moderator and the addition of cross-group constraints did not significantly worsen model fit. Residual variances for both parental restrictiveness

and adolescent alcohol abuse were successfully constrained to be equal across groups; model fit did not significantly increase.

For early maturing and on-time/late maturing girls, the intercept-to-intercept association was statistically significant (β=.30, p<.01), such that greater initial levels of adolescent alcohol abuse corresponded with greater initial levels of parental restrictiveness. Both groups reported a negative association between the intercept of adolescent alcohol abuse and the slope of parental restrictiveness (β=-.44, p<.01), such that greater initial levels of adolescent alcohol abuse predicted greater decreases in parental restrictiveness from grades 7 to 10. Additionally, early maturing girls reported a negative association between the intercept of parental restrictiveness and the slope of adolescent alcohol abuse (β=-.48, p<.01), such that lower initial levels of parental restrictiveness predicted greater increases in adolescent alcohol abuse from grades 7 to 10. For on-time/late maturing girls, the association between the intercept of parental restrictiveness and the slope of adolescent alcohol abuse was not statistically significant. There were statistically significant differences between early maturing girls and on-time/late maturing girls on the strength of the association between the intercept of parental restrictiveness and the slope of adolescent alcohol abuse, $\Delta\chi^2(1, N=957)=6.57$, p=.01. Finally, the slope-to-slope association did not reach conventional levels of statistical significance for early maturing (β=.84, p=.14) and on-time/late maturing girls (β=-.09, p=.57).

Estimated Changes in Parental Restrictiveness and Adolescent Alcohol Abuse

Figure 4 presents the results of simple slope analyses that describe the association between the intercept of adolescent alcohol abuse and the slope of parental restrictiveness among all girls. The higher the initial level of adolescent alcohol abuse, the sharper the rate of decrease in parental restrictiveness. From the 7th to 10th grade, there was an estimated 15% decrease in parental restrictiveness at low levels of adolescent alcohol abuse (β=-.50, p<.01), a 20% decrease in parental restrictiveness at medium levels of adolescent alcohol abuse (β=-.63, p<.01), and a 32% decrease in parental restrictiveness at high levels of adolescent alcohol abuse (β=-.94, p<.01).

Figure 5 presents the results of simple slope analyses that describe the association between the intercept of parental restrictiveness and the slope of adolescent alcohol abuse among early maturing girls. The lower the initial level of parental restrictiveness, the sharper the rate of increase in adolescent alcohol abuse. From the 7th to 10th grade, there was an estimated 95% increase in adolescent alcohol abuse at high levels of parental restrictiveness (β=.23, p=.04), a 180% increase in adolescent alcohol abuse at medium levels of parental restrictiveness (β=.37, p<.001), and a 326% increase in adolescent alcohol abuse at low levels of parental restrictiveness (β=.55, p<.001).

Control Variables

The addition of household structure and parental warmth as control variables to the multiple group parallel process growth model resulted in a significant worsening of model fit, suggesting that the pattern of associations between parental restrictiveness and adolescent alcohol abuse may not vary depending on household structure or the degree of closeness between parents and daughters.

Comparison of Associations between Maternal and Paternal Restrictiveness.

A multiple-group model contrasted the strength of associations between adolescent alcohol abuse and adolescent reports of maternal restrictiveness with associations between adolescent alcohol abuse and adolescent reports of paternal restrictiveness. Separate multiple group models were run for early maturing girls and on-time/late maturing girls. In both instances, there were no significant chi-square differences, indicating a similar pattern of associations for maternal restrictiveness and paternal restrictiveness.

DISCUSSION

The first goal of this study was to test a parent driven model to determine if initial parent restrictiveness predicted changes in adolescent alcohol abuse. As hypothesized, for all girls, adolescent alcohol abuse linearly increased from grade 7 to grade 10. For the sample as a whole, however, initial parental restrictiveness was not associated with the rate of increase in adolescent alcohol abuse.

The second goal of this study was to test a child-driven model to determine if adolescent alcohol abuse predicted changes in parental restrictiveness. As hypothesized, parental restrictiveness linearly decreased from grade 7 to grade 10. For the sample as a whole, greater initial adolescent alcohol abuse predicted steeper declines in parental restrictiveness.

The third goal of this study was to test a moderated model to determine if pubertal timing moderated longitudinal associations between parental restrictiveness and adolescent alcohol abuse. Moderated effects were found for the association between initial parental restrictiveness and the slope of adolescent alcohol abuse. Lower levels of parental restrictiveness in early adolescence predicted greater increases adolescent alcohol abuse across adolescence, but only among early maturing girls. Parental restrictiveness did not predict later increases in adolescent alcohol abuse among on-time and late maturing girls. No moderated effects were found for the association between initial adolescent alcohol abuse and the slope of parental restrictiveness.

Parent-driven Effects of Change in Adolescent Alcohol Abuse

For the group as a whole, adolescent alcohol abuse increased over time, however there were no links between parental restrictiveness at age 13 and changes in alcohol abuse from age 13 to age 16. It may not be surprising that initial parental restrictiveness was unassociated with increases in alcohol abuse. For a majority of the sample, age of first menarche either had not yet occurred, or occurred relatively recently, at the time of the first assessment (age 13). Because of this, the physical signs of pubertal development may have not been fully apparent. Given that parents and peers likely both influence the risk of girls' alcohol abuse (Guilamo-Ramos et al., 2005; Simons-Morton & Chen, 2005; Stice et al., 1998), their perceptions of girls' physical maturity is likely to be an influential factor, but only after menarche. In other words, physically immature girls may not yet elicit the mechanisms responsible for parent-driven effects. Alternatively, early maturing girls may encounter social contexts or forces which are not experienced by on-time or late maturing girls. These unique social contexts may elevate the risk of adolescent alcohol abuse if parents are unable or unwilling to counter their effects.

Previous research employing growth curve modeling throughout early adolescence also found that the associations between the initial levels of protective parenting behaviors (e.g., monitoring, expectations, and involvement) and the slope of alcohol use did not reach conventional levels of significance (Simons-Morton & Chen, 2005). However, there were still signs of protective influence; the slopes of protective parenting behaviors were inversely associated with the slope of adolescent drinking. Some may question why a significant association between slopes was not replicated in the current study. It should be noted that Simons-Morton and Chen (2005) examined

growth in alcohol consumption over time whereas the current study examined growth in alcohol intoxication. Because of this, the current study may not have had the resolution needed to identify relationships between parenting behavior and moderate alcohol consumption. It is also possible that the measure of parental restrictiveness assessed in the current study may represent a different construct.

Child-driven Effects of Change in Parental Restrictiveness

For all girls, alcohol abuse at age 13 predicted changes in parental restrictiveness from age 13 to age 16 such that parents of girls who engaged in alcohol abuse in early adolescence became less restrictive over time when compared to parents of girls who did not abuse alcohol in early adolescence. Furthermore, this association did not vary across early, on-time, and late maturing girls. Past studies have found that parents respond to adolescent problem behavior by disengaging and withdrawing support (Huh et al., 2006; Hafen & Laursen, 2009). The magnitude of the effect was not trivial. The rate of decrease in restrictiveness doubled for girls who abused alcohol in early adolescence when compared to girls who did not abuse alcohol.

Child-driven models of change in parental behaviors posit various mechanisms to account for parental withdrawal in response to adolescent problem behaviors (Bell, 1968; Laursen & Collins, 2009). A pattern of decreasing parental involvement and increasing child problems may have existed prior to the ages investigated in this study. Elevated levels of initial alcohol abuse may also be a consequence of past parent-child interactions. Parents who encountered direct or indirect signs of adolescent alcohol abuse may have mismanaged attempts to control adolescents' misbehavior. For example, when parents confront adolescent girls regarding their behavior, girls may have responded

manipulatively or coercively. Adolescent girls may have minimized the issue, emphasized their maturity and strongly resist their parents' demands, or may have attempted to make parents feel guilty for constraining their freedom. Parents who choose to acquiesce to girls' demands ultimately do not resolve the underlying problem and only end up negatively reinforce girls' poor behavior. Adolescent girls then become aware of their ability to manage their parents' behavior and are therefore more likely to exercise their control in future exchanges (Patterson, 1982). Alternatively, girls engaging in alcohol abuse may be less willing to disclose their free-time activities to parents (Kerr et al., 2008). In this case, parents may simply not be aware that their daughters are abusing alcohol and therefore do little to prevent such behavior (Kerr et al., 2006).

Pubertal Timing Moderates Parent-driven Effects of Change in Adolescent Alcohol Abuse

The initial model included null effects between parental restrictiveness at age 13 and changes in alcohol abuse from age 13 to age 16 that masked a powerful interaction. Parent-driven effects were revealed when comparing patterns of associations across early, on-time, and late maturing girls. Among early maturing girls, parental restrictiveness at age 13 predicted increases in alcohol abuse from age 13 to age 16 such that girls of less-restrictive parents in early adolescence abused alcohol at faster pace when compared to girls of parents who were more restrictive. This association did not change after accounting for the degree of closeness between parents and daughters. No effects were found for on-time and late maturing adolescents.

Previous studies have found that lax parental supervision and rule setting is concurrently associated with higher levels of adolescent alcohol abuse among early maturing girls (Costello et al., 2007; Schelleman-Offermans et al., 2011). The present study builds upon these findings by identifying longitudinal associations between initial parental restrictiveness and later growth in adolescent alcohol abuse for early maturing girls. Specifically, the rate of increase in alcohol abuse was 33% higher than normal if parents of early maturing girls were initially below average in parental restrictiveness. These findings indicate that the relative level of rule setting in early adolescence can have lasting consequences.

Parent-driven models of change posit that the association between parental restrictiveness and adolescent alcohol abuse could be the result of buffering mechanisms, risk mechanisms, or both. In terms of parent behaviors as risk factors, parents who set and maintain low levels of restrictiveness may remove safeguards that typically prevent adolescent girls from engaging in problematic behaviors. In terms of parent behaviors as buffering factors, restrictiveness attenuates the negative social influences encountered by early maturing girls (e.g., associations with deviant peers, experimentation, etc). Unique to this study is the finding that early pubertal maturation increases the risk that low initial levels of parental restrictiveness accelerate the growth of adolescent alcohol abuse. This relationship indicates that early maturing girls likely have a heightened sensitivity to the negative effects of lax parenting practices. In the absence of parental influence, negative peer influence may shape adolescent behaviors. Furthermore, this finding compliments past research which identified similar effects for the negative influence of low parental monitoring (i.e., knowledge) on adolescent alcohol abuse (Westling et al., 2008). It may

be the case that parents of early maturing girls must be both knowledgeable and firm in rule setting in order to avoid negative child outcomes later in adolescence.

Alternative interpretations of the parent-driven effects identified in this study should also be considered. First, parents who grant early maturing girls autonomy and freedom in pursuing social activities on their own may incorrectly assume that their children are capable of avoiding risky experimentation, thereby increasing the risk of adolescent alcohol abuse. Second, in responding to social pressures to consume alcohol, early maturing girls may take advantage of their unobservant parents, which may embolden them to test boundaries. Third, initially nonrestrictive parents may believe they are appropriately setting limits on their child's behaviors, but are unaware of the new risks associated with their child's entry into adolescence, and do not change parenting strategies accordingly.

Evaluating Mechanisms Underlying Moderated Parent-driven Effects

The "off-time" hypothesis proposes that early and late maturing girls are more likely than on-time maturing girls to suffer from ineffective social support and greater emotional distress due to dissatisfaction with physical changes associated with pubertal development (Caspi & Moffitt, 1991; Gatti et al., 2014). According to this hypothesis, difficulties navigating this turbulent period lead to the development of adolescent problem behaviors. Specifically, poor self-image and self-esteem may interact with ineffective or non-responsive parenting resulting in an increased risk for alcohol abuse among early maturing girls. While this study's findings are consistent with the notion that early maturers respond poorly to non-restrictive parenting, I can only speculate that this

relationship may be driven by early maturing girls' low self-esteem. As such, support for this hypothesis is tentative.

The stage-termination (i.e. early maturing) hypothesis (Livson & Peskin, 1980) may provide a partial account for the parent-driven effects found in this study. According to this hypothesis, early pubertal timing cuts short the previous developmental period, leaving adolescents emotionally or psychologically unprepared to cope with the stressors typical of adolescence. In turn, poor coping skills interact with hostile parenting resulting in the development of adolescent problem behaviors (Ge et al., 1996). In the present study low levels of parental restrictiveness were linked to increases in alcohol abuse; low restrictiveness is not typically equated with hostile parenting. In contrast, *excessive* levels of parental restrictiveness may be consistent with harsh parenting practices (e.g., coerciveness and high psychological control). However, due to insufficient power, curvilinear effects between restrictiveness and early maturers' alcohol abuse could not be explored, therefore support for this hypothesis is limited.

Building on the stage termination hypothesis, the contextual-amplification hypothesis proposes that multiple risk factors have a cumulative accelerating effect on the growth of adolescent alcohol abuse. In this manner, the stressors associated with early pubertal timing may combine with poor or ineffective parenting practices, resulting in an increased risk for engaging in alcohol abuse throughout adolescence. As such, the current study's findings are consistent with the hypothesis that early pubertal timing and inadequate parental restrictiveness combine to predict worsening outcomes. However, the explanatory power of this hypothesis is limited because it does not explicitly detail how poor parenting exacerbates early maturing girls' tendency to abuse alcohol; it merely

states that the risk of such behavior is elevated. Considering that negative influence from both parents and peers have been linked to heightened levels of adolescent alcohol abuse (Dishion & McMahon, 1998; Simons-Morton & Chen, 2005), it may be the case that the contextual-amplification hypothesis simply identifies the contexts in which negative social influence is at its strongest (Stattin et al., 2011).

In contrast to the above, the peer-socialization hypothesis may provide a mechanism in which to frame the current study's findings. The peer-socialization hypothesis proposes that early pubertal timing increases adolescent susceptibility to negative social influences from peers (Stattin et al., 2011; Stattin & Magnusson, 1990). Because early maturing girls are more physically developed than most other same-aged peers, they are more likely to develop friendships with older adolescents whom are more prone to engaging in delinquent behaviors, including alcohol abuse. As such, the formation and maintenance of friendships with deviant peers provides opportunities for early maturing girls to abuse alcohol. Parents who fail to restrict early maturing girls from socializing with deviant peers may inadvertently promote adolescent alcohol abuse. In other words, the association between parental restrictiveness and adolescent alcohol abuse may not be direct, it may be mediated through friends' deviancy. Although peer deviancy was not assessed in the current study, the current study's findings would be consistent with such a model.

Evaluating Mechanisms Underlying Child-driven Effects

Interestingly, child-driven effects were not moderated by pubertal timing; for all girls higher levels of initial alcohol abuse was associated with greater declines in parental restrictiveness. Although null effects should be interpreted with caution, this finding is

consistent with the notion that parents do not consider physical maturity to be a factor in how they respond to girls' poor coping, adolescence-related stress, or overt signs of alcohol abuse. Therefore, no support can be offered for the proposed moderation of child-driven effects as outlined by the off-time, early maturation, and contextual-amplification hypotheses. In terms of the peer socialization hypothesis, it is likely that early, on-time, and late maturing girls are similarly skilled in managing the level of knowledge parents have regarding their activities. However, it is important to note that there was less variance in the trajectory of parental restrictiveness when compared to the trajectory of adolescent alcohol abuse, which may have precluded the identification of moderation of child-driven effects.

Study Strengths

A main strength of this study is the implementation of latent growth curve modeling to explore associations between parental restrictiveness and adolescent alcohol abuse over time. Modeling associations in this manner allowed for the estimation of initial levels and the growth in both variables from age 13 to 16. The association between the intercepts of each variable allowed for the control of initial relationship between girls and parents, which is a necessary requirement before exploring effects over time. Associations between intercepts and slopes of each variable allowed for the estimation of parent- and child-driven effects, both of which were central to the testing of the study's hypotheses. These effects remained after accounting for the association between the trajectories of parental restrictiveness and the trajectories of adolescent alcohol abuse. This is important because the association between the slopes represents synchronous change as a result of interdependent or circular mechanisms within the parent-adolescent

relationship (Kuczynski, 2003). Controlling for this association bolsters confidence that cross-associations between intercepts and slopes are proper estimations of parent-driven and child-driven effects (Hafen & Laursen, 2009). Furthermore, the slope-to-slope association may also capture the extent to which restrictiveness and alcohol abuse are jointly attributable to shared genetic variance between parents and daughters (Hafen & Laursen, 2009).

This study also benefited from the richness of the data. All Swedish girls from a town in central Sweden participated in the current study. The large size of the sample provided suitable power to conduct multiple group analyses with pubertal timing as a moderator. Considering that roughly only a fifth of the sample were categorized as early maturing, utilization of a smaller sample may not have been sufficient.

While longitudinal modeling can be an important advantage in the testing of causal assumptions, the current study falls short of demonstrating causality. First, due to the limitations inherent in analyzing archival data, it was not possible to randomly assign participants into different conditions (Rutter, Pickles, Murray, & Eaves, 2001). Randomization is advantageous as it allows researchers to conduct a controlled manipulation of the causal variable and isolate its effects by holding all other effects equal across conditions. Because I could not randomly assign adolescents to low, medium, and high restrictiveness conditions, the possibility remains that the parent-driven effects identified in this study are the result of alternative sources of influence. Second, in contrast to the current study, genetically informed designs are able to reveal if parent-driven and child-driven effects are a result of gene-environment correlations. For example, the genes responsible for lax parenting may be passed to offspring who, as a

consequence, do not consider the negative consequences of socializing with deviant peers or in engaging in problematic behaviors. To demonstrate casual proof of the parent-driven and child-driven effects in this study, future studies should suitably discount these alternative hypotheses and others like them.

Study Limitations

A number of methodological limitations should be noted. First, issues pertaining to shared-reporter variance may have biased the findings in this study; parental restrictiveness, alcohol abuse, and pubertal timing were reported by adolescents. Second, an absence of objective measures of male pubertal timing precluded their inclusion in this study. Future studies should determine if similar associations between parental restrictiveness and adolescent alcohol abuse are found among boys. Recent evidence suggests that early pubertal timing among boys may also result in the development of problem behaviors (Mendle & Ferrero, 2012). Third, the development and application of a standardized assessment of adolescent drinking would facilitate the proper comparison of findings across future studies. Fourth, only one measure of pubertal timing (i.e., age of menarche) was obtained. I assume that the results would replicate when relying upon more visible measures of pubertal development (e.g., growth spurt; breast development). Fifth, because this study only included girls from a small town in central Sweden, the findings in this study may or may not generalize to youth living in urban or transient or less affluent settings. Sixth, socioeconomic status (SES) was not assessed in the current study. As such, it was not possible to determine if controlling for SES would attenuate parent-driven or child-driven effects. Adolescent girls from low SES families in North America are both more likely to enter puberty at younger ages (Ellis & Essex, 2007) and

are more likely to engage in deviant behavior. However, within Nordic countries, SES appears to be unrelated to female pubertal timing (Bratberg, 2007).

Implications

Early maturing girls face unique social pressures (Brooks-Gunn & Reiter, 1990; Susman & Dorn, 2009), foster increased attention from older peers (Stattin et al., 2011), and are more likely to engage in deviant behaviors (Stattin & Magneusson, 1990). The results of this study provide a strong indication that early maturing girls are also sensitive to ill-effects of lax parenting. This is problematic because parents have been found to respond to their daughters' early pubertal timing by loosening restrictions and granting greater autonomy (Lerner et al., 2001; Silbereise, & Kracke, 1997), at the same time that early maturing girls may find themselves socializing with older, deviant peers (Ge et al., 2002; Obeidallah et al., 2004). As demonstrated in the current study, the confluence of both of these effects results in an accelerated growth in adolescent alcohol abuse and is therefore undesirable.

Parents should be cautioned against allowing early maturing daughters to make decisions about what friend-related activities they engage in away from home, and at what time they should return home at night. Failure to set appropriate limitations provides early maturing girls with more opportunities to abuse alcohol with friends. However, it is a challenge to maintain restrictiveness while avoiding emotional and psychological distress in adolescents who seek greater autonomy. An authoritative, not an authoritarian, approach to parenting is likely ideal. Adolescents who feel overcontrolled, or those who are restricted from meeting normative and healthy developmental milestones, tend to have poor outcomes later in life (Galambos et al., 2003; Pettit, Laird, Dodge, Bates, &

Criss, 2001). While daughters frequently argue with parents about how much freedom they should have, these disagreements should be considered a normative and healthy process because they ensure that role renegotiation occurs at an appropriate pace (Collins, 1995; Laursen & Collins, 2004). It is therefore recommended that parents remain vigilant of the hazards typical of the adolescent years while ensuring that early maturing girls are not prevented from encountering valuable learning experiences.

Conclusions

This study replicates and extends past findings exploring concurrent and longitudinal associations between parenting practices and adolescent problem behaviors. The more a girl drinks at the onset of adolescence, the more parents withdraw from supervision, and the less parents supervise at the onset of adolescence, the more early maturing girls increase their drinking. The findings of this study demonstrate that lax parental rule setting in early adolescence is a risk factor for the development of alcohol abuse among early maturing girls. Some experimentation with alcohol is normative during adolescence but persistent abuse may result in a plethora of negative outcomes including engaging in risky sexual behavior, and poor academic performance (Stueve & O'Donnell, 2005; Grunbaum et al., 2004). Parents of troubled adolescents must be cautious of withdrawing from parental responsibilities too quickly, however tempting this may be.

Table 1

Means, Standard Deviations, and Correlations between Variables

	1 [95% CI]	2 [95% CI]	3 [95% CI]	4 [95% CI]	5 [95% CI]	6 [95% CI]	7 [95% CI]	8 [95% CI]	*M* [95% CI]	*SD*
1. Age of Pubertal Timing	—								12.59 [12.50, 12.69]	1.47
2. Parent Restrictiveness Grade 7	-.09* [-.17, -.01]	—							1.75 [1.72, 1.79]	0.45
3. Parent Restrictiveness Grade 8	-.03 [-.10, .04]	.39** [.31, .48]	—						1.76 [1.73, 1.80]	0.48
4. Parent Restrictiveness Grade 9	.04 [-.03, .11]	.37** [.28, .46]	.51** [.44, .58]	—					1.69 [1.65, 1.72]	0.48
5. Parent Restrictiveness Grade 10	-.01 [-.10, .09]	.37** [.24, .50]	.42** [.32, .53]	.57** [.49, .65]	—				1.58 [1.54, 1.62]	0.48
6. Alcohol Abuse Grade 7	-.19** [-.26, -.11]	.20** [.10, .30]	.13** [.04, .23]	.05 [-.05, .16]	-.04 [-.16, .08]	—			1.13 [1.10, 1.15]	0.30
7. Alcohol Abuse Grade 8	-.12** [-.19, -.06]	.15** [.06, .25]	.17** [.09, .25]	.03 [-.06, .11]	-.11* [-.21, -.01]	.57** [.48, .65]	—		1.37 [1.32, 1.41]	0.60
8. Alcohol Abuse Grade 9	-.11** [-.18, -.04]	.08 [-.01, .18]	.12** [.04, .19]	.04 [-.04, .12]	-.10* [-.19, -.01]	.46** [.38, .54]	.66** [.60, .72]	—	1.56 [1.52, 1.61]	0.69
9. Alcohol Abuse Grade 10	.00 [-.08, .08]	-.07 [-.19, .05]	.01 [-.10, .12]	.07 [-.02, .17]	-.04 [-.13, .06]	.26** [.15, .36]	.45** [.37, .53]	.58** [.52, .65]	1.74 [1.68, 1.79]	0.67

Note. N=957. *p<.05, **p<.01. Age of pubertal timing was measured in years. Parental restrictiveness was rated on a scale ranging from 1 (*never*) to 3 (*most often*). Adolescent alcohol abuse was rated on a scale ranging from 1 (*no, it has not happened*) to 3 (*several times*).

Table 2

Parameter estimates for univariate growth curves

	Intercept				Linear Slope			
Variable	*M*	(*SE)*	Variance	(*SE)*	*M*	(*SE)*	Variance	(*SE*)
Parental Restrictiveness	1.77**	(.02)	0.08**	(.01)	-0.05**	(.01)	0.01*	(.01)
Adolescent Alcohol Abuse	1.14**	(.01)	0.10**	(.01)	0.21**	(.01)	0.03**	(.01)

Note. *N*=957, *p<.05, **p<.01

Table 3

Parameter estimates for univariate nonlinear growth curves

	Intercept		Linear Slope		Quadratic Slope	
Variable	*M* (*SE*)	Variance (*SE*)	*M* (*SE*)	Variance (*SE*)	*M* (*SE*)	Variance (*SE*)
Parental Restrictiveness	1.75** (.02)	0.06* (.01)	0.03 (.02)	0.02 (.05)	-0.03** (.01)	0.01 (.01)
Adolescent Alcohol Abuse	1.13** (.01)	0.07** (.03)	0.16** (.01)	0.20** (.05)	0.02** (.01)	0.02** (.01)

Note. *N*=957, *p<.05, **p<.01

Figure 1. Measurement growth curve model of parental restrictiveness and adolescent alcohol abuse from grades 7 to 10.

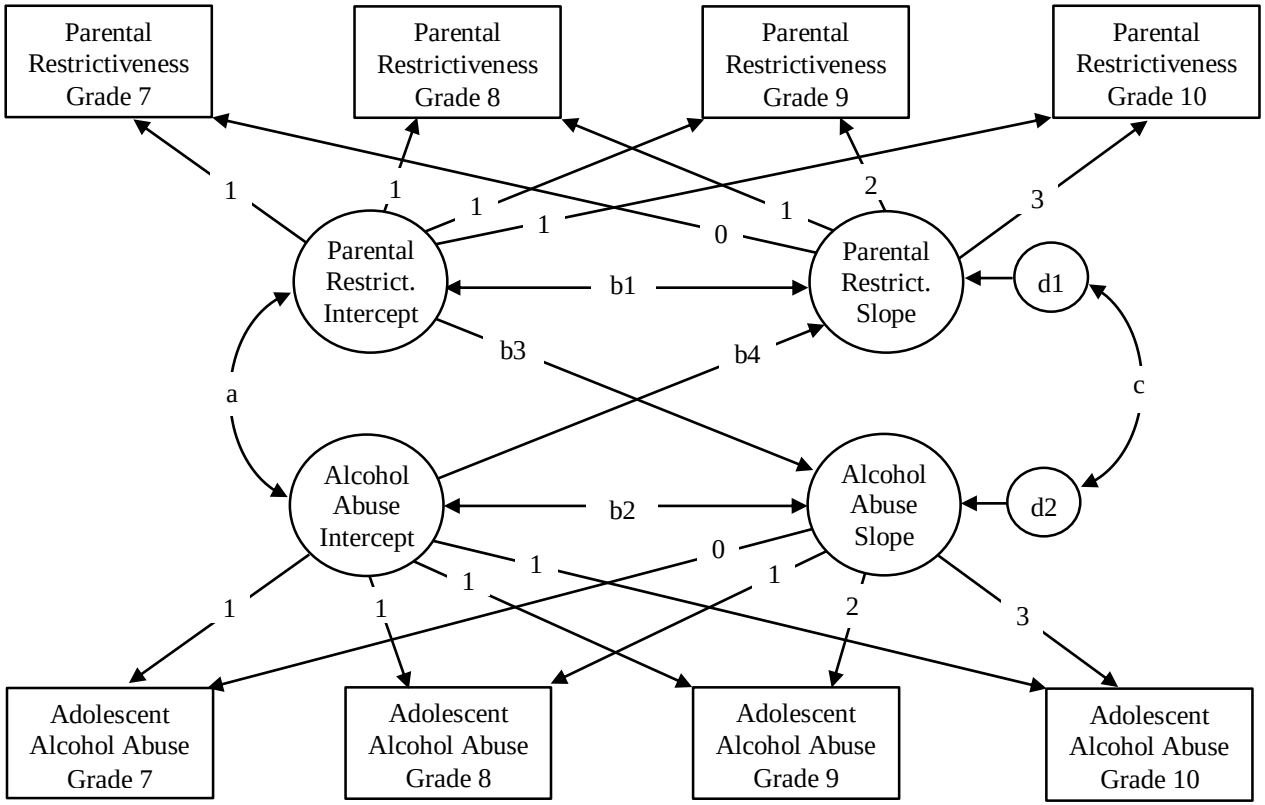
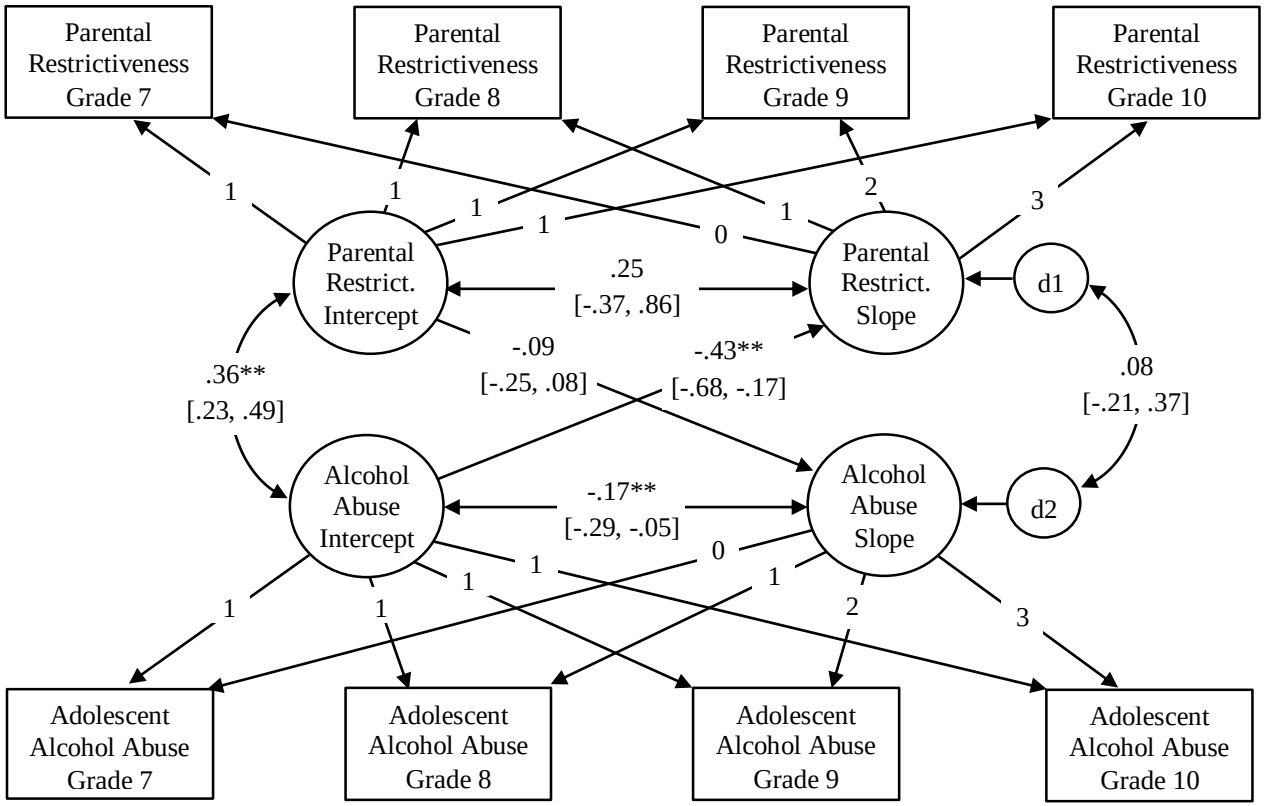
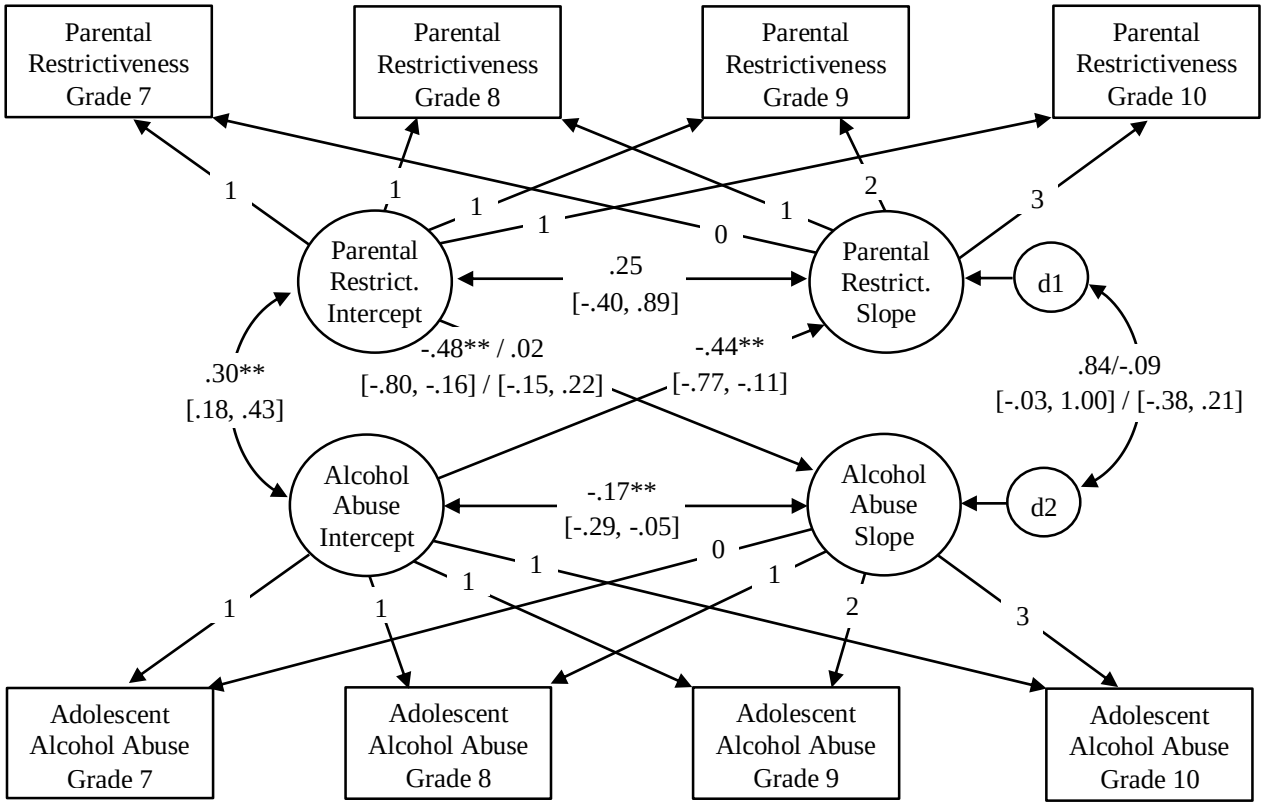


Figure 2. Growth curve model of parental restrictiveness and adolescent alcohol abuse from grades 7 to 10.



Note. N=957. For each path, 95% confidence intervals are presented in brackets. *p<.05, **p<.01, two-tailed.

Figure 3. Multiple group growth curve model of parental restrictiveness and adolescent alcohol abuse from grades 7 to 10; early maturing girls (*n* = 184) and on-time/late maturing girls (*n* = 773).



Note. *N*=957. For paths with one beta weight, results for early, and on-time/late maturing girls were constrained to be equal. For paths with two beta weights, results for early maturing girls are reported on the left of the slash; results for on-time/late maturing girls are reported on the right of the slash. For each path, 95% confidence intervals are presented in brackets. *p<.05, **p<.01, two-tailed.

Figure 4. Estimated change in parental restrictiveness from 7th to 10th grade for girls (*n*=957) at low (-0.35 SD; zero-value), moderate (mean), and high (+1.0 SD) levels of 7th grade adolescent alcohol abuse.

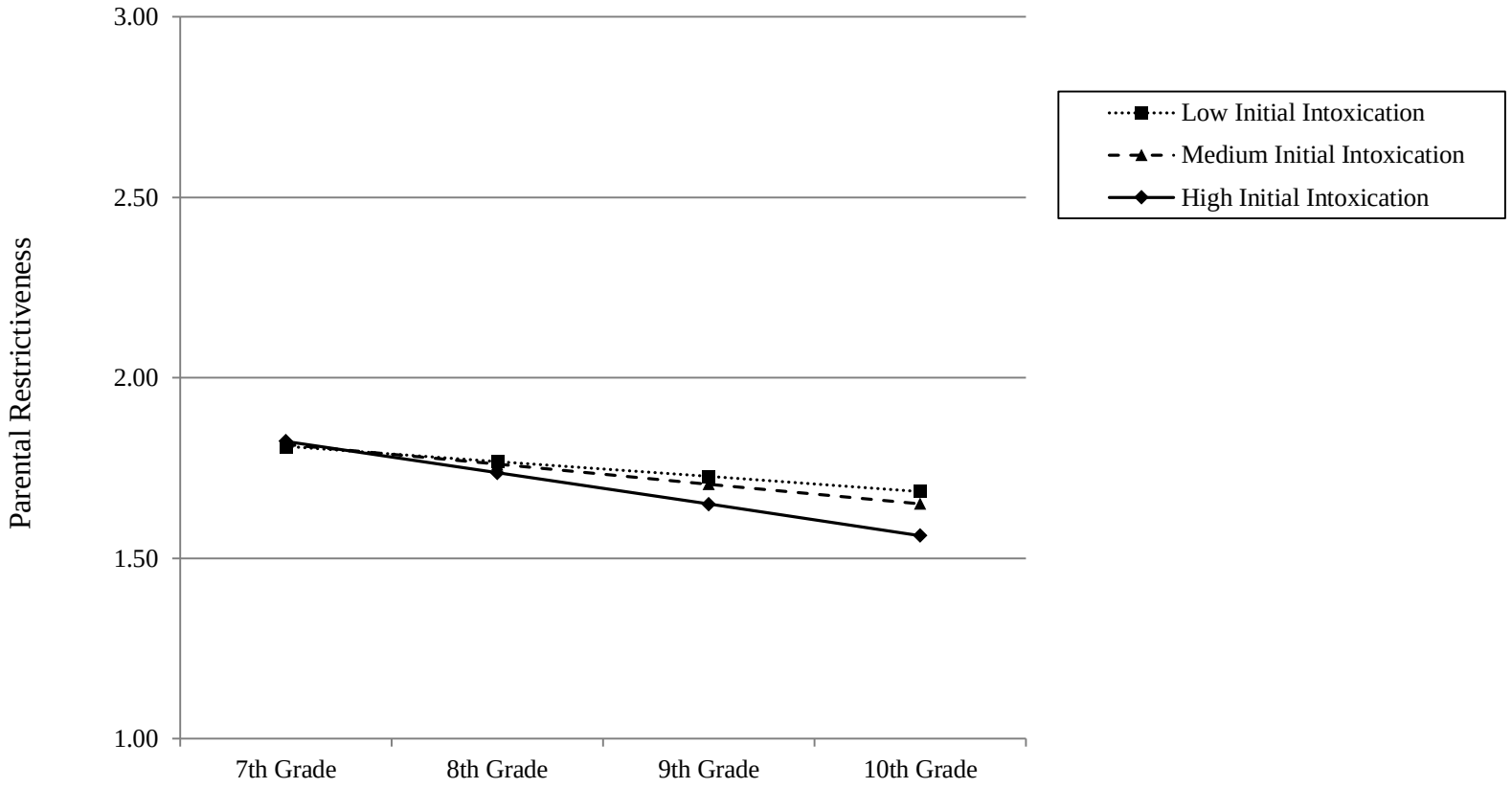
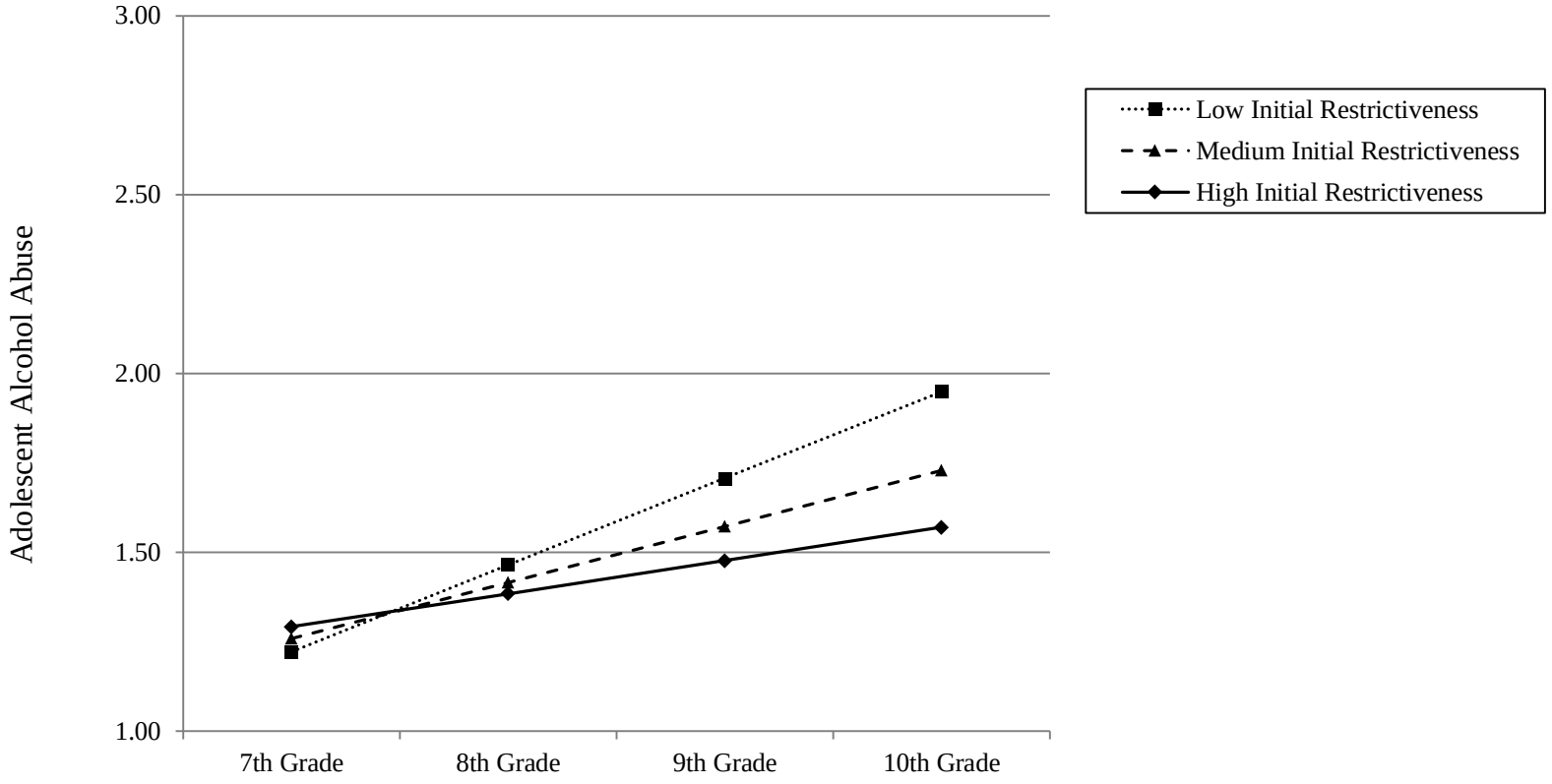


Figure 5. Estimated change in adolescent alcohol abuse from 7th to 10th grade for early maturing girls (*n*=184) at low (-1 SD), medium (mean), and high (+1 SD) levels of 7th grade parental restrictiveness.



APPENDICES

APPENDIX A

Adolescent Reports of Parental Restrictiveness

1. My mother gives me as much freedom and responsibility as I want.
2. My mother lets me decide freely about my free time (friends, activities).
3. My mother lets me decide what time I should be home at night.
4. My father gives me as much freedom and responsibility as I want.
5. My father lets me decide freely about my free time (friends, activities).
6. My father lets me decide what time I should be home at night.

Response format:

1. Never
2. Sometimes
3. Most often

APPENDIX B

Adolescent Reports of Adolescent Alcohol Abuse

Have you drank so much beer, liquor, or wine that you got drunk during the last year?

Response format:

1. No, it has not happened
2. 1 to 10 times
3. More than 10 times

Over the last month, how many times did you drink alcohol until you got drunk with your best friend/peer?

Response format:

1. No, it has not happened
2. One time
3. Several times

Over the last month, how many times did you drink alcohol until you got drunk with your peer group?

Response format:

1. No, it has not happened
2. One time
3. Several times

APPENDIX C

Adolescent Reports of Age of First Menarche

When did you get your first menstruation?

Response format:

1. Before I was 10 years old
2. When I was 10 years old
3. When I was 11 years old
4. When I was 12 years old
5. When I was 13 years old
6. When I was 14 years old
7. After I was 14 years old
8. I haven't menstruated yet

APPENDIX D

Household Structure

Which adults do you live together with? (You may check several answers)

1. Both mother and father (biological or adoptive parents)
2. With mother
3. With father
4. Mother and stepfather
5. Father and stepmother
6. Other relatives
7. Foster parents
8. Children's home
9. Other adult

Response format:

1. No answer
2. Yes

APPENDIX E

Adolescent Reports of Parental Warmth

How often does your…

1. Mother praise you for no reason?
2. Mother show they care for you with words or gestures?
3. Mother does small things that make you feel special (e.g. blink, smile)?
4. Mother constantly show how proud they are of you?
5. Mother focus on the positive and seldom the negative things you do?
6. Mother always show their love to you without cause – almost regardless of what you do?
7. Father praise you for no reason?
8. Father show they care for you with words or gestures?
9. Father does small things that make you feel special (e.g. blink, smile)?
10. Father constantly show how proud they are of you?
11. Father focus on the positive and seldom the negative things you do?
12. Father always show their love to you without cause – almost regardless of what you do?

Response format:

1. Never
2. Sometimes
3. Most often

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