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Antecedents and Continuity of Compliance in Preschoolers

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Abstract

Self-regulation, and compliance behavior specifically, has been implicated in the development of successful socialization. Difficulty self-regulating has led to negative outcomes in areas such as academic success and mental health, and a number of possible contributors, such as temperament, maternal sensitivity and attachment, have been identified. In this study, we examined these possible predictors of preschool compliance behavior through causal modeling utilizing a large and diverse longitudinal dataset from the NICHD Study of Early Child Care and Youth Development. We aimed to predict compliance and delay of gratification performance in children across 2, 3 and 4.5 years of age by looking at both lab and parent-report measurements. We found that compliance at 2 years of age was difficult to predict and path models including more than two time points did not fit well. Additionally, compliance lacked stability from 2 to 3 years of age. These findings suggest that stability of compliance and self-regulation behaviors may not occur until preschool or later. The findings also suggest that laboratory-based compliance may not be an optimal indicator of self-regulation but instead should be examined in conjunction with other measures in other contexts.

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Antecedents & Continuity of Compliance in Preschoolers

The ability of a child to engage in self-regulation is critical for navigating the social world. Self-regulation allows a child to consciously and deliberately control his or her own behaviors. Strategies such as arousal regulation, behavioral inhibition, and engaging in socially acceptable behavior--even in the absence of external cues--are all demonstrations of self-regulation (Kopp, 1982). These skills are essential for successful socialization, which requires an individual to behave in a way that is appropriate, as determined by the social environment (Bugental & Grusec, 2006; Parke & Buriel, 2006). Researchers from a cognitive background point to the connection between self-regulation and executive function. Kopp (2008) implicates self-regulation in the facilitation of executive functions such as goal setting, monitoring and evaluating goals, and other self-motivated aspects of planning. Due to its wide reach, this very broad construct is characterized by a number of different behaviors which are typically examined independently of each other.

As described by Kopp (1982), the transition into full self-regulation is gradual: in the earliest form, self-regulation appears merely as neurophysiological modulation when arousal states and reflex movements are activated. For example, infants display behavior like non-nutritive thumb sucking to reduce arousal. Gradually, abilities such as intentionality, goal-directed behavior, and conscious awareness of action are gained. By two years, children are in the final phase, labeled “self control” before they fully transition to self-regulation: they are able to self-initiate and internally monitor themselves, as in full-blown self-regulation, but are limited in adapting to new situational demands. Self-regulation, in contrast, occurs when a child has increased flexibility in response to such situational demands and changes. While the basic skill set necessary to self-regulate is often in place by preschool-age, Kopp (1982) emphasizes this

does not mean preschoolers have optimal levels of self-regulated maturity. Kopp's theory highlights the possibility that self-regulation is in-flux around the preschool age and may be somewhat unstable.

While the definition of self-regulation presented above seems intuitive, there are ambiguities related to its conceptualization and resulting measurement. Self-regulation is interchangeably referred to as effortful control, behavioral inhibition, and self-control, among other concepts (for a discussion see Kochanska, Murray & Harlan, 2000, or McCabe, Rebello-Britto, Hernandez & Brooks-Gunn, 2004). Part of this conceptual confusion seems to be related to the fact that self-regulation attempts to address a variety of similar or complementary skill sets. Further complicating the matter, many researchers use the same or similar methods, despite using different terminology.

Compliance is one of the skills related to self-regulation that has received thoughtful investigation. Compliance behavior relies on external cues, or on the child's adoption of behavioral standards, to elicit child cooperation (Kaler & Kopp, 1990). Additionally, successful socialization requires that children learn to follow directions and comply with requests from parents (Bugental & Grusec, 2006). Similar to the more inclusive term *self-regulation*, compliance has been shown to share relations with constructs such as temperament and parenting. Different from self-regulation however, compliance behavior appears to be more context-specific in that there must be an explicit or implicit request for a certain response in order to show compliance.

The goal of the present study is to examine the possible influences of early experiences on later compliance behavior. We had the opportunity to examine these relationships with the nationally representative sample provided in the National Institute of Child Health and Human

Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). The SECCYD began in 1991 and has collected data on a sample of over one thousand children from birth to young adulthood across ten different sites in the continental United States. This large, longitudinal database permitted the examination of the effects of early temperament, parenting, attachment and other measures on compliance at the ages of 2, 3, and 4.5 years.

Measurement of Self-Regulation

Measurement of self-regulation spans domains and strategies ranging from behavioral measures of performance in tasks such as delay of gratification and clean-up, to biological measures of cortisol and fMRI imaging of the anterior cingulate cortex (Posner, Rothbart, Sheese & Tang, 2007). Common cognitive tasks include those focused on inhibition and attention orienting; self-control tasks are among the behavioral tasks most commonly used.

McCabe et al. (2004) conducted an extensive review of laboratory methodology focused on self-regulatory behaviors and made distinctions among the variety of tasks available. They categorized common laboratory measures into four groups: delay of gratification measures, motor control measures, cognitive control measures, and sustained attention measures. While these groups appear to tap a number of distinct skills, many researchers have explored the interrelations among the different tasks and found some concordance among tasks from the different groups.

In a review by Rafaelli, Crockett and Shen (2005), for example, the authors assessed three different approaches to measuring self-regulation in a confirmatory factor analysis of a parent-reported behavior from a longitudinal study. They manipulated the relations between processes of emotion, attention, and behavior, and found that the approach with all three integrated was the most suitable, supporting the complexity of this construct.

One of the primary research groups to assess behaviorally the agreement among measures has been Kochanska and her colleagues. Using a battery of tasks, such as delay of gratification, slowing down motor movement, and suppressing/initiating activity, Kochanska et al. (2000) assessed the inter-item correlation among a series of tasks that have been designed to tap effortful control and found moderate correlations in the toddler and preschool age groups.

These examples of prior work address some of the challenges in studying self-regulation via lab-based measures, but do not touch on the biological ones used. An interest in capturing the biological markers of self-regulation has led to work examining the anterior cingulate cortex (ACC) and the hypothalamic-pituitary-adrenocortical (HPA) system. The HPA system is responsible for the secretion of cortisol, and seems to be influenced by activity in the ACC (Davis, Bruce & Gunnar, 2002). The attentional orienting from the ACC seems to assist as a distress regulator, allowing for the selection of information and control of thoughts and actions by a child (Rueda, Posner & Rothbart, 2005). Indeed, attention has been predictive of performance in tasks such as delay of gratification and those requiring effortful control (Eisenberg, Smith, Sadovsky & Spinrad, 2004). Given these connections, it is clear that the ACC and HPA system play some role in regulation of attention and the stress system.

However, the exact relationship between cortisol levels and self-regulation is slightly unclear from the literature. In many cases, cortisol levels seem to better indicate reactivity rather than stress regulation. Work by Davis et al. (2002) found a positive correlation between cortisol levels and a few neurophysiological tasks (go, no-go and attentional control). But there has also been work to show the opposite where a decline in performance was related to very high levels of cortisol (Vedhara, Hyde, Gilchrist, Tytherleigh & Plummer, 2000). It is possible this illustrates a u-shaped curve proposed by Davis et al. (2002).

From this brief review, we see that there are a large number of techniques to measure self-regulation, and the best ones to implement may not always be clear. Examining multiple measurements from across perspectives may help bring focus to this area of research. For our purposes, we will refer to self-regulation as an umbrella term, one which captures the terminology and methodology basic to all of this research.

Additionally, it is evident by the varied measurement techniques that there are many markers or ways in which self-regulation is explored. Compliance is one such example. Not only does compliance have a meaningful interpretation on its own, but it also serves as a type of task that can be related back to the larger construct of self-regulation. We will examine this relationship in more detail now.

Defining Compliance as a Marker of Self-Regulation

Compliance is a commonly measured aspect of the broader construct of self-regulation. Compliance, as it is typically defined, captures a range of regulatory behaviors, from initiating behavior (e.g., cleaning up toys) to inhibiting or ceasing behavior (e.g., stop playing with toys; Kochanska, Coy, & Murray, 2001). Similar to the larger construct of self-regulation, compliance is critical for socialization (Bugental & Grusec, 2006). Unlike self-regulation however, compliance is reliant on external cues to elicit child behavior (Kaler & Kopp, 1990).

Kochanska et al. (2001) have made a point to differentiate between the form of these cues, labeling them as “do” versus “don’t” requests. The distinction between the types of requests is worth noting because it requires different behavior for the child to succeed, specifically initiating or inhibiting. “Do” contexts require sustaining an activity that is presumed to be unpleasant whereas “don’t” contexts alternately require suppressing or discontinuing a pleasant activity. These two forms of requests have been found to relate to distinct forms of

compliance as well as to self-regulation. Specifically, self-regulation seems to be more challenging in "do" contexts (Kochanska & Aksan, 1995). This dynamic illustrates an interactive process that may result in very context-dependent behavior from the child.

Gralinski and Kopp (1993) chose to focus specifically on the content of parental requests to examine the role they play in child compliance. They found that by eighteen months, the child was exposed to an increasing number of prohibitions and rules that spanned a range of types, from safety requests to respect for others. Rules increased in complexity and began including social conventions as the child's cognitive and language development increased. However, as Kuczynski, Kochanska, Radke-Yarrow, & Girnius-Brown (1987) point out, compliance research can be flawed when it frames the child as only a passive recipient of the parents' influence, rather than perceiving the child as actively in control. Although compliance is most often studied in response to an external cue, such as that from the parent, the child plays a role in shaping the compliance request, either from previous patterns of responding or from current behavior. Not only must the child understand the actual vocabulary of the person requesting compliance (typically the parent), but the child must also understand that there is an expectation they follow directions. Kochanska et al. (2001) also differentiate between "situational" and "committed" compliance speaking to this idea. Situational compliance is, as the name implies, context dependent and involves the child's cooperation but not acceptance of the parent's agenda. Committed compliance, on the other hand, results from the child's acceptance of the parent's agenda and indicates a stronger capacity to self-regulate.

While it's clear that compliance and self-regulation share characteristics, and compliance may rely in part on self-regulation, it is not entirely clear how compliance relates to other self-

regulatory skills. Additionally, due to the notion that compliance is much more context-dependent, we can see that an expectation of consistency or stability may be misguided.

There are a variety of ways compliance is observed, and many are not dissimilar to the ways in which self-regulation is measured. Many types of self-control tasks fall into the domain of compliance and can often involve behavioral coding of the child and parent engaged in conversation. The parent may request a child to do a number of things, such as clean up toys, or avoid touching a desirable object. This type of design has face validity because it mimics a more naturalistic interaction between parent and child. However, there are many tasks that are implemented in lab settings that can be framed to provide understanding of compliance.

Other examples of self-control tasks fit this criterion. Examples of these tasks include designs such as the delay of gratification, in which a child is often presented with two prizes and told that they must wait for the experimenter to return if they want to receive the greater prize. In order for a child to succeed at the task, he or she must be able to control behavior; therefore, observing that a child is successful in a self-control task can indicate successful compliance. Certainly, even at the most basic level, any task that requires the child to successfully follow directions is requiring compliance and therefore may indicate another source of evidence of self-control.

Antecedents of Compliance and Self-Regulation

Our current understanding of self-regulation points to a number of possible antecedents during development. Temperament, attachment, and parental sensitivity are among the more salient contributors. Temperament, in fact, is often defined in part by a child's regulation ability, but given Kopp's (1982) illustration of the developmental process, it seems that this skill is not

something as stable or early appearing as temperament is believed to be by many researchers (Rothbart & Bates, 2006; Eisenberg et al., 2004).

Some researchers use the term "effortful control" to refer to this self-regulatory component of temperament (e.g., Rothbart & Bates, 2006), defining effortful control as the ability to perform a subdominant response while suppressing a dominant response. As Rueda et al. (2005) summarize, in factor analyses of temperament questionnaires, subscales relating to shifting and focusing attention, inhibitory control, perceptual sensitivity, and low-intensity pleasure all tend to load on a single factor, providing validation of a temperament-based component of self-regulation.

As mentioned earlier, parental approach also plays a role in self-regulation (Gralinski & Kopp, 1993). Responsiveness is one predictor in particular that has been explored. Kochanska et al. (2000) conducted a longitudinal examination of the stability of effortful control and included predictors such as parental sensitivity, responsiveness and even self-report of socialization. They found parental responsivity, a component of sensitivity, to be a significant predictor of effortful control. At both twenty-two and thirty-three months, children with more responsive mothers at twenty-two months displayed higher effortful control on a series of related tasks.

Eisenberg et al. (2004) theorize that the relationship between responsivity and effortful control may be a result of the role of responsiveness in supporting autonomy in the child. The more responsive the parent is to a child's requests or bids for attention, the more likely it illustrates to the child his or her own ability to exert influence on the environment. Kochanska et al. (2000) also found in their work a connection between mothers' self-report of socialization and child regulation, suggesting the possible role of modeling in the development of self-regulation.

In addition to parental responsivity, sensitivity of the parent also seems to play a role in self-regulation. A previous study using the NICHD Study of Early Child Care dataset explored relationships between attachment and maternal sensitivity and cognitive and social competence (Belsky & Fearon, 2002). As has been mentioned, research has long investigated the links between attachment and child outcomes, and has often assumed a causal link between parental sensitivity and attachment style. What Belsky and Fearon (2002) recognize however, is that the experience between parent and child (through something like sensitivity) is often not considered in relation to the attachment status but rather attachment is treated like "fixed trait". By examining the possible interactive relationship, the authors found that when attachment is secure *and* maternal sensitivity is high, competence in items like expressive and receptive language, school readiness, and behavior problems were all improved. Interestingly, however, they also found that when socio-economic status was ignored, children who were insecurely attached but had mothers with high sensitivity scored higher than those who were securely attached on expressive language. Thus, attachment status in and of itself does not determine long-term outcomes.

Much work has been done to look at the combined relations between parent and child behaviors on child outcomes. Maternal behavior, specifically maternal control, has been proposed as serving as a mediator between temperament and compliance, for example (Braungart-Rieker, Garwood, & Stifter, 1997). Lehman, Steier, Guidash and Wanna (2002) looked at the relationship of child compliance to both child temperament and parental style. When examining mother-toddler dyads (children aged 15 to 31 months) during a free play and clean-up task, they found that children who were perceived as less socially fearful and less anger-prone were more compliant. When looking at parental influences, Lehman et al. (2002)

discovered that emotional availability was the strongest predictor of compliance in a clean-up task. Emotional availability was coded from parent and child play based on five subscales measuring both parent and child behavior and assessing synchrony between the two.

A recent study by Cipriano and Stifter (2010) investigated how self-regulation, assessed through effortful control measurements, is differentially impacted by parental behavior depending on the temperament of the child. In contrast to previous similar work, they chose to focus specifically on the behavior and tone of the parent in a competing demands task where the parent had to attend both to a questionnaire and the child. Cipriano and Stifter (2010) had a number of predictions relating to the interaction between parental behavior and child temperament. They hypothesized that certain responding may be more facilitative for positive self-regulatory development in one group of children. At the same time, such behavior may be ineffective in another group of children. Specifically, parents who use gentle tactics, such as redirecting the child's behavior or explaining their reasons for doing so in a positive way, may facilitate effortful control with inhibited children. However, it seems that with exuberant children, effortful control may be facilitated by parents who use both a positive emotional tone and overt control. After categorizing children according to temperament at the two-year time point as either exuberant, inhibited, or low reactive, and measuring parent behavior, they collected effortful control performance at 4.5-years of age. It was found that the use of commands and prohibitions was helpful in the development of effortful control in exuberant children, particularly when delivered in a positive tone, but the same relationship was not found in inhibited children, regardless of tone. Additionally, the use of redirection or reasoning in a neutral tone was detrimental to the effortful control of exuberant children, but delivered in a positive tone and redirection or reasoning was found to be beneficial to all children.

Outcomes Associated with Early Compliance and Self-Regulation

The long-term outcomes associated with successful self-regulation include functioning across many domains, including academic success, social endeavors, and mental health (Rafaelli et al., 2005). Being able to self-regulate allows one to remain calm in stressful situations, make friends with peers, and allot attention to important material in the classroom. Martin McDermot and Fox (2007) describe the relationship between self-regulation and problem outcomes as a u-shaped curve. Externalizing behaviors such as poor impulse control and poor social interaction are observed in those with too little self-regulation, whereas those with too much self-regulation can have internalizing problems such as anxiety. Based on this observation, it appears that externalizing behaviors in particular can be an indication of poor self-regulation.

Caspi, Elder, and Bem (1987) examined the long-term outcomes of "explosive" children who had difficulty controlling impulses and emotional expressions; these children tended to struggle more in adulthood in areas such as work and marriage when compared to their peers. Shoda, Mischel, and Peake (1990) explored the relations between delay-of-gratification and adolescent coping and competence. Previous work by these same authors (Mischel, Shoda & Rodriguez, 1989) demonstrated a link between delay of gratification at four years of age and adolescent academic competence. These authors were interested in exploring particular features of the delay-of-gratification performance and focused on the delay period, measuring not only the amount of time the child delayed but also the implementation of distraction strategies. The children who waited longer, and were not offered any distraction strategies or had the prize occluded from them, were presumed to have employed their own strategies to distract themselves, indicating effective cognitive-attentional strategies. These same children were those

who later went on to have higher SAT scores and were rated by parents as having higher coping skills.

The value in understanding compliance and self-regulation is clear when examining the clinical implications that seem to follow individuals with dysregulation. A pattern of dysregulation across affect, behavior, and cognition has been labeled the "Dysregulation Profile" from the Child Behavior Checklist (CBC-L; Achenbach, 1992). The profile consists of high scores on the following subscales of the CBC-L: Anxious-Depressed, Aggressive Behavior and Attention Problems (Althoff, Verhulst, Rettew, Hudziak & van der Ende, 2010). Althoff et al. (2010) assessed the long-term outcomes and reliability of classifying a child with this particular profile and found increased risks. Specifically, dysregulation in childhood significantly predicted anxiety disorders, mood disorders, disruptive behavior disorders, and drug abuse. In Campbell, Shaw, and Gilliom's (2000) review of the literature, they highlight the range of maladaptive outcomes that toddlers and preschoolers who display externalizing behavior problems may exhibit. In fact, children who demonstrated high amounts of externalizing behavior, such as noncompliance, had impairments ranging from behavioral difficulties to clinical diagnoses in areas such as attention deficit hyperactivity disorder or oppositional defiant disorder.

Present Study

The goal of the current study is to examine the antecedents and correlates of early compliance and self-regulation in a large, heterogeneous sample of children. Structural equation modeling will be employed to test specific relationships found in previous studies as well as to explore continuity of compliance and self-regulation over time. Although some previous research in this area has been longitudinal, sample sizes and measures have been limited. The aims here are to include a number of predictors from various time points, beginning in infancy,

to assess their relation with later self-regulatory behaviors, and to assess the individual difference stability of compliance and self-regulation. Using the NICHD Study of Early Child Care and Youth Development longitudinal dataset, compliance behavior in a clean-up task and in a delay of gratification task will serve as indicators of self-regulatory behavior. The NICHD SECCYD has a variety of measures and assessments beginning after birth and continuing to early adulthood, but the focus of the current investigation will be on the infant and toddler years.

Previous work by the NICHD Study of Early Child Care Research Network (1998) has examined predictors of compliance behavior from twenty-four to thirty-six months. The primary focus of this earlier study was the influence of child-care experiences on compliance outcomes, but variables relating to family background, mothering and child characteristics were also included. Utilizing factor analyses and ordinary least squares regressions, the predictive power of early factors was tested. In general, their results showed very little effect of child care on self-control, compliance, and problem behaviors, with less than 3% of the variance attributed to it when solely considering child-care predictors (and this decreased with the inclusion of attachment and sensitivity components). Family predictors, and in particular their composite of mothering, seemed to show a larger contribution, with 4.3% of the variance in 36-month compliance being accounted for by mothering. While this contribution is important, we are seeking to explore the exact pattern of relations beyond the mere sum of contributions.

In the current study, we intend to examine multiple predictors of compliance in preschoolers from early infancy measures and concurrent measures. Specifically, we believe that two- and three-year-old compliance will be related to earlier measures of temperament and sensitivity, as well as to concurrent measures of externalizing behavior. A second goal is to examine individual difference stability across time in measures of compliance and self-

regulation. We expect to see this stability from infancy to preschool and across lab and maternal measures. In the NICHD SECCYD, measures of compliance were collected in different settings using different measures, but we hypothesize that parent report and lab measures will relate to one another. Measures of parental sensitivity and of attachment style will be examined to see if they predict self-regulation and compliance independently or jointly. As discussed earlier (Belsky & Fearon, 2002), there is some question as to whether these maternal measures will independently predict later compliance. The final goal of this study is to test these ideas using the large and heterogeneous dataset provided to us by the NICHD SECCYD. Our specific questions, therefore, are: Does early temperament relate to preschool compliance behavior? Do attachment and sensitivity independently (or in combination) predict preschool compliance behavior? Do concurrent parent report measures of child behavior predict lab-based compliance behavior? Does early child compliance behavior predict later compliance behavior?

These hypotheses will be tested through structural equation modeling; Figure 1 shows the most complete form of the cross-time model predicting 24-, 36-, and 54-month compliance behavior. Although there are a large number of paths in this model, many of the cross-lagged paths are omitted. Instead, the prediction is that compliance at any given age is predicted from concurrent variables as well as from compliance at the immediately preceding age. Additional, simpler models will be tested as well, once the fit of the large model is explored.

Method

Participants

Participants in the NICHD SECYYD were recruited from ten areas across the country: Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA;

Charlottesville, VA; Morganton, NC; Seattle, WA; and Madison, WI. Sampling from each location included families with mothers that did not graduate high school, single parent families, and members of ethnic minorities. Mothers were contacted at the hospital shortly after giving birth to determine eligibility for participation. Eligibility was based on the ability to speak English and having no plans to move within the next three years. The final 1,364 families were diverse; 22% belonged to an ethnic minority group, 26% had no more than a high school education, and 21% had incomes no greater than 200% of the poverty level. At the 54-month time point, there were 1,226 subjects enrolled. Children with missing data on any of the measures of interest were excluded, leading to a final sample of 776. Similar to other work with this dataset (e.g., NICHD, 1998), there were significant differences between the enrolled and dropped participants across the following variables: income, mother's education, number of parents, ethnicity, and mother's psychological adjustment.

Measures and Procedure

Income-to-needs ratio

At the one-month visit, the mother reported the family income. Family income included all of the following if and when applicable: mother's income, father/partner's income (if he lived at home) and any other source of income. The ratio was computed by dividing this reported income by the poverty threshold for the household size, as determined by the U.S. Department of Labor.

Maternal sensitivity

When the children were 6, 15, and 24 months of age, mothers' sensitivity was measured from a composite of the following behaviors, rated on a 4-pt scale (from "not characteristic" to "highly characteristic") by independent coders: sensitivity to nondistress, intrusiveness

(reversed), and positive regard for the child. When the child was 36 and 54 months, a 7-point scale (from "very low" to "very high") was used to rate mothers' supportive presence, respect for the child's autonomy, and hostility (reversed). These ratings by independent coders were made during a semi-structured free play session between the mother and child. At 6 and 15 months, the interaction was recorded in the home and for subsequent visits it was recorded at the lab. The free play session for the first four timepoints (i.e., 6, 15, 24 and 36 months) lasted for 15 minutes and during the first half, mothers were asked to play as they normally would using the toys of their choosing. For the second half of the session, mothers were provided a standard set of toys to use to play with their child. Cronbach's alpha from the NICHD network reported across 6, 15 and 24 months were: .714, .704, and .737, respectively. Internal reliability at 36 months was high (alpha = .78).

At 54 months, maternal sensitivity was measured from a different 15-minute semi-structured interaction in the lab between the mother and child. Three activities were designed for the interaction, two of which required the mother's help to complete and a third which encouraged play between the mother and child. The first activity was a maze attached to the screen of an Etch-A-Sketch and the second activity was forming same-sized towers with variously shaped wooden blocks. The final activity was playing with a variety of hand puppets. Again, independent coders observed the mother's behavior and assigned ratings on a 7-point scale (from "very low" to "very high") for: supportive presence, respect for autonomy, and reversed hostility. The scores from these three items were then summed to create a sensitivity composite (Cronbach's alpha = .84).

Early infant temperament questionnaire (EITQ)

The Early Infant Temperament Questionnaire (Medoff-Cooper, Carey & McDevitt, 1993) was used to assess infant temperament at one and six months. Because little stability is expected from the one-month assessment, it was excluded from the majority of analyses. Parents were given 55 items to rate on a 6-point scale (from "almost never" to "almost always"). The items correspond to one of five subscales: activity, adaptability, approach, mood and intensity. Additionally, parents were asked one "global temperament" question: was the child "more difficult than average", "about average" or "easier than average". The overall composite score indicates difficult temperament, with higher scores indicating a more "difficult" temperament. The composite was created by calculating the mean of the non-missing items after reversing those for which it was necessary. With missing data removed, the Cronbach's alpha for the overall temperament was reported as .81 by the NICHD network. Although there are no reports on the validity of the EITQ, the ITQ (Carey & McDevitt, 1978), from which the EITQ was derived, has been assessed. Goldsmith, Rieser-Danner, & Briggs (1991), for example, conducted a series of comparisons and assessments of a variety of temperament measures and found good convergent validity of the ITQ with other infant temperament measures.

Strange situation

At fifteen months, the child and primary caregiver were invited to the lab to take part in the Strange Situation. Following the standard procedure of this task, the child and mother were placed in an unfamiliar room and the child was encouraged to play with the toys. After a few minutes, an unfamiliar adult entered the room and engaged with both the mother and then attempted to interact with the child. The mother then left the room for three minutes (unless the child became too distressed). After returning, the mother stayed for another three minutes before leaving again for another three-minute period. Trained coders observed the two reunion periods

and rated the child on proximity and contact seeking, contact maintaining, resistance, and avoidance. The child was then classified according to his or her pattern of attachment. For the purposes of our analyses, only the binary secure/insecure classification created by the NICHD network was used. Agreement for this classification between two coders was 86% (kappa = .70).The Strange Situation procedure itself has been used in hundreds of studies and validated by many researchers (e.g., Belsky, Rovine & Taylor, 1984).

Child behavior checklist (CBC-L)

The Child Behavior Checklist (CBC-L, Achenbach, Edelbrock, & Howell, 1987; Achenbach, 1992) for 2- and 3-year-olds was distributed to primary caregivers when children were 24 and 36 months of age. At 54 months the 4-18 year version of the instrument was administered (Achenbach, 1991). The CBC-L assesses problem behaviors by asking caregivers to rate how characteristic each of 99 behaviors is of the child (0 = not true, 1 = sometimes true, 2 = very true). The behaviors are combined into six syndrome scales which further combine into three total scales (*Externalizing Problems, Internalizing Problems* and *Total Problems*). In the current study, only the *Externalizing* scale, comprised of the *Aggressive* and *Destructive* syndrome scales, was used. Examples of items from this subscale include "Demands must be met immediately" or "Destroys his/her own things". The manual (Achenbach, 1992) reports the following information regarding reliability and validity for the 2-3 year version: All of the sub-scales show good test-retest reliability ($p < .001$; $r = .71$ - .93). Interparental agreement is significant at both ages ($r = .63$ at age 2; $r = .60$ at age 3, $p < .01$). Additionally, all stability coefficients are significant at $p < .001$ over a one-year period. The validity of the measure has also been tested; the CBC-L discriminates between clinically referred and non-referred children

after partialling out demographic information. The 4-18 year version of the CBC-L has also been found to be a reliable and valid instrument.

Adaptive social behavior inventory (ASBI)

The Adaptive Social Behavior Inventory (ASBI; Hogan, Scott & Bauer, 1992) assesses the social competence of children. It was administered to parents and caregivers at 24 and 36 months. The thirty items that comprise the inventory are rated on their frequency of occurrence (1 = rarely, 2 = sometimes, 3 = almost always) by parent or caregiver. Examples of the items include "Bossy" and "Cooperates". These thirty items combine to form three subscales: *Comply, Express* and *Disrupt*. For the purposes of these analyses, only the *Comply* ASBI subscale from the parent was used. As reported by the NICHD SECYYD Network, the internal reliability of this scale is good, with alpha coefficients of .82 and .84 at 24 and 36 months when the parent completed the report, and alphas of .82 and .87 when completed by caregivers at 24 and 36 months. The ASBI has been tested elsewhere, for example, in high-risk preschoolers and the dimensions and validity of the measure have been confirmed (Greenfield, Wasserstein, Gold, & Jorden, 1997).

Clean-up compliance

In this task, the child was in a laboratory room with his or her mother and a set of attractive toys at 24 and 36 months. (The toys varied across each visit). After fifteen minutes of free play with the mother, the mother was given containers for the toys and was instructed to request that the child clean up the toys by placing them in the containers. The clean-up session lasted five minutes or until the child cleaned up all the toys. The child was rated on a number of characteristics by a coder (blind to attachment security, maternal sensitivity and child-care status) on a 5-point global scale (1 = "not at all characteristic" to 5 = "very characteristic"). The

coder rated the child on compliance, noncompliance (specifically autonomy/self-assertion, passive noncompliance and defiance) positive affect, and negative affect. Additionally, a dyadic cooperation rating (again on a 5-point scale) was assigned according to the interaction between mother and child.

We created a composite variable at the two time points, 24 and 36 months of age, to assess overall compliance in the clean-up task. It was created by summing six of the 1-5 rankings obtained from the paradigm and appropriately reversing those that required it: compliance, autonomy/self-assertion(r), defiance(r), passive noncompliance(r), negative affect(r), and dyadic cooperation. This composite showed good internal reliability at both twenty-four months (α = .860) and thirty-six months (α = .836). The composite score used here is similar to the composite used in the NICHD Early Child Care Research Network (1998) study. In the 1998 study, the composite scale was created after factor analyzing the items from the clean-up task; however, the positive and negatively worded items were separated into two distinct factors. Factor analyses in the present study did not support a two-factor solution, so the negative items were reverse scored and a single composite score for the clean-up compliance task was created. (At 24 months, the eigenvalue for factor one was 3.609 and the second factor was 1.091. For 36 months, eigenvalues were 3.401 for factor one and 1.132 for factor two. These eigenvalues and the scree plots produced both suggest the presence of one factor.)

Delay of gratification (DoG)

At 54 months, the child participated in Mischel's (1974, 1981) laboratory-based delay of gratification (DoG) task, designed to elicit a self-imposed delay from the child. The task began with the child selecting a favorite food from among M&Ms, animal crackers or pretzels. The child was then given a choice between waiting for the experimenter to return to receive the larger

quantity of food or ringing a bell to bring the experimenter back into the room and receiving the smaller quantity of food. The duration of the delay period was seven minutes and during this time the child was seated at a table with the food placed directly in front of them. The amount of time the child waited, the amount of time the child spent attending to the food, and the amount of time spent *not* attending to the food were recorded. The validity of this measure has been supported through a longitudinal assessment which found that performance on the delay of gratification predicted later self-regulatory abilities (Shoda et al., 1990).

The primary outcome measures for this study were the clean-up compliance and delay of gratification variables, which both relate to the larger construct of self-control. The predictors of these outcomes included infant temperament, attachment security, maternal sensitivity, and the CBC-L and ASBI questionnaires. See Table 1 for a complete list of measures used at each time-point.

Data Analytic Plan

Given the very large sample size (776 participants with complete data), there was sufficient power for our intended analyses. Kline (2005), for example, recommended a minimum sample size of 200 for conducting structural equation modeling. Using path models, we attempted to elucidate both the relations across constructs, as well as possible moderating or mediating influences. Specifically, we first examined cross-time and within-time correlations of all the measures. We then examined the predictive value of maternal sensitivity, infant temperament, and attachment on the child's later outcome variables. Because of the complexity of such a model, we also employed a step-by-step strategy to predict compliance at 2, 3 and 4.5 years, and then used what was learned from each individual model to build a more comprehensive model.

Results

Correlational Analyses

Initial examination began with cross-time and concurrent correlations among all the measures. Temperament showed significant stability from one month to six months, $r = .293$, $p<.001$. Maternal sensitivity showed significant stability across the five time points from 6 to 54 months, with correlations ranging from .276 to .489, $p<.001$ (See Table 2). Compliance in the clean-up task from 24 to 36 months was also positively correlated $r = .154$, $p<.001$. Parent-rated compliance on the ASBI subscale at 24 and 36 months was correlated $r = .633$, $p<.001$. Finally, externalizing behaviors reported by parents on the CBC-L showed significant stability, with correlations ranging from .557 to .698 across the 24- to 54-month time points, $p<.001$.

At the 24-, 36-, and 54-month assessment points, correlations were computed between each of the available measures (see Tables 3, 4, and 5). The majority of these correlations were small to moderate indicating enough covariation to proceed with the causal modeling.

Path Models

A primary goal of this study was to examine the prediction of early compliance measures using path modeling, a form of structural equation model that makes use of observed variables. In path modeling, a predictive or causal model is proposed and the fit of the data to the model is evaluated using several summary statistics. One of these 'fit indices' is the chi-square statistic. A model is said to fit the data if the chi-square value is non-significant. However, with large sample sizes, there is generally very little chance of a non-significant chi-square (Kline, 2005). Given our sample size of 776 subjects, we did not expect to see a non-significant chi-square but instead focused on alternate indices of fit.

There are a number of other indices we have included in our report such as CFI, RMSEA and the Hoelter index. CFI (comparative fit index) is based on the non-centrality chi-square and good fit is indicated by a CFI value of greater than .95. A CFI between .90 and .95 is often taken as an acceptable fit. RMSEA (root mean square error of approximation) is another commonly used fit index, and an RMSEA of .05 or less is ideal. The RMSEA confidence interval ideally includes .00 in its range. The final fit index included in these results is the Hoelter index. This index helps address the issue of a large sample size by indicating what the sample size would need to be in order for the chi-square statistic to be nonsignificant. At alpha of .05, a Hoelter index value at or above 200 is recommended.

The initial model tested was an omnibus model which included all the possible predictors and time-points, from 6 to 54 months. While there were a few logical ways to depict the possible relations between the various variables, Figure 1 was settled on as addressing our main predictions. Overall, the model fit was poor: χ^2 (66) = 398.008, p<.001, CFI = .876, RMSEA = .081 (Confidence Interval .073 -.088), Hoelter Index (alpha = .05) = 168.

Rather than delete nonsignificant paths, and add new paths, on a posthoc basis, we employed a different strategy to understand the antecedents of compliance across time. We began with models to separately predict 24-month compliance, 36-month compliance, and 54-month delay of gratification. Selection of these models was based primarily on a simplification of the above model and attempted to predict the variable of interest from the immediately preceding timepoint. The first of these models (Figure 2) attempted to predict 24-month compliance (measured during the clean-up task) from concurrent parent reports of externalizing and compliance and maternal sensitivity across 15 and 24 months. Additionally, attachment was included as a predictor of maternal sensitivity. The fit of this model was poor, $\chi^2(9) = 69.988$, p

<.001, CFI = .860, RMSEA = .094 (Confidence Interval .074-.115), Hoelter Index (alpha = .05) = 188. The standardized regression weights estimated for this model are shown in Figure 2. Initially, temperament at six months was included as a predictor of 15-month maternal sensitivity but due to the decline in model fit, it was removed from the presented model. What this model does illustrate, despite the poor fit, is the 24-month compliance seems to only be predicted from the externalizing behavior at the same age. Sensitivity, ASBI compliance, and attachment do not significantly predict compliance at 24 months.

Based on the relationship found between attachment and sensitivity (Belsky & Fearon, 2002), we created an interaction term to include in the model as a predictor of 24-month compliance and found it did not improve model fit. Due to the fact that 15-month attachment is coded as a binary variable, it is not well suited as a mediating variable in structural equation modeling and instead can only be included as a predictor. Because of this, the inclusion of attachment is no longer relevant for the next two models since they include only two consecutive time-points.

Based on the 1998 NICHD Study, we also conducted a test of the model including an income-to-needs ratio variable as a predictor of 24-month externalizing and ASBI compliance. However, despite the 1998 study finding this variable was weakly predictive of externalizing and ASBI compliance, it worsened model fit and was therefore left out.

The second model tested aimed to predict 36-month compliance from concurrent parent report of externalizing and compliance, as well as maternal sensitivity at 24 and 36 months, and earlier compliance from the clean-up task (Figure 3). The fit of this model was good, as measured by the CFI of .951 and the Hoelter index of 200. However, the RMSEA of .085 was slightly above the conventional value of .05 for a good fitting model. The chi-square value was

$\chi^2(14) = 92.128$, $p < .001$. Compared with the prediction of compliance at 24 months, externalizing behavior at 36 months was no longer a significant predictor of compliance but maternal sensitivity and ASBI compliance were now significant predictors. In addition, clean-up compliance at the preceding time-point was also a significant predictor of 36-month compliance. Again, based on the 1998 NICHD study, we included the income to needs ratio as a predictor of clean-up compliance at 36 months but it worsened fit so was left out of the presented model.

The third model tested (Figure 4) was aimed at predicting 54-month delay of gratification performance. Again, the fit of this model was borderline acceptable but only the Hoelter Index was ideal, $\chi^2(10) = 71.175$, $p < .001$, CFI = .941, RMSEA = .089 (Confidence Interval .070-.109), Hoelter Index (alpha = .05) = 200. In this model, we again find that sensitivity and ASBI compliance are the best predictors of self-regulatory behavior, in this case, delay of gratification.

The final model tested (Figure 5) integrated all of the components of the previous three models to make an alternate omnibus model that again attempted to predict compliance or delay of gratification across three time points. This trimmed version of the three combined models removed all nonsignificant paths. The model fit was not ideal, suggesting an overall inability to predict compliance and self-regulatory behaviors across more than two time points, $\chi^2(51) = 305.386$, $p < .001$, CFI = .901, RMSEA = .080 (Confidence Interval .072-.089), Hoelter Index (alpha = .05) = 175.

Discussion

Self-regulation is an important ability and a key construct in the socialization literature. Indeed, the long-term outcome of children with poor self-regulation puts them at risk for a number of negative consequences (e.g., Campbell et al., 2000). The purpose of this study was to investigate possible predictors for the self-regulatory capabilities associated with compliance and

delay of gratification tasks. Previous literature suggested important predictive roles for the constructs of maternal sensitivity, attachment, temperament, and early externalizing behaviors. We attempted to address these possibilities using the longitudinal dataset made available by the NICHD SECCYD. This dataset provided a unique opportunity not only because of the longitudinal design but also because of the size and diversity of the sample. We used structural equation modeling to evaluate the cross-time stability of compliance as well as its prediction from earlier measures.

Initial attempts to find a good-fitting, omnibus model across 24, 36, and 54 months did not prove successful, despite theoretical support for the models in previous literature. We then proceeded, age by age, predicting compliance or delay of gratification from current measures of sensitivity and externalizing behaviors as well as by compliance at the previous age. This produced three models to assess the cross-time predictability of self-regulatory behaviors: the prediction of 24-month compliance, 36-month compliance, and 54-month delay of gratification. The fit of these models was better than the larger model but the models at the later age points (36 and 54 months) also fit better overall compared to the model at 24 months. These findings suggest that not only is compliance, and possibly self-regulation, better predicted only from the immediately preceding age, but they also suggest that stability may not be attained until a child is closer to three years of age. A final model integrated the findings from the age by age models and included only significant predictors and significant paths. This model fit was still not optimal, and due to the fact that it is not theoretically derived, we will not discuss it further other than to highlight the conclusion that integrating more than two time points into the prediction of early self-regulation seems to present significant difficulties.

In revisiting our specific hypotheses and questions of interest, we found that neither temperament nor attachment predicted preschool compliance behavior. Sensitivity *did* seem to play a small role but the interaction between sensitivity and attachment was not significant. We found that some of the parent report measures did predict lab-based compliance although this was not consistent across each time point or each measure. Finally, we found that early child compliance predicted later compliance behavior only from the 24 to the 36-month lab-task. There are a number of possible explanations for these findings.

The stability of self-regulatory abilities seems as though it may have played a large role in our findings and difficulty in finding a good model fit. The possibility that self-regulatory abilities do not stabilize until after 2 years of age is supported by findings from a number of researchers (e.g., Kopp, 1982; Vaughn, Kopp, & Krakow, 1984). As noted by Vaughn et al. (1984) the period between the second and third year is transitional, particularly for the abilities related to self-regulation. It is during this transition that the child becomes capable of monitoring and altering his or her own behavior. If we assume compliance is indeed a marker of self-regulation, then based on this assumption, it seems logical that 24-month compliance would be harder to predict than compliance at later ages. In Kopp's (1982) summary of the stages of self-regulatory development, she highlights a key period from two- to three-years of age. Before the child can fully self-regulate, he or she must gain full access to capacities for self-control, such as reflection and introspection, and it is during this age period that the transition occurs. This means that for some children, Kopp (1982) points out, they may never attain this final stage of self-regulation, and even for those who do, this seems to be a critical age.

Another important point to discuss is whether compliance really does serve as a marker for self-regulation, which was the assumption we were making. It is possible, that due to the

context-specific nature of compliance, it is is not an optimal sole predictor of self-regulation and therefore we cannot extend these findings to the broad construct of self-regulation. Individual differences in compliance may change from one situation as Kochanska and colleagues point out (2001) as the person making the request changes, the form of the request changes, and the type of behavior each request requires differs. Self-regulation may not follow this same pattern of change.

In addition to the overall fit of the models, there were interesting patterns of which constructs served as significant predictors across the various age points. Two constructs that were of initial interest to us, temperament and attachment, seemed to play a minimal role in prediction and fit of the models. The lack of a significant path from early temperament to 24-month compliance may be due to the 18-month gap between assessment of the two constructs. Temperament was assessed through parent report when the infant was 6 months old. The earliest measure of the child's self-regulation, parent or lab-based, was not until 24 months of age.

It also seems likely that a scale designed to measure temperament at one and six months of age (which is the case with the EITQ; Medoff-Cooper et al., 1993) would not fully capture the conceptualization of effortful control abilities, such as "shifting and focusing attention" or "inhibition". Indeed, when reviewing the items on the EITQ (Medoff-Cooper et al., 1993), it is clear that the items are very specific to situations in infancy, and we might not expect stability of individual differences into the preschool age.

The lack of influence of a secure attachment is a bit more difficult to explain. Of course, attachment was assessed at 15 months, and as various studies have shown, attachment status can change throughout infancy (e.g., Frodi, Grolnick & Bridges, 1985; Egeland & Farber, 1984) and from infancy to toddlerhood (e.g., Bar-Haim, Sutton, Fox, & Marvin, 2000) suggesting the

possibility of outside factors influencing the relationship between attachment and compliance. This possibility has been discussed by Belsky & Fearon (2002), who suggested that attachment and sensitivity interact in important ways to predict later outcomes. From this perspective, it is the interaction between attachment and sensitivity that influence self-regulation. Indeed, Frodi et al. (1985) demonstrated that mothers who were controlling and less sensitive were more likely to have infants who remained or shifted to an insecure attachment from 12 to 20 months of age Alternatively, infants with mothers who were less controlling and more sensitive remained or became secure across the two measurements. However, when we introduced this interaction term into our model to predict 24-month compliance, we did not see an improvement, suggesting that this explanation is not reasonable for early compliance. Given our findings, we would not presume attachment would independently influence self-regulation, and any influence of the interaction of attachment and sensitivity may also be mediated by unobserved variables.

We did find, however, that, maternal sensitivity predicted compliance, although it was less than we would have predicted based on previous findings. Kochanska et al. (2000), for example, also found a relation between effortful control and maternal responsivity. Both studies suggest that maternal influence has some role in influencing compliance, but the mechanisms remains unclear. It was expected that maternal sensitivity would be even more strongly related to compliance than what we found here, based on findings from previous research. Whether this discrepancy indicates a problem with the reliability of the compliance measure is unclear. Stayton, Hogan, and Ainsworth, (1971) and Lehman et al. (2002) used a single item to measure sensitivity, and it is possible that this difference in measuring sensitivity may also account for the dissimilarities between our findings and those of others.

It was also apparent that the significant predictors of compliance change over time. In the 24-month model (Figure 2), externalizing behavior (CBC-L) significantly predicted clean-up compliance. In the subsequent models, however (Figure 3 and 4), externalizing was no longer a significant predictor. Instead, parent-rated compliance on the ASBI, and maternal sensitivity became significant predictors. This pattern raises some interesting hypotheses. The externalizing scale of the CBC-L is comprised of the Aggressive and Destructive syndrome scales, as mentioned earlier, and while it seems logical to suggest a pattern of shared variance among these scales and self-regulatory behaviors, it also seems likely that lack of self-regulation in 2-year-olds might manifest more in externalizing types of behavior. In the 3- and 4.5-year-olds, however, lack of self-regulation may not share so much variance with aggression or destructive behavior.

In addition to the models presented, additional models and alternate possibilities were tested. To explore socioeconomic status (SES), the income-to-needs ratio was included in two of our models. Based on previous work with this dataset (1998), we expected small but significant paths coefficients between this measure of SES and some of the predictors. Specifically, in the 1998 study, the income-to-needs ratio was found to significantly predict 24-month externalizing behavior (CBC-L), 24-month ASBI scores, and 36-month clean-up compliance. However, the inclusion of the ratio as a predictor did not do anything to strengthen the fit of the model or produce significant paths. This suggests, as many researchers before have proposed, that income alone may not be predictive when other more proximal measures of the child's environment are included (e.g., maternal sensitivity, Whittaker, Harden, See, Meisch & Westbrook, 2011).

Both the cross-lag correlations within measures and the synchronous-time correlations across measures indicate some stability and cohesion among measures, much as expected based

on other research. For measures with more than two timepoints, the magnitude of the correlations did not strengthen or weaken over time, again confirming the presence of some individual difference stability.

It is possible that the measure of clean-up compliance itself may not be very reliable. There was no test-retest reliability data presented for this laboratory based measure and the cross-age correlations were quite small. Future studies should make an effort to calculate short-term stability of the laboratory based compliance measure used in the NICHD study. The cross-time correlation of compliance from 24 to 36 months was relatively small (r = .154). This small stability coefficient provides further confirmation of the notion that stability is not reached until the child is closer to three years of age. It seems likely that other cognitive and motor developments may need to come into play to help the child attain self-regulation, as Kopp (1982) and Vaughn et al. (1984) suggest. Some of these skills might include vocabulary (being able to understand what is asked of you, for example) and memory recall (having an idea of what is expected of you in a particular social setting).

Kochanska and colleagues (2001) point out the interactive features of compliance behavior – from the difference in request type, to the difference in behavioral responses, and finally to the difference among how accepting the child is of the requestor's agenda. By suggesting these context-dependent features, it seems reasonable to assume that individual differences in compliance may change from one situation to another. However, as mentioned earlier, the umbrella concept of self-regulation may not follow the same pattern of change. Indeed, most researchers seem to discuss self-regulation as more consistent than compliance. Future studies using clean-up compliance as an indicator of self-regulation, should supplement their methods with alternate measures of self-regulation or of compliance in other situations

(e.g., home or school). Future investigations should also focus on the relationship between compliance and other self-regulatory tasks in order to clarify the role compliance plays in shaping some of the outcomes associated with self-regulation. Because this study only had one behavioral measure of compliance, it is difficult to confirm the notion of compliance being truly situationally based. A second, concurrent measure of self-regulation would have helped to test the notion that clean-up compliance behavior mirrors other self-regulation behaviors. Because this study was based on secondary data, we were limited by the choices made in the original NICHD study.

This investigation has highlighted important questions for the field to pursue, as well as illustrated the difficulty of using a single indicator to map onto a larger construct. Our exploration leads us to the conclusion that self-regulation, as measured by compliance, does not stabilize until later toddlerhood. However, it also appears that compliance alone should not be used to indicate self-regulation but rather supplemental measurements should be acquired. Both self-regulation and compliance are important areas of development to continue studying due to their influence on outcomes such as academic performance and psychological well-being. Having a better understanding of these constructs will strengthen our understanding of the role they play in the process of development.

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Table 1. *Measures Included in Analyses*

	1 Month	6 Months	15 Months	24 Months	36 Months	54 Months
Parent Report						
Income-to-needs Ratio	X					
Early Infant Temperament Questionnaire (EITQ)		X				
Child Behavior Checklist (CBC-L)				X	X	X
Adaptive Social Behavior Inventory (ASBI)				X	X	
Lab-based Measures						
Maternal Sensitivity		X	X	X	X	X
Strange Situation			X			
Clean-up Compliance				X	X	
Delay of Gratification (DoG)						X

Table 2. *Maternal Sensitivity Across Five Time Points*

	6 Months	15 Months	24 Months	36 Months	54 Months
6 Months	1				
15 Months	.370**	1			
24 Months	.276**	.348**	1		
36 Months	.375**	.364**	.451**	1	
54 Months	.321**	.336**	.414**	.489**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3. *24-Month Correlations Across Measures*

	Maternal Sensitivity	Clean-Up Compliance	Externalizing (CBC-L)	Compliance (ASBI)
Maternal Sensitivity	1			
Clean-Up Compliance	.086*	1		
Externalizing (CBC-L)	-.162**	-.154**	1	
Compliance (ASBI)	.226**	.130**	-.533**	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. *36-Month Correlations Across Measures*

	Maternal Sensitivity	Clean-Up Compliance	Externalizing (CBC-L)	Compliance (ASBI)
Maternal Sensitivity	1			
Clean-Up Compliance	.125**	1		
Externalizing (CBC-L)	-.164**	-.078*	1	
Compliance (ASBI)	.228**	.119**	-.513**	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 5. *54-Month Correlations Across Measures*

	Maternal Sensitivity	Externalizing (CBC-L)	Time Waited in Delay of Gratification
Maternal Sensitivity	1		
Externalizing (CBC-L)	-.122**	1	
Time Waited in Delay of Gratification	.273**	-.111**	1

**. Correlation is significant at the 0.01 level (2-tailed).

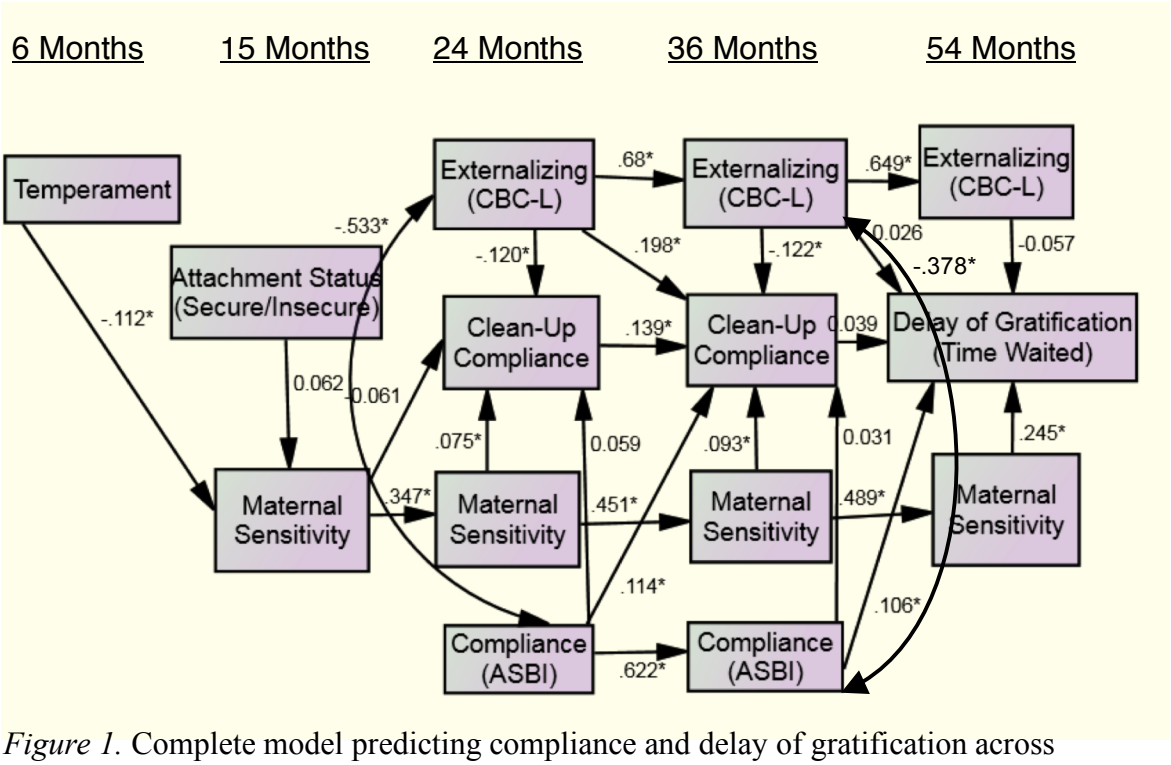

Figure 1. Complete model predicting compliance and delay of gratification across five time points. Error terms omitted for clarity of presentation.

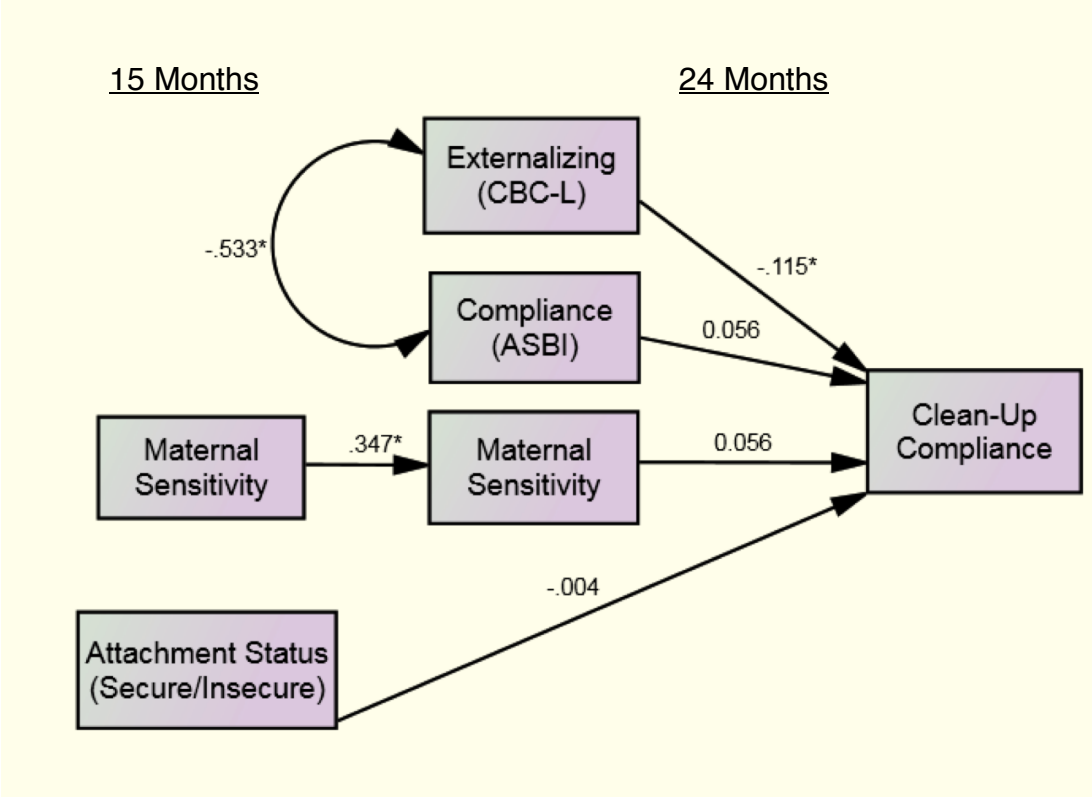

Figure 2. Predicting 24-month compliance from earlier and concurrent measures. Error terms omitted for clarity of presentation.

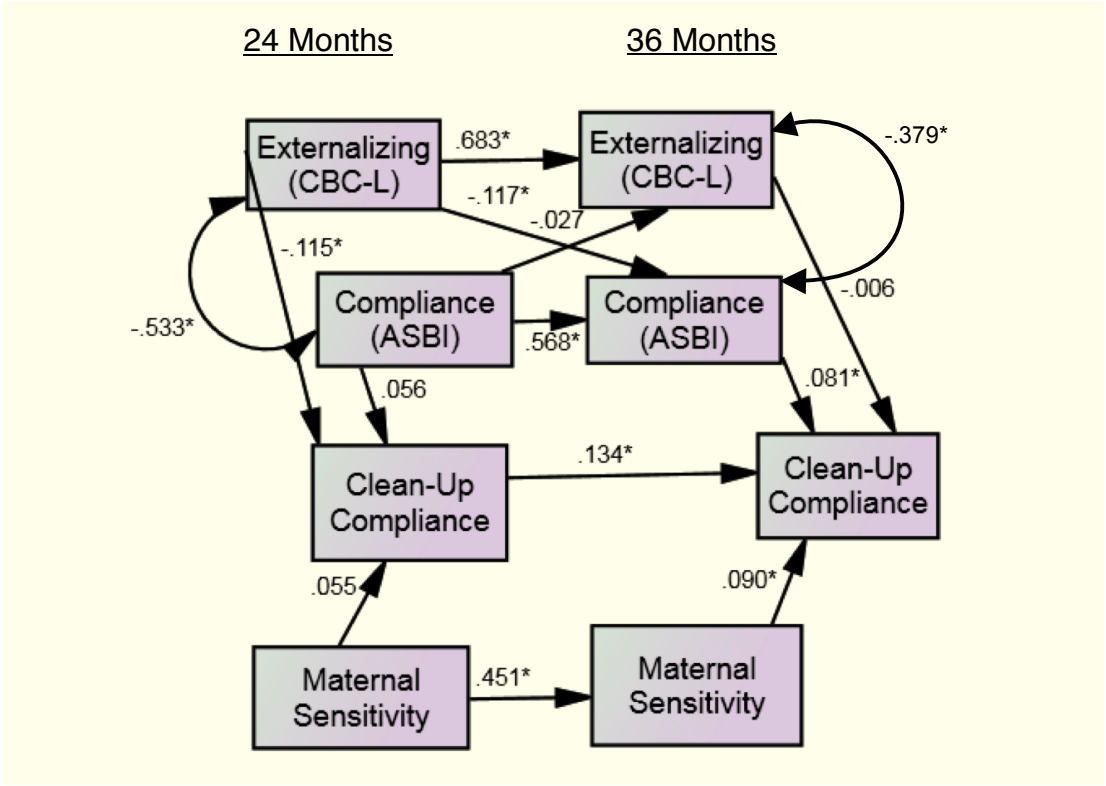

Figure 3. Predicting 36-month compliance from earlier and concurrent measures. Error terms omitted for clarity of presentation.

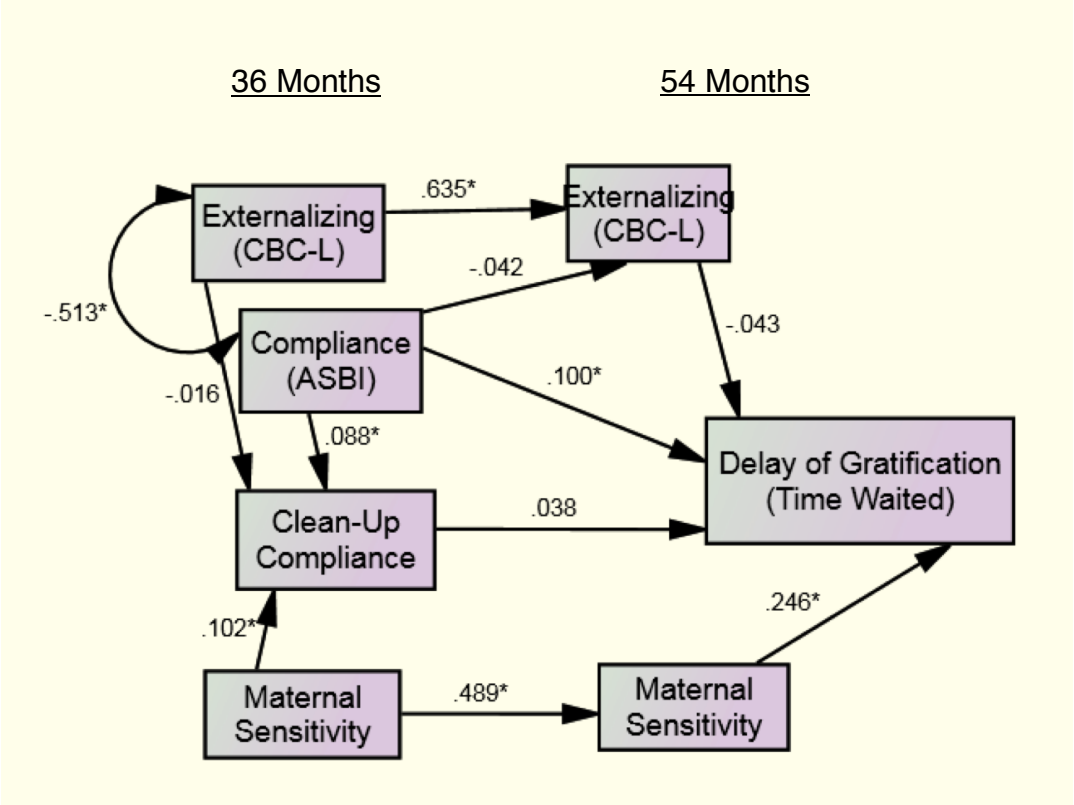

Figure 4. Predicting 54 month delay of gratification from earlier and concurrent measures. Error terms omitted for clarity of presentation.

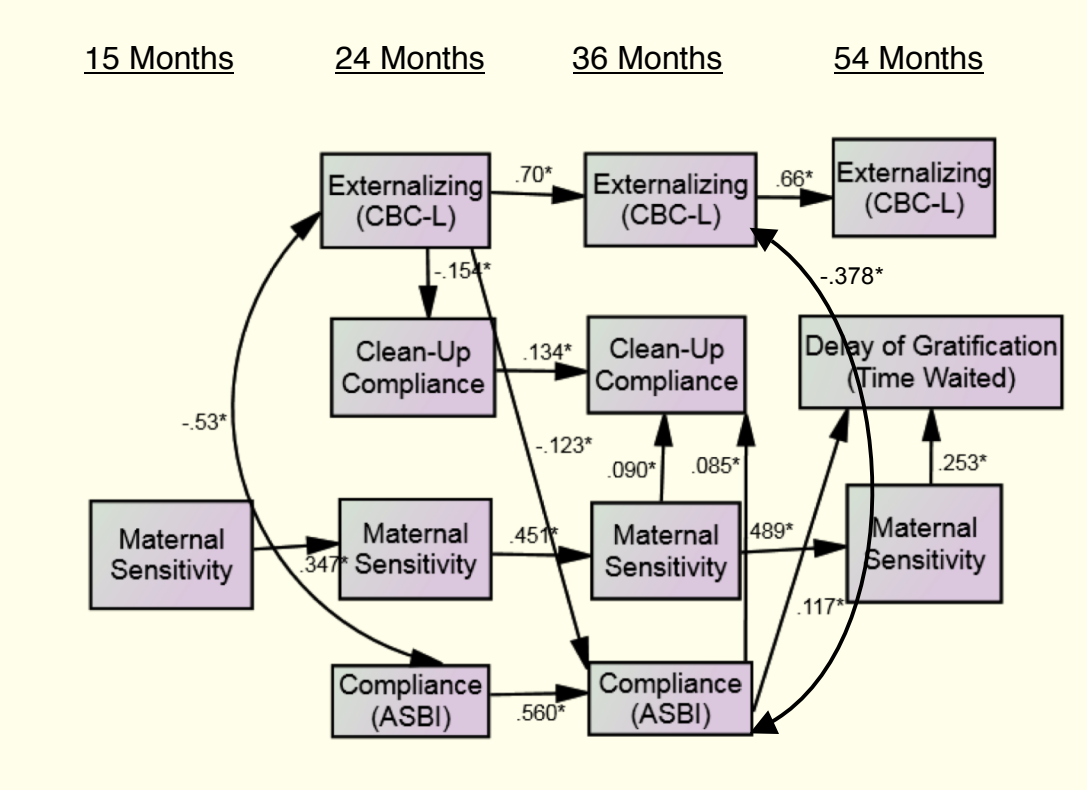

Figure 5. Trimmed model combining Figures 2-4 and removing nonsignificant paths. Error terms omitted for clarity of presentation.