

A vicious or auspicious cycle: The reciprocal relation between harsh parental discipline
and children's self-regulation

Running head: SELF-REGULATION DEVELOPMENT

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Abstract

Children's ability to exercise self-regulation is a key predictor of academic, behavioural, and life outcomes, but the developmental dynamics of children's self-regulation are not adequately understood. We investigated how children's self-regulation skills and harsh parental discipline reciprocally predict each other across 12,474 children at ages three, five, and seven in the UK (Millennium Cohort Study). Cross-lagged structural equation models indicated that high initial levels of harsh parental discipline predicted lower subsequent self-regulation, which then reciprocally predicted higher levels of harsh parental discipline. Conversely, high initial levels of child self-regulation predicted lower subsequent harsh parental discipline. Implications for policy and interventions are discussed.

Keywords: self-regulation, parenting, self-control, parent-child relations

A vicious or auspicious cycle: The reciprocal relation between harsh parental discipline and children's self-regulation

Self-regulation, defined as a person's ability to autonomously control actions and attention in the service of pre-established ends (Flouri, Midouhas, & Joshi, 2014), has been associated with a range of life outcomes. From the earliest years, self-regulation skills measured during childhood predict higher academic achievement (Duckworth & Carlson, 2013; Evans & Rosenbaum, 2008), better health (Moffitt, Arseneault, & Caspi, 2011; Schlam, Wilson, Shoda, & Mischel, 2013), improved employment prospects (Daly, Delaney, & Baumeister, 2015), and even higher marital stability (Mischel, 2014).

The studies referenced above regarded self-regulation as a predictor of subsequent life outcomes, whereas other studies have investigated the antecedents of self-regulation. Research suggests that one key antecedent of self-regulation development is parenting practices (Moilanen, Rasmussen, & Padilla-Walker, 2015; Sanders & Mazzucchelli, 2013), with harsh parental discipline showing some of the strongest negative effects (Deater-Deckard, Wang, Chen, & Bell, 2012; Mackenbach et al., 2014). Despite the evidence regarding effects of harsh parental discipline on children's self-regulation, the reciprocal effect of children's self-regulation on harsh parental discipline remains relatively under-explored.

Previous research has investigated this reciprocal relation for older (i.e., over seven-years-old) children (Eisenberg, Fabes, Shepard, Guthrie, & Murphy, 1999; Moilanen, Rasmussen, & Padilla-Walker, 2015) and for related constructs such as effortful control (Eisenberg et al., 2005). By contrast, very few studies have directly

investigated this reciprocal relation between harsh parental discipline and self-regulation during the early childhood years. The present study aims to address that very issue.

Development of self-regulation during early childhood

Empirical evidence indicates that the first signs of self-regulation emerge around age two (Kopp, 1982; Moilanen, Shaw, Dishion, Gardner, & Wilson, 2009), when children first demonstrate the ability to modulate their behavior (e.g., suppressing the impulse to make noise in a quiet place). Once children begin developing self-regulation, the process is largely mediated by maturation of the pre-frontal cortex, which fully develops by approximately age 25 (Diamond, 2006). In addition to brain development, social interactions and child-parent interactions strongly influence self-regulatory development (Eisenberg et al., 1999; Spinrad, Eisenberg, Silva, Hofer, & Smith, 2012).

Sameroff's (1975) Transactional Model posits that children become agents in the social construction of the people, relationships, and world around them. In the parent-child context, the child and parent reciprocally influence the behavioral trajectories of one another – neither trajectory is wholly dependent on the other, but both are substantially influenced by one another (Sameroff, 1975). In this model children are conceptualized as active agents with regard to their own development (see Figure 1).

Figure 1 about here

In the present study, we focus on reciprocal parent-child influences when children are between the ages of three- and seven-years-old. We test the adapted transactional model in Figure 1, which shows socio-demographic characteristics affecting both children's self-regulation and parents' harsh discipline behaviors, which then reciprocally affect one another across time. Such a pattern could be described as a vicious cycle,

whereby initial maladaptive child and parenting behaviors make subsequent maladaptive behavior more likely (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013), or as an auspicious cycle, whereby initial adaptive behaviors make subsequent adaptive behaviors more likely.

Empirical evidence has corroborated that parents and children exert reciprocal effects, and thereby initiate both vicious and auspicious cycles, with one another among children in later childhood (i.e., over seven-years-old) and early adolescence (Eisenberg et al., 1999; Moilanen et al., 2015), but the evidence in early childhood remains comparatively sparse. These literature gaps, in addition to others that are discussed in the upcoming literature review section, intend to be filled by the present study. In so doing, we go beyond existing literature regarding self-regulation development and harsh parental discipline in early childhood.

Harsh parental discipline and self-regulation

Harsh parental discipline is characterized (Baumrind, Larzelere, & Owens, 2010; Scaramella & Leve, 2004; Shumow, Vandell, & Posner, 1998) by disciplinary tactics that rely on punishment and anger (e.g., spanking, shouting) to redirect a child's behaviour. In a survey of 33 lower-income and middle-income countries, UNICEF (2010) found approximately half of the sampled children to be spanked by their parents. In the United States, the percentage of parents who report spanking their children is even higher at approximately 65 percent (Regalado, Sareen, Inkelas, Wissow, & Halfon, 2004).

In the largest meta-analysis ($n = 88$ studies) on spanking, Gershoff (2002) found that children who routinely experience corporal punishment exhibit higher immediate compliance with parental demands. Neither Gershoff's (2002) meta-analysis nor other

researchers who have endorsed corporal punishment (Baumrind et al., 2010; Larzelere, 2000) directly measured self-regulation. In fact, although the literature investigating harsh parental discipline is extensive, the literature connecting harsh parental discipline to self-regulation is limited, even though self-regulation-related citations have increased dramatically in recent years (Jacob & Parkinson, 2015).

In contrast to Gershoff (2002), Lucassen et al. (2015) did directly measure children's self-regulation skills and harsh parenting. They found that higher levels of harsh parenting predicted significantly lower inhibitory self-control. Given the study's cross-sectional design, the authors concluded that reciprocal effects could not be ruled out (Lucassen et al., 2015, p. 500). That is, whereas the directional mechanisms described heretofore focus on the effect of harsh parental discipline on children's self-regulation, the reverse relationship (i.e., children's effect on parents' disciplinary behaviour) is also critical to analyze.

To the best of our knowledge, only one reciprocal effects study of harsh parental discipline and self-regulation in early childhood exists. Specifically, Cecil et al. (2012) analyzed monozygotic twin pairs in the United Kingdom to investigate the bidirectional relation between harsh parental discipline and self-control. The authors measured harsh parental discipline using self-reported smacking and shouting by the parents, whereas self-control was measured using a parental rating of children's hyperactivity, persistence, and emotional regulation. Parental discipline and child self-control data were collected when the children were ages three, four, seven, and nine during the 1990s.

The authors found negative bidirectional effects between children and harsh parental discipline at the ages of three, four, seven, and nine. Thus, these findings

corroborated the results of a bidirectional effects paper with adolescents between the ages of 11 and 16-years-old (Moilanen et al., 2015). However, in contrast to Moilanen et al. (2015), Cecil et al. (2012) did not use latent variable models to account for measurement error in their self-control instrument.

Given the complexities of the self-regulation measurement (McClelland & Cameron, 2012), Cecil et al.'s (2012) measure presents problems on a theoretical level because their instrument may not accurately capture children's self-regulation skills. Since the authors did not conduct validity testing for their self-regulation measure, their observed self-regulation results with those from other studies; moreover, without validating their measure, it cannot be known whether the self-regulation indicators capture the construct they intend to capture. Secondly, on a statistical level, the lack of latent variable modeling presents problems because Cecil et al. (2012) did not account for measurement error, which is commonly present in self-regulation measures (Miyake et al., 2000). Thus, it is possible that the observed bidirectional relation in Cecil et al. (2012) were either underestimated or overestimated given the limitations of their self-regulation measurement approach.

The other reciprocal effects study regarding harsh parental discipline and self-regulation (Moilanen et al., 2015) also found negative cross-lagged associations from harsh parental discipline to self-regulation as well as the reverse; however, that paper's sample involved adolescents aged 11 and 16, which does not provide information about reciprocal effects in early childhood. By contrast, Cecil et al. (2012) investigated the reciprocal association during early childhood, but, again, their self-control instrument has neither been used in other published literature nor does it account for measurement error.

Without a single paper that focuses on early childhood and also adequately captures the self-regulation construct, the current literature has a significant gap. Moreover, none of the aforementioned studies involve a nationally representative sample, which diminishes the generalizability of the findings. Given that Cecil et al. (2012) conducted their study only with monozygotic twin pairs, they call for future researchers to replicate the findings using singletons (p. 296).

Thus, in the present paper, we intend to replicate and expand upon the findings of Cecil et al. (2012) in two ways: 1) We use a latent self-regulation factor (cf. Moilanen et al., 2015) to account for the widely reported (McClelland & Cameron, 2012; Willoughby, Holochwost, Blanton, & Blair, 2014) measurement error in the self-regulation construct, and 2) We enhance the external validity of our findings by investigating singletons from a nationally representative sample, which will be described in the Methods section following the research hypothesis section below.

Having identified gaps in the existing literature, the present study will investigate the following research question: How do harsh parental discipline and self-regulation reciprocally predict one another between the ages of three, five, and seven?

Based on the adapted transactional model (Figure 1), we hypothesize that harsh parental discipline and children's self-regulation will negatively predict one another within and across time. Specifically, higher self-regulation at age three will predict lower harsh discipline at five, which will then predict even higher self-regulation for the child at age seven. Conversely, higher harsh parental discipline at age three will predict lower self-regulation at five, which will then predict higher harsh parental discipline at seven.

Method

Sample. We used data from the Millennium Cohort Study (MCS), which is a nationally representative prospective longitudinal cohort study that began in September 2000 in England, Scotland, Wales, and Northern Ireland. Children and their families were recruited at 9 months ($n = 18,552$) and then followed up at ages 3 ($n = 15,590$), 5 ($n = 15,246$), 7 ($n = 13,857$), and 11 (Hansen, 2012), giving a total of 19,518 children.

The analytic sample ($n = 12,474$) is comprised of first-born and singleton MCS children who had at least two out of three self-regulation ratings and two out of four ratings of parenting styles (see the following “Measures” section for more detail). Next, because this study focuses on parental discipline, respondents who were not natural, step, adoptive, or foster parents were excluded (e.g., grandparents, siblings, or other relatives). Finally, only mother-reported self-regulation evaluations of children were analyzed because there were insufficient father ratings on children’s self-regulation (average $n = 72$ across the three relevant time points). Overall, the analytic sample is 51.1% female, 89.5% white, and 45.2% disadvantaged according to the MCS socio-economic disadvantage guidelines (see Hansen, 2012 for more information).

The MCS data collectors received ethical clearance for each of the data collection sweeps from the National Health Service’s (NHS) Research Ethics Committee (REC). Parents, guardians, and other adult respondents provided consent for children’s participation (Hansen, 2012).

Measures

Self regulation. Mothers rated their child's self-regulation skills at ages three, five and seven using six items (see Table 1) from the Child Social and Behavioural Questionnaire (CSBQ; Luteijn, 2000). The six items used here have also been used to create a latent self-regulation factor in other published literature (see Flouri, Midouhas, & Joshi, 2014), and the CSBQ has been validated through the Effective Provision of Pre-school Education (EPPE) study (Sammons et al., 2004). The CSBQ items have scale scores ranging from 1 to 3, where higher scores signify higher self-regulation.

(Table 1 about here)

We specified a confirmatory factor analysis (CFA) with each item loading onto the unidimensional construct. Using cut-offs of $< .08$ for the Root Mean Square Error of Approximation (RMSEA), and $> .90$ and $> .95$ for Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) for acceptable and good model fit, respectively, the one-factor solution fitted data well at each time point (Child at age three: $\chi^2_{[9]} = 456.89$, $p < .01$; RMSEA = .06, CFI = .95, TLI = .92; Child at age five: $\chi^2_{[9]} = 423.35$, $p < .01$; RMSEA = .06, CFI = .97, TLI = .96; Child at age seven: $\chi^2_{[9]} = 428.42$, $p < .01$; RMSEA = .06, CFI = .95, TLI = .95).

We then tested the invariance of the self-regulation factor structure across the three time points. Specifically, we tested a strong invariance model ($\chi^2_{[146]} = 3234.92$, $p < .01$; RMSEA = .04, CFI = .95, TLI = .95), which constrained factor loadings and intercepts to equality, after previously testing configural invariance ($\chi^2_{[114]} = 2158.19$, $p < .01$; RMSEA = .04, CFI = .97, TLI = .96) and weak invariance ($\chi^2_{[124]} = 1980.28$, $p < .01$; RMSEA = .04, CFI = .97, TLI = .96) models with fewer constraints. The model fit

values across configural, weak, and strong invariance models fell within the guidelines suggested by Chen (2007).

The measurement invariance model results suggest that the observed self-regulation changes over time resulted from genuine developmental change rather than changes in the latent construct's measurement across time. Finally, the self-regulation measure had ordinal reliability (Gadermann, Guhn, & Zumbo, 2012) values of .71, .78, and .79 across the three data collection time points.

Harsh parental discipline. Harsh parental discipline was measured using three MCS parent-report items. Consistent with the literature we selected three indicators of harsh parenting used in previous studies (Bezenski & Tuppet, 2013; Moilanen et al., 2015; Shumow et al., 1998), including shouting, smacking, and telling off the child.

Specifically, the mother is asked to rate the tendency to 1) “shout at the child when s/he is naughty,” 2) “smack the child when s/he is naughty,” and 3) “tell off the child when s/he is naughty” using a five-point scale indicating frequency: 1 = never, 2 = rarely, 3 = once a month, 4 = once a week or more, and 5 = daily (see Table 2).

(Table 2 about here)

As with the self-regulation construct, we tested structural validity across the three time points using a configural invariance model ($\chi^2_{[15]} = 140.37, p \leq .001$; RMSEA = 0.03, CFI = 0.99, TLI = 0.99), weak invariance ($\chi^2_{[19]} = 201.32, p \leq .001$; RMSEA = 0.03, CFI = 0.99, TLI = 0.99) and strong invariance ($\chi^2_{[31]} = 2154.48, p \leq .001$; RMSEA = 0.07, CFI = 0.97, TLI = 0.96). Again, these measurement invariance results indicate that observed changes in harsh discipline over time resulted from genuine behavioural change rather than changes in the latent construct's measurement over time. Finally, the

harsh parental discipline measure had ordinal reliability (Gadermann, Guhn, & Zumbo, 2012) values of .73, .71, and .71 across the three data collection time points.

Covariates. We also included covariates to control for known sociocultural features. For child-level covariates, the models controlled for child gender (0 = male, 1 = female) and age. Age was measured in fractions of years, where one year is 365.25 days, based on date of birth data from the MCS questionnaire (i.e., a child aged three years and six months would be coded as 3.5 years old).

Next, the models incorporated the six-item Kessler scale (Kessler, Barker, Colpe, Epstein, Gfroerer, Hiripi, & Zaslavsky, 2003) to control for mothers' psychological distress levels. The six Kessler items are measured on a 1-5 Likert-type scale (ranges from "none of the time" to "all of the time") and assess phenomena such as whether the mother has felt depressed or hopeless, which have been shown to be associated with harsh parental discipline (Chang, Lansford, Schwartz, & Farver, 2004). By controlling for Kessler scores, we could isolate the association between harsh discipline and self-regulation while avoiding any confounding influence from mothers' psychological distress levels. After that, the models controlled for maternal education as measured by their highest National Vocational Qualification (NVQ) from NVQ level 1 to level 5, with five being the highest.

Next, we controlled for MCS regional strata (see Hansen, 2012 for more information about strata in the MCS dataset) by including the English-advantaged stratum as the baseline group and then dummy-coded predictors for the other eight strata. This ensured that the results were not affected by the disproportionate over-sampling of disadvantaged and ethnic minority families (see also Malmberg & Flouri, 2011).

Finally, the analyses controlled for family socio-economic disadvantage (SED), which was measured as the sum of five binary indicators that reflect whether the family: 1) has an income below the 60% OECD median, 2) lacks access to a car, 3) does not own its home, 4) lives in overcrowded accommodation, and 5) receives income support. This SED variable has been used to broadly capture the material implications of poverty (Flouri et al., 2014; Malmberg & Flouri, 2011).

Statistical Approach

All analyses were conducted using Mplus version 7.3 (Muthén & Muthén, 2012) using the weighted least squares means and variances (WLSMV) estimator for ordinal-scale variables. The WLSMV estimator does not assume normally distributed continuous variables and is thus more appropriate than maximum likelihood approaches for modeling ordinal data (Brown, 2006).

As for missing data, the overall proportion of missing data points was 0.06 (SD = .10, Min = 0.00, Max = 0.60). The average proportion of missing data per variable was 0.06 (SD = .05; Min = 0.00, Max = 0.19). To account for the uncertainty we imputed three datasets (Enders, 2010) using the Markov Chain Monte Carlo (MCMC) estimator in SPSS Version 21 (IBM, 2012). Thus, all tables and analyses are based on the full analytic sample of $n = 12,474$ respondents across time points.

Results

The correlations among self-regulation, harsh parental discipline, and the covariates are presented in table 3. The correlations follow a simplex structure whereby the self-regulation and harsh parental discipline constructs have stronger correlations with

temporally proximate measurements (i.e., a child's self-regulation skills at age three are more highly correlated with self-regulation skills at age five than at age seven).

Moreover, we observed significant and negative correlations between self-regulation and harsh parental discipline. These observed relationships thus warrant the autoregressive and cross-lagged models described below.

(Table 3 about here)

Following our hypothesized model (see Figure 1), we specified auto-regressive and cross-lagged paths including the self-regulation and harsh parental discipline invariance models described in the Methods as well as the covariates. We included the self-regulation and harsh parental discipline constructs at each of the three time points (i.e., when children were ages three, five, and seven). By controlling for the construct at each time point, we could determine precisely how much the construct had changed since the previous time point.

This model fitted data well ($\chi^2_{[133]} = 4017.80$; $p < .001$, RMSEA = .02, CFI = .95, TLI = .94). The results support the reciprocal relation between self-regulation and harsh parental discipline (see Figure 2). Specifically, high harsh parental discipline at age three predicted lower self-regulation at age five ($\beta = -.09$, 95% CI $[-.07, -.11]$, $p < .001$) controlling for prior self-regulation ($\beta = .66$, 95% CI $[.64, .68]$, $p < .001$). On the other hand, high self-regulation at age three predicted lower harsh parental discipline at age five ($\beta = -.05$, 95% CI $[-.03, -.07]$, $p < .001$) controlling for prior harsh parental discipline ($\beta = .68$, 95% CI $[.66, .70]$, $p < .001$).

Moreover, high harsh parental discipline at age five continued to predict lower ($\beta = -.04$, 95% CI $[-.02, -.06]$, $p < .01$) self-regulation at age seven, controlling for self-

regulation at age three. Conversely, high self-regulation at age five was not a significant predictor ($\beta = -.01$, 95% CI $[-.02, .03]$, $p > .05$) of harsh parental discipline at age seven, controlling for harsh parental discipline at age five. Thus, the results mostly support our hypothesis of reciprocal effects over time, though the cross-lagged effects between ages five and seven were significant only for harsh parental discipline on children's self-regulation.

Discussion

Using data from the MCS, we found that self-regulation and harsh parental discipline do reciprocally influence one another during early childhood. These results suggest that high levels of harsh parental discipline during early childhood predicts self-regulatory decline, whereas early robust self-regulation predicts decline in harsh parental discipline over time.

Evidence from previous studies (Dix, 1991; Grolnick & Ryan, 1989) suggests that harsh discipline often represents a lack of behavioral regulation by parents. When parents lose control over their emotions and harshly reprimand their children, this provides a poor emotional regulation model for children. Conversely, children of parents who effectively modulate their parenting behaviors have been shown to have superior self-regulation skills than children of parents without robust self-regulation (Kochanska et al., 2001).

Harsh disciplinary practices such as shouting or smacking can also amplify the salience of the distressing event for a misbehaving child (Grolnick & Ryan, 1989). If a child is already upset about his or her misbehavior, then the additional stress of a harsh

parental reaction may increase the child's negative emotionality (Dennis, 2006), which may cyclically intensify the level of harsh parenting practices (Scaramella & Leve, 2004).

In the other bidirectional effects paper from early childhood, Cecil et al. (2012), which focused only on twins, also noted relatively small cross-lagged effect sizes from child self-control and harsh parental discipline to one another at the age three data collection ($\beta = -.07$ in both directions). In contrast to Cecil et al.'s (2012) findings, however, the present study found stronger effects of the parent behavior on child behavior than the reverse. Again, the present study used latent self-regulation factors to address issues of measurement error, which could account for the observed differences in effect size.

The effect size magnitude of the cross lags also decreased over time in the present study, which is consistent with previous bidirectional studies of self-regulation (Cecil, Barker, Jaffee, & Viding, 2012; Moilanen et al., 2015) as well as other developmental phenomena (Eisenberg et al., 2005; Spinrad, Eisenberg, Silva, Hofer, & Smith, 2012). This finding underscores the importance of both children's self-regulatory behaviours and parental disciplinary behaviours from a very early age.

The importance of early behaviours brings us to the notion of vicious and auspicious cycles. Specifically, existing research indicates (Flouri et al., 2014; Raver et al., 2013) the potential for poverty and stressful life events to undercut children's self-regulation from the earliest years; if such a stressful life event precipitates an early decline in self-regulation, then the results suggest that such a decline will be associated with an increase in harsh parental discipline, which could, in turn, predict even lower self-regulation over time.

By contrast, the opposite is also true. If a child is predisposed to robust self-regulation skills from a young age, then the child's self-regulatory behaviours can predict lower harsh discipline, which then predicts further improved self-regulation for the child. Additionally, parents who naturally tend toward harsh discipline can reduce their harsh discipline through parenting programmes, which would then predict improved self-regulation in their children, which would then predict even further diminished harsh discipline in the parent.

Thus, the observed negative cross lags can have a positive message: Auspicious initial behaviour from either the parent or the child can catalyze an auspicious cycle that improves outcomes for both members of the dyad. It is hoped that such knowledge, which are also the first to be based on a nationally representative sample, will compel parents to initiate a positive cycle from the earliest years.

Limitations

Despite this study's strengths, the paper has two limitations worthy of note. The quality of this paper's measures emerges as the first limitation. Specifically, the self-regulation data lack objective measures (e.g., the Head-Toes-Knees-Shoulders task or the peg tapping task) and observational measures. Instead, the MCS self-regulation data derive from parent reports with relatively low internal consistencies. Parents also reported on their own harshness, so parents may rate themselves as less harsh than they actually are.

Secondly, this paper excluded parental reports from fathers given the low frequency of paternal self-regulation ratings across sweeps (average $n = 72$), which diminishes the generalizability of the results.

Implications

The findings of this paper have implications for parents and interventionists who seek to cultivate self-regulatory capacity in young children. The results demonstrate that parents' disciplinary behaviours are significantly and reciprocally associated with children's self-regulation skills. This means that a parent who is harsh toward a young child can impede the child's ability to control his or her behavior, which then makes harsh parenting even more likely in the future. That is, parents' ability to control their disciplinary impulses predicts children's ability to control their behavioural impulses. The opposite is also true; a child's ability to regulate his or her impulses from a young age can lessen the likelihood of subsequent harsh discipline from parents.

Given these findings, parenting interventions emerge as one option to decrease harsh discipline. Fortunately, parenting intervention literature suggests (Jones, Daley, Hutchings, Bywater, & Eames, 2007; Sanders & Mazzucchelli, 2013) that parents can improve their self-regulation to counteract children's self-regulatory difficulties. Several intervention studies have shown that parenting programmes such as the Incredible Years (Jones et al., 2007; Webster-Stratton, Reid, & Stoolmiller, 2009) and the Positive Parenting Program (Bor, Sanders, & Markie-Dadds, 2002) can reduce harsh discipline by parents. By helping parents improve their own self-regulation, these interventions also enhance children's self-regulation by providing a model of self-regulatory growth (Sanders & Mazzucchelli, 2013; Webster-Stratton et al., 2009).

In addition to the focus on parenting practices, future research could address other methods to hone self-regulation skills during early childhood. Whereas this study focused on harsh parental discipline, it is also important to identify educational predictors of self-regulation. Some studies have shown preliminary evidence of curricula such as Tools of the Mind (Blair & Raver, 2014) and interventions such as the Chicago School Readiness Program (Jones, Bub, & Raver, 2013) that hone children's self-regulation skills, but more research is necessary to corroborate their effectiveness.

Moreover, future research could also track the effects of childhood self-regulation skills on adolescent and adult outcomes. Several authors have found (Moffitt et al., 2011; Schlam, Wilson, Shoda, & Mischel, 2013) that self-regulation measured in childhood predicts higher wages, better health outcomes, lower incarceration rates, and other favorable life outcomes. As MCS children move toward adolescence and adulthood, these findings can be replicated and expanded upon for decades to come.

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Tables

Table 1

Descriptive statistics for self-regulation (SR) CSBQ items when the children are ages three, five, and seven

		SR 1	SR 2	SR 3	SR 4	SR 5	SR 6
Age three	Mean	2.54	2.22	2.68	2.25	2.64	2.13
	Std. Deviation	0.57	0.59	0.49	0.61	0.53	0.61
	Skewness	-0.70	-0.11	-1.04	-0.15	-0.95	-0.04
	Kurtosis	-0.48	-0.49	-0.03	-0.56	-0.12	-0.38
Age five	Mean	2.52	2.41	2.74	2.25	2.72	2.3
	Std. Deviation	0.57	0.59	0.46	0.60	0.48	0.62
	Skewness	-0.71	-0.42	-1.36	-0.17	-1.28	-0.3
	Kurtosis	-0.51	-0.69	0.56	-0.56	0.44	-0.66
Age seven	Mean	2.48	2.38	2.72	2.24	2.72	2.29
	Std. Deviation	0.59	0.63	0.47	0.62	0.48	0.65
	Skewness	-0.66	-0.49	-1.29	-0.21	-1.31	-0.37
	Kurtosis	-0.52	-0.65	0.41	-0.60	0.54	-0.75

Note. SR 1 = Child works things out for him/herself; SR 2 = Child does not need much help with tasks; SR 3 = Child chooses activities on his/her own; SR 4 = Child persists in the face of difficulties; SR 5 = Child moves on to new tasks after finishing others; SR 6 = Child sees tasks through to the end

Table 2

Descriptive statistics for mothers' smacking and shouting when the children are ages three, five, and seven

		Smacking	Shouting	Telling off
Age three	Mean	1.92	3.36	4.07
	Std. Deviation	0.89	1.19	0.98
	Skewness	1.09	-0.21	-1.07
	Kurtosis	1.11	-1.19	0.4
Age five	Mean	1.69	3.12	3.59
	Std. Deviation	0.72	0.92	0.85
	Skewness	0.82	-0.05	-0.33
	Kurtosis	0.47	-0.60	-.26
Age seven	Mean	1.56	3.11	2.27
	Std. Deviation	0.66	0.90	0.64
	Skewness	0.95	-0.06	-0.34
	Kurtosis	0.65	-0.54	-0.75

Table 3

Correlation matrix with child self-regulation, harsh parental discipline, and covariate data across the three time points (i.e., children ages three, five, and seven).

	1.	2.	3.	4.	5.	6.	M	SD
1. Self-regulation T1 (age 3)							2.41	0.33
2. Self-regulation T2 (age 5)	0.59						2.48	0.35
3. Self-regulation T3 (age 7)	0.48	0.67					2.45	0.37
4. Harsh parenting T1 (age 3)	-0.19	-0.20	-0.18				3.12	0.79
5. Harsh parenting T2 (age 5)	-0.19	-0.27	-0.21	0.67			2.80	0.64
6. Harsh parenting T3 (age 7)	-0.16	-0.22	-0.28	0.61	0.72		2.72	0.62
7. Child's sex (0 = boy, 1 = girl)	0.16	0.19	0.17	-0.11	-0.11	-0.11	49%	
8. Child's age time 1	0.01	-0.02	-0.02	-0.04	-0.02	-0.01	3.13	0.20
9. Child's age time 2	0.01	0.07	0.07	0.00	-0.02	-0.02	5.22	0.24
10. Child's age time 3	0.00	0.05	0.06	-0.01	-0.04	-0.02	7.23	0.25
11. M's distress (Kessler) time 1	-0.13	-0.17	-0.16	0.20	0.14	0.12	3.25	3.71
12. M's distress (Kessler) time 2	-0.11	-0.19	-0.15	0.13	0.17	0.12	3.13	3.76
13. M's distress (Kessler) time 3	-0.12	-0.16	-0.20	0.11	0.12	0.17	3.19	3.75
14. M's Educational level time 1	0.14	0.12	0.11	-0.05	-0.02	-0.02	2.02	1.11
15. Family socio-economic disadvantage	-0.08	-0.12	-0.12	-0.02	-0.05	-0.04	1.17	1.46

Note. Significance at $p < .001$ is indicated in bold font above. All $N = 12,474$. Estimates are latent correlations from Mplus 7.4 (Muthén & Muthén, 2012). Means and standard deviations estimated from pooled imputed data. Stratum covariates not included.

Figures

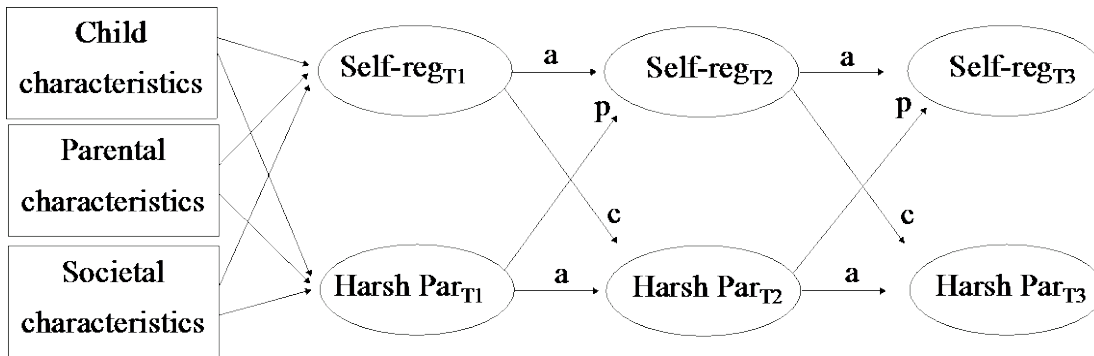


Figure 1. Figure 1. Adapted Transactional Model (Sameroff, 1975) with socio-demographic characteristics of parents and children, harsh parental discipline, and children's self-regulation constructs over time.

Note: a = auto-regressive coefficient, p = effect of harsh parenting on change in child's self-regulation, c = effect of child's self-regulation on change in harsh parenting.

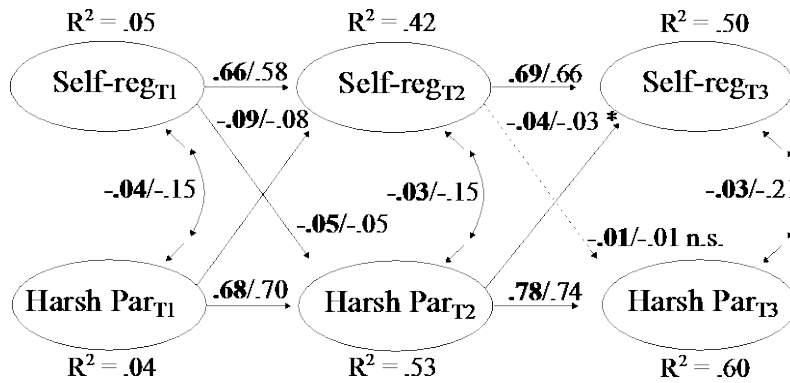


Figure 2. Adapted Transactional Model (Sameroff, 1975) with socio-demographic characteristics of parents and children, harsh parental discipline ("Harsh Par"), and children's self-regulation ("Self-reg") constructs over time.

Note: Unstandardized (in **bold**) and standardized estimates from Mplus 7.4 (Muthén & Muthén, 2012). Covariates not shown. Significance is $p < .001$ unless indicated n.s. = not significant, $* = p \leq .01$.