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A Preliminary Study of Cortisol Reactivity and Behavior Problems in Young Children Born Premature

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Abstract

The purpose of the present study was to examine the relation between cortisol reactivity and comorbid internalizing and externalizing behavior problems among children born premature. Children between the ages of 18 and 60 months who were born < 37 weeks gestation and presented with clinically significant externalizing behavior problems were included. Children were categorized based on those who mounted a cortisol response to a stressor and those who did not mount a cortisol response. Children demonstrating the cortisol response were reported to have more problems with attention, emotional reactivity, anxiety, and depression based on maternal report and displayed higher rates of negative verbalizations during a mother-child interaction than children without a cortisol response. These results extend the findings of the relation between cortisol reactivity and comorbid internalizing and externalizing behavior problems to a sample of children born premature.

Keywords

cortisol; prematurity; behavior problems; stress; assessment

Cortisol Reactivity and Behavior Problems in Young Children Born Premature The prevalence of preterm birth has increased substantially over the last decade and constitutes a significant public health concern (Berman & Butler, 2006). Compared to infants born full-term, infants born premature are at an increased risk for difficulties with attention, learning, and memory between 5 and 36 months (Rose, Feldman, & Jankowski, 2001, 2002; Rose, Feldman, Jankowski, & Van Rossem, 2005), as well as behavioral and emotional problems between ages 3 and 8 years (Gray, Indurkha, & McCormick, 2004). A recent meta-analysis suggested that children born at very low birth weight (≤ 1500 g) and/or very preterm (≤ 33 weeks) demonstrated moderate-to-severe deficits in attention problems and internalizing behavior problems (Aarnoudse-Moens, Weisglas-Kuperus, van Goudoever, & Oosterlaan, 2009). Another meta-analysis indicated that most studies of children born premature report higher rates of both externalizing and internalizing behavior problems (Bhutta, Cleves, Casey, Cradock, & Anand, 2002). Internalizing and externalizing behavior problems in children born premature are thought to be mediated by neuromotor and cognitive deficits and worsen with increased age (Aylward, 2002). Collectively, these findings highlight the importance of addressing comorbid externalizing and internalizing behavior problems among children born premature.

Given the association between early life stress and neurobiological changes (Heim & Nemeroff, 2001; McEwen, 1998), the negative developmental outcomes of prematurity have been linked to possible alterations in hypothalamic-pituitary-adrenal (HPA) functioning (Grunau, Weinberg, & Whitfield, 2004; Nomura, et al., 2007; Tu, et al., 2007). For example, infants between 18 and 20 months who were born premature show reduced volume of hippocampal brain regions involved in the regulation of the HPA axis (Peterson, et al., 2003). Changes in HPA functioning may be, in part, secondary to chronic early exposure to painful Neonatal Intensive Care Unit (NICU) procedures (Grunau, et al., 2005; Grunau, et al., 2004) and are also thought to be due to social stressors, such as maternal separation while in the hospital (Bhutta & Anand, 2002).

Differences in HPA axis functioning between preterm and full-term infants have varied depending on the age of the child. During the neonatal period, infants born premature display decreased HPA regulation reflected by lower basal cortisol levels between birth and 3 months of age (Grunau, et al., 2005; Haley, Weinberg, & Grunau, 2006; Ng, et al., 2004; Watterberg, Gerdes, & Cook, 2001). However, basal cortisol levels were higher among children who were born preterm than those born full-term between 8 and 18 months corrected age for prematurity (Grunau, et al., 2007; Grunau, et al., 2004), and evidence of higher baseline cortisol has been extended to children born premature between ages 8 to 14 years (Buske-Kirschbaum, et al., 2007). In addition, maternal factors, such as parenting stress, have been shown to moderate the relationship between high basal cortisol levels and poor focused attention among 8-month-old preterm infants (Tu, et al., 2007). Although these findings suggest HPA programming is altered in infants born very preterm and the pattern changes with age, there have been no studies examining the relationship between cortisol levels and comorbid behavior problems among young children who were born premature.

Among children born full-term, research examining the relation between HPA axis functioning and externalizing and internalizing behavior problems has yielded conflicting findings. School-age children with disruptive behaviors (e.g., aggression) have lower basal cortisol levels (McBurnett, Lahey, Rathouz, & Loeber, 2000) and exhibit a dampened cortisol response to stress (Yang, Shin, Noh, & Stein, 2007). However, among preschool-age boys, cortisol reactivity was positively associated with externalizing behavior problems, and median cortisol was negatively associated with internalizing behavior problems (Tout, de Haan, Campbell, & Gunnar, 1998). Depressed preschoolers between the ages of 3 and 5 years displayed increasing cortisol levels following parental separation and frustration stressors compared to children diagnosed with a disruptive behavior disorder and children with no diagnosis, who both showed decreasing cortisol levels in response to the separation but increasing cortisol levels in response to the frustration stressor (Luby, et al., 2003). Cortisol reactivity has also been shown to depend on the social context of the child. For example, preschool-age children displaying a change from high cortisol reactivity during the initial weeks of school to low or normal cortisol reactivity several weeks later were well liked by their peers compared to children displaying an increase in cortisol reactivity or high cortisol reactivity across both situations (Gunnar, Tout, de Haan, Pierce, & Stansbury, 1997).

The effect of cortisol reactivity among full-term children with comorbid behavior problems has received less attention, and findings have also been inconsistent. Marsman and colleagues (2008) found that comorbidity and gender moderated the relationship between cortisol and behavior problems. Specifically, girls from 10 to 12 years of age with pure externalizing behavior problems demonstrated a significantly higher cortisol awakening response than girls with comorbid externalizing and internalizing behavior problems. However, children ages 8 to 11 years with co-occurring oppositional defiant disorder (ODD) and anxiety demonstrated increased cortisol response to stress compared to children with ODD alone (van Goozen, et al., 1998). Specifically, a cortisol increase in response to stress was strongest in highly

externalizing and highly anxious children, whereas a cortisol decrease in response to stress was strongest among children with high levels of externalizing behavior problems and low levels of internalizing behavior problems. The discrepant findings of these two studies on comorbidity may, in part, be due to the differences in stressor conditions (i.e., awakening versus a difficult task). In fact, Gunnar and colleagues (2009) have recently stressed the importance to take into account several factors (e.g., availability of coping resources) in choosing appropriate and effective stressor paradigms.

Despite the high risk of internalizing and externalizing behavior problems among children born premature (Bhutta, et al., 2002), no studies have examined the relation between these behavior problems and cortisol reactivity in this population. The purpose of this study was to extend the previously described research on full-term children with comorbid externalizing and internalizing problems by examining the cortisol response in a sample of children born premature who presented with clinically significant levels of externalizing behavior problems and varying degrees of internalizing behavior problems. Similar to the previous findings by van Goozen and colleagues (1998), we hypothesized that children who mounted the cortisol response and were reactive to a stressor would display increased internalizing behavior problems based on maternal report as well as a higher frequency of observed negative verbalizations during a mother-child interaction.

Given the preliminary nature of the study and the conflicting findings of cortisol reactivity among children with comorbid problems, we also examined individual differences in externalizing behavior problems among children in the current sample, even though all children were recruited into the study due to maternal report of externalizing behavior problems. We also examined if gender moderated the relationship between cortisol reactivity and child behavior due to previously described findings of differences in cortisol reactivity among boys and girls.

Method

Participants

Participants were recruited from a larger study examining an intervention for externalizing behavior problems in children born premature. The sample included 27 child-mother dyads. Children were between the ages of 18 and 60 months and born at less than 37 completed weeks of gestation based on medical records. Most (74%) of the children were referred by pediatricians at a neonatal follow-up clinic, 12% were self referred by their mother, 7% were referred by staff at early intervention programs, and 7% were referred by pediatric health care professionals at other pediatric sites. Exclusion criteria for children included major sensory impairments (e.g. deaf, blind), motor problems that impair mobility, and oxygen dependence; however, no children were excluded from this study based on this criteria. Children with symptoms of an autism spectrum disorder, as assessed by the *Modified Checklist for Autism in Toddlers* (M-CHAT; Robins, Fein, Barton, & Green, 2001), were also excluded.

The child participants were mostly boys (70%) and had a mean age of 38.33 months ($SD = 13.21$) and a mean birth weight of 1208.26 grams ($SD = 609.63$). The median gestational age was 28 weeks (23-35), and the median 1 min and 5 min APGAR scores were 5 (1-10) and 7 (1-10), respectively. APGAR scores were unavailable for 5 children that were not referred by the neonatal follow-up clinic. All children were evaluated cognitively at either the neonatal follow-up clinic or the screening evaluation for the current study. Depending on age, children were administered either the Bayley Scale of Infant and Toddler Development – Third Edition (Bayley-III; Bayley, 2006) or the Wechsler Preschool and Primary Scale of Intelligence – Third Edition (WPPSI-III; Wechsler, 2002). Of the 17 children that were evaluated with the Bayley-III, the average Cognitive score was 80.65 ($SD = 15.05$). Of the 10 children that were evaluated

with the WPPSI-III, the average Full Scale IQ score was 84.60 ($SD = 11.47$). Ethnic composition was 22% Hispanic, and racial composition was 82% White, 4% African America, 4% Asian, and 11% Biracial. The mother participants were mostly White (93%) with a mean age of 32.26 years ($SD = 4.61$). The mean Hollingshead score (Hollingshead, 1975) was 44.26 ($SD = 12.63$), suggesting most families were in the middle class of socioeconomic status.

Procedure

The study was approved by the hospital Institutional Review Board. Eligibility was determined at the screening evaluation if the mother's score for the child was ≥ 60 on the *Child Behavior Checklist 1½-5* (CBCL) externalizing scale. The mother also needed to score ≥ 75 on the *Wechsler Abbreviated Scale of Intelligence* (WASI; Wechsler, 1999), a short and reliable measure of adult intelligence (Hays, Reas, & Shaw, 2002; Saklofske, Caravan, & Schwartz, 2000). Of the 53 children attending the screening, 16 families did not show up for the evaluation 1 week later and dropped out of the larger treatment study (Bagner, Sheinkopf, Vohr, & Lester, in press), and 9 families did not meet inclusion criteria. Of the 9 families that did not meet inclusion criteria, 7 children had scores < 60 on the CBCL externalizing problems scale, and 2 children presented with symptoms of an autism spectrum disorder. One child who met criteria and participated in the larger study did not have interpretable cortisol data and was not included in the current study.

Mother-child dyads that met study criteria came back to the clinic 1 week after the screening to complete the mother-child observations and saliva collection. The procedure included a series of behavioral episodes designed to collect cortisol levels at a baseline and in response to a stressor. The mother was asked to make sure their child did not eat or drink anything (except water) within 1 hour of their appointment to ensure food and/or drink were not affecting changes in cortisol levels. All mothers in the study reported compliance with this request. Upon arrival to the clinic, the mother completed questionnaires while the child played with toys for approximately 20 min, and then the child and mother watched a pleasant video (e.g., Baby Einstein for children younger than 36 months and Dora the Explorer for children older than 36 months) together for 10 additional min. Following the video, the mother played with the child with a standard set of toys for 5 min. The mother was then asked to get her child to clean up all of the toys without helping for 5 min, which was the stressor condition. All child participants were included in the study due to maternal report of externalizing behavior problems (e.g., defiance, aggression), and cleanup is a stressful activity for children with these difficulties.

Baseline cortisol was collected approximately 20 min after the start of the video, roughly at the same time as cleanup, reflecting cortisol levels during the baseline period. A second cortisol sample was collected 20 min after the stressor (i.e., cleanup) in order to allow children to mount the cortisol response. Prior to the second collection, the child finished watching the pleasant video with the mother.

Measures of Child Behavior and Physiology

Child Behavior Checklist for 1½ to 5 Year Olds (CBCL; Achenbach & Rescorla, 2001)—The CBCL is a 99-item parent-rating scale designed to measure the frequency of children's behavioral and emotional problems with excellent psychometric properties. A T -score ≥ 60 on the externalizing problems scale was required for study inclusion. The emotionally reactive, anxious/depressed, aggressive behavior, attention problems, and internalizing and externalizing scales were used as measures of child behavior. In this sample, internal consistency estimates for these scales ranged from .54 to .81.

Dyadic Parent-Child Interaction Coding System-Third Edition (DPICS-III; Eyberg, Nelson, Duke, & Boggs, 2004)—The DPICS-III is a behavioral coding system

that measures the quality of parent-child social interactions. It provides an observational measure of parent and child behaviors during three 5-min standard observations that vary in the degree of parent control (i.e., *child-led play*, *parent-led play*, and *cleanup*). For this study, children were observed during a child-led play and clean up situation, as described above. The clean up situation was used as the stressor condition because it is a situation most young children resist (Miron, Marva, & Zeanah, 2009), particularly children with externalizing behavior problems. In addition, similar compliance tasks are utilized by evidence-based assessment procedures to evaluate individual differences in behavioral regulation (Wakschlag, Briggs-Gowan, et al., 2008; Wakschlag, Hill, et al., 2008). Although the clean up situation has not been used to examine cortisol reactivity, previous research has successfully used this task to measure response to stress and frustration using other physiological measures, such as cardiac variability (Scheeringa, Zeanah, Myers, & Putnam, 2004; Stifter, Spinrad, & Braungart-Rieker, 1999). In addition, parent-child interaction tasks such as clean up may activate parent-child psychosocial processes that elicit cortisol reactivity (Gunnar, Talge, & Herrera, 2009).

We created a composite category of “child negative verbalizations,” which included negative talk, whining, and yelling codes. The frequency of child negative verbalizations was tallied during both the 5-min child-led play and cleanup situation. Half of the observations for each mother-child dyad were coded a second time by another coder, and reliability (percent agreement and Cohen’s kappa) was calculated for these 27 observations. Percent agreement ranged from 61% (whine) to 100% (yell), and kappa ranged from .53 (negative talk) to 1.00 (yell) for the codes used in this study.

Cortisol Measurement—Using established methodology for young children, salivary cortisol was sampled 20 min after a baseline period and 20 min after a stressor condition (i.e., cleanup). Saliva was collected with two sorbettes (1 min and 200 μ l per sample) and kept at -20°C until analyzed (performed by Salimetrics, LLC., State College, PA). Children were grouped into those who showed an increase in cortisol from baseline to stressor and those who showed a decrease or blunted cortisol response from baseline to stressor.

Data Analysis

Children were divided into two groups whether or not they showed an increase or decrease in cortisol levels from baseline to stressor. Children whose cortisol level increased between baseline and cleanup ($n = 10$) are referred to as “increasers”, and children whose cortisol level decreased between baseline and cleanup ($n = 17$) are referred to as “decreasers”. Increasers were compared to decreases on the demographic and outcome variables using t -tests and χ^2 tests. Follow-up Analyses of Covariance (ANCOVAs) were also conducted to examine differences between increasers and decreasers while holding child age, birth weight, and time of day as covariates.

The normality of all variables was examined. Although there was some skewness to our data, it was relatively small (median skewness index = .722, range from $-.830$ to 1.33), suggesting assumptions of normality were not violated and supporting the use of parametric statistics.

Results

Cortisol Response

As shown in Table 1, the increasers did not differ from decreasers on any demographic and clinical characteristics. Although assessments were conducted in the morning and afternoon, the number of increasers versus decreasers did not significantly differ based on the time of day, $\chi^2(1) = 1.99, p = .159$. Fifty percent of the increasers and 24% of the decreasers were evaluated

in the morning (i.e., before 1pm). As displayed in Table 1, the increasers and decreasers did not differ on cortisol levels at baseline, $t(25) = -1.46, p = .158$, or stressor, $t(25) = 0.59, p = .559$, conditions. In addition, increasers and decreasers did not significantly differ in the absolute percent change in cortisol between baseline and stressor conditions, $t(25) = 0.74, p = .474$.

Behavior Differences Based on Cortisol Response

Table 2 shows the mean scores for increasers and decreasers on child internalizing and externalizing behaviors on the CBCL and negative verbalizations during the parent-child observations. On the CBCL, increasers were significantly more likely to be emotionally reactive and anxious/depressed and were more likely to show internalizing problems than decreasers. Increasers also had significantly more attention problems than decreasers, although there was only a trend for statistical significant differences in attention problems when including the covariates in the ANCOVA analyses ($p = .091$).

During the mother-child interactions, increasers displayed significantly higher rates of negative verbalizations than decreasers, $t(25) = 3.44, p = .002, d = 1.33$. On average, the increasers had 4 times as many negative verbalizations than the decreasers (8.60 vs. 2.12). Effect sizes based on Cohen's d (Cohen, 1988) were calculated between the groups for all variables and suggest the groups were approximately 1 standard deviation apart on child internalizing problems, emotionally reactive, anxious/depressed, and attention problems scales as well as negative verbalizations.

Gender Differences

Follow-up regression analyses were conducted to examine whether gender moderated the relation between cortisol reactivity and child behavior. Specifically, cortisol reactivity (i.e., increaser or decreaser), gender, and a gender by cortisol reactivity interaction term were included as predictors. The gender by cortisol reactivity term did not significantly predict any of the measures of child behavior ($ps > .35$).

Discussion

We examined the relation between cortisol reactivity and behavior problems among children born premature with clinically significant externalizing behavior problems. Children with increased cortisol reactivity had significantly more problems with attention, emotional reactivity, anxiety, depression, and overall internalizing behavior problems than children with decreases in cortisol levels following the stressor. They also displayed higher rates of negative verbalizations during mother-child interactions. Follow-up analyses indicated that child age, birth weight, and time of day of cortisol collection were not confounding variables. This collection of deficits in emotion regulation, behavior, and cognitive control (e.g., attention) has been described as a singular neurobehavioral disinhibition disorder thought to reflect disturbances in the prefrontal cortex (Tarter et al., 2003); however, brain functioning was not directly tested and beyond the scope of the present study.

The current findings are similar to previous research demonstrating increased cortisol levels in response to stress among full-term children with co-morbid externalizing behavior problems and anxiety (van Goozen, et al., 1998) and extend these findings to a sample of children born premature. In addition, children displaying cortisol reactivity had higher levels of attention problems, a negative outcome common among children born premature and recently linked to lower birth weight (Conrad, Richman, Lindgren, & Nopoulos, 2010). Among children with externalizing behavior problems, cortisol reactivity may be a physiological indicator of comorbid internalizing behavior problems and attention problems. Although some view these behavior problems as separate factors of psychopathology, it is not uncommon for internalizing

and externalizing disorders to occur together (Tarter et al., 1999; Tarter et al., 2003). The findings of increased cortisol reactivity among children with comorbid internalizing and externalizing behavior problems, suggest possible HPA activity involvement in this broader behavioral profile among children born premature.

Children with increased cortisol reactivity following a stressor did not differ on a global measure of externalizing behavior problems from children who did not exhibit the cortisol response. The lack of significant differences between groups was not surprising because children were pre-selected for participation in this study based on the presence of elevated levels of externalizing behavior problems. Previous research demonstrated a dampened cortisol response to stress among school-age children at risk for externalizing behavior problems (Yang, et al., 2007). However, this study was not designed to replicate this finding because all children in the current study scored above the clinical cutoff for externalizing behavior problems at the initial assessment. Gender has also been shown to moderate the relationship between cortisol reactivity and behavior problems (Marsman, et al., 2008; Tout, et al., 1998), but follow-up analyses with the current data including gender as a moderator were nonsignificant. Our sample included a small number of girls ($n = 8$; 3 decreaseers and 5 increaseers) and limits any conclusions we can make about the impact of gender on the analyses. Therefore, future research should examine the effect of gender in this population with larger samples.

Differences in cortisol reactivity may help account for the different profiles in children with behavior problems. Specifically, children born premature with disrupted HPA activity may be at increased risk for co-occurring internalizing and externalizing behavior problems. Examination of the longitudinal trajectory of HPA reactivity and behavior in children born premature could help elucidate whether physiology affects behavior or whether there are more complex biobehavioral patterns that emerge with age. Another interpretation of the findings is that decreased HPA functioning may be a protective factor for children born premature, which would be consistent with animal findings (Fride, Dan, Feldon, Halevy, & Weinstock, 1986) and human findings demonstrating other physiological measures (e.g., cardiac vagal tone) as resilience factors in 3-year-old children (Sheinkopf, et al., 2007), as well as school-age children (El-Sheikh, Harger, & Whitson, 2001).

This study was the first to examine the relation between cortisol reactivity and behavior problems among young children who were born premature. In addition, the use of a cleanup situation as a stressor condition was unique to the current literature examining physiological stress among young children with externalizing behavior problems. It provides a more realistic experience of stress for young children than other laboratory conditions, thereby increasing the external validity of the current study. Another strength of the study is the inclusion of both maternal report and behavioral observations in assessing child behavior problems. Maternal report is subject to rater bias, and the behavioral observations help provide more objective data about the child's behavior. Although this study did not empirically examine the validity of the behavior observation data, our findings were consistent when examining the relation between cortisol reactivity and both maternal report and observational data.

Despite the methodological strengths and unique features of the current study, there are some limitations that need to be addressed. First, the sample size was relatively small, which may have reduced the power to detect some effects, such as differences in externalizing behavior problems and the moderating effect of gender. Second, the study included children from a large age range of 18 to 60 months with variability in birth weight and gestational age. However, the two groups (increaseers and decreaseers) did not differ on these variables, suggesting age and degree of prematurity were not confounding variables in the present findings. Nonetheless, the small sample size prevented a full evaluation of possible age effects. Mother behavior during

mother-child interactions was also not measured and could have an impact on child behavior and cortisol reactivity. Finally, the study did not include a control group of children who were not born premature or did not have elevated externalizing behavior problems. Although the purpose of the current study was to provide an initial examination of cortisol reactivity among children born premature with elevated externalizing behavior problems, the lack of a control group limits any conclusions we can make about differences in cortisol reactivity between preterm and full-term children and children with and without externalizing behavior problems.

In sum, this study demonstrates a relation between cortisol reactivity and internalizing behavior and attention problems among children born premature with elevated externalizing behavior problems. These findings extend previous research of cortisol reactivity among children with co-morbid externalizing and internalizing behavior problems to children born premature. Future research should examine this relationship in a larger sample and compare cortisol reactivity among young children born premature and full-term and those with and without externalizing behavior problems. In addition, examination of the effect of neonatal status and temperament on cortisol reactivity in preterm children can help elucidate specific mechanisms in this biobehavioral model.

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Table 1

Demographic Characteristics of Increaseers and Decreasers

Characteristic	M (SD), Median (range), or percent	t(25)	X ² (1)	p
	Increaseers (n = 10)	Decreaseers (n = 17)		
Child age (months)	43.00 (13.50)	35.59 (12.64)	1.44	– .163
Birth weight (grams)	1140.20 (507.64)	1248.29 (674.07)	–0.44	– .665
Gestational age (weeks)	29 (24–35)	28 (24–35)	0.48	– .638
APGAR 1 min ¹	6 (3–8)	4 (1–10)	1.45	– .163
APGAR 5 min ¹	8 (4–9)	6 (1–10)	1.49	– .152
Child sex (% male)	82.35	50.00	--	3.16 .075
Child ethnicity (% minority)	29.41	30.00	--	0.00 .974
Bayley-III Cognitive ²	88.00 (5.70)	77.58 (16.81)	1.33	– .203
WPPSI-III Full Scale ²	83.60 (9.97)	85.60 (13.94)	–0.26	– .801
Hollingshead	41.30 (11.45)	46.00 (13.30)	–0.93	– .360
Baseline cortisol (µg/dl)	.08 (.03)	0.11 (0.06)	–1.46	– .158
Stressor cortisol (µg/dl)	0.10 (.04)	0.08 (.06)	0.59	– .559
Percent cortisol change ³	.31	.23	0.74	– .474

Note: Bayley-III = Bayley Scales for Infant and Toddler Development – Third Edition; WPPSI-III = Wechsler Preschool and Primary Scale for Intelligence.

¹ APGAR scores are median values and were only available from 22 of the 27 children, so degrees of freedom were 20.

² Seventeen children (5 increaseers and 12 decreaseers) were given the Bayley-III, whereas 10 children (5 increaseers and 5 decreaseers) were given the WPPSI-III, so degrees of freedom were 15 and 8, respectively.

³ The absolute value of percent change between cortisol levels at baseline and after stressor was used to demonstrate the magnitude of change between groups.

Table 2

Group Differences in Child Behavior

Measure	Group	n	M	SD	t(25)	p	d ^I
Child Behavior Checklist for 1½ to 5 Year Olds							
Internalizing Problems	Increases	10	64.40	6.62	2.29	.031	1.00
	Decreases	17	55.53	11.11			
Emotionally Reactive	Increases	10	67.80	7.60	2.43	.022	0.98
	Decreases	17	60.24	7.91			
Anxious/Depressed	Increases	10	61.10	5.67	2.13	.043	0.88
	Decreases	17	55.47	7.13			
Externalizing Problems	Increases	10	74.10	10.20	0.69	.496	0.27
	Decreases	17	71.53	8.83			
Attention Problems	Increases	10	70.70	6.42	2.11	.045	0.86
	Decreases	17	64.53	7.89			
Aggressive Behavior	Increases	10	74.50	12.77	0.25	.805	0.10
	Decreases	17	73.35	10.75			

^I Cohen's *d* = Effect size between increases and decreases.