Parent Training: Equivalent Improvement in Externalizing Behavior for Children With and Without Familial Risk

Ned Presnall, MSW, LCSW,
Carolyn H. Webster-Stratton, PhD, FAAN, John N. Constantino, MD

Objective: The Incredible Years Series intervention has demonstrated efficacy for decreasing conduct disorder (CD) symptomatology in clinically affected youth in multiple randomized controlled trials. Because children with family psychiatric histories of antisocial behavior are at markedly increased risk for enduring symptoms of antisocial behavior (compared with their counterparts with a negative family history), the authors examined whether intervention effects across studies would prevail in that subgroup or would be relatively restricted to children without genetic risk. **Method:** A reanalysis was conducted of 5 randomized controlled trials of Incredible Years involving 280 clinically affected children 3 to 8 years of age for whom a family psychiatric history of externalizing behavior in first- and second-degree relatives was ascertained from at least 1 parent. **Results:** Incredible Years equally benefitted children with CD with and without family psychiatric histories of externalizing behavior. Family psychiatric history of externalizing behavior and parental depressive symptomatology predicted greater severity of CD symptomatology at baseline. **Conclusion:** The beneficial effects of IY are evident in children with CD, irrespective of whether their conditions are more or less attributable to inherited susceptibility to enduring antisocial syndromes. A next phase of research should address whether earlier implementation of group-based education for parents of young children at increased familial risk for antisocial behavior syndromes—before the development of disruptive patterns of behavior—would result in even more pronounced effects and thereby constitute a cost-effective, targeted, preventive intervention for CD. J. Am. Acad. Child Adolesc. Psychiatry, 2014;53(8):879–887. **Key Words:** antisocial, children, behavioral, Incredible Years, maltreatment

Externalizing disorders in childhood have long been known to predict persistent antisocial behavioral disorders throughout life,[1,2] which entail massive social costs associated with health and social service provision, law enforcement, and criminal justice.[3,4]

Evidence from social scientific and behavioral genetic research supports additive,[5] interactive,[6-8] and direct effects of stressful life events[9,10] and genetic predisposition[11-14] on childhood conduct disorder (CD). The complexity of the gene-environment interaction has informed a "differential susceptibility" model of child development in which genetic differences confer sensitivity to enriching and toxic aspects of the developmental environment.[15] Ideally, the primary caregiver acts as a protective buffer against environmental toxicity and as a positive moderator of cognitive, emotional, and behavioral susceptibilities[16,17] during sensitive developmental periods.[18] Positive parenting appears to promote adaptive executive functioning and self-regulation, even in children with an emotionally reactive temperament in infancy.[19]

The central role of the primary caregiver in buffering stress and enriching the developmental environment has informed the creation of evidence-based parenting interventions to prevent and treat childhood conduct problems as


Supplemental material cited in this article is available online.

early as possible.[20] One of the best-validated and most cost-effective parent-training interventions is the Incredible Years Series (IY), which includes a core group-based parent-training component and complementary interventions for teachers and children. Through multiple randomized controlled trials (RCTs)[21-30] and independent replications,[31-37] IY has been shown to decrease problem behavior in children, improve core parenting skills, enhance positive teaching practices, and, in consequence, interrupt longer-term trajectories of externalizing behavior in a substantial proportion of children for whom the intervention is implemented.[23,26,28]

It is not known whether IY effects (typically assessed over months) might be relatively restricted to the large subset of children whose conduct problems would otherwise resolve naturally (i.e., without treatment and over a matter of years) and conversely might be less effective in children with the greatest likelihood of persistent antisocial syndromes. This important subgroup is characterized by high levels of genetic influence that contribute to the differential heritability of antisocial behavior observed from childhood to adulthood[14]; inherited influences contribute the largest portion of population-attributable risk for syndromes of antisocial behavior that persist through early adulthood.[14,38] Targeting intensive intervention toward those children who are most likely to exhibit long-term antisocial syndromes is a major public health priority.

In this study, the authors focused on an intervention that has succeeded, but they also wanted to determine whether success was restricted to families with lower levels of intergenerational risk for persistent antisocial development, especially because the time scale of resolution of childhood-limited antisocial syndromes far exceeds that of most intervention studies. Prior studies of the IY intervention have shown that the impact of the intervention is robust across a wide range of parent and environmental characteristics,[39] but familial liability to antisocial development has never been explored. Some previous studies have explored the effects of maternal depression, parental substance abuse, and parental cognitive disabilities on the impact of parenting interventions and child outcome; however, such studies have not systematically explored the extent to which the inherited liabilities associated with these disorders—versus environmental modifications brought about by intervention—jointly influence offspring outcome. The authors are aware of only 1 study that has directly tested the moderating effect of genetic risk for externalizing behavior on the response to parent-training intervention in general. In that study, an allelic variation in DRD4 in children was found to moderate the effects of parent training on child externalizing behavior,[40] underscoring a role of the 7-repeat allele in responsiveness to modification of the environment.

In this study, the authors capitalized on the availability of RCT data from 5 independent studies in which familial liability to antisocial outcome—as indexed by family psychiatric history—was collected but not analyzed in the ascertainment of intervention effects. Specifically, they reanalyzed IY RCT data to determine whether IY was as effective in children with higher familial loading for externalizing behavior as in those without. Historic attempts to apply psychosocial interventions to inherited disability syndromes have been successful in improving adaptive functioning[41] but often sobering with respect to the resolution of primary symptoms of the disorder (e.g., see Charman[42] and Kazdin[43]). Therefore, the authors hypothesized that the effects of the intervention would be attenuated in the subgroup with increased familial risk after controlling for severity of symptomatology at baseline. The ability of the intervention to exert positive effects on symptom burden—even in the context of familial susceptibility—would substantially enhance its relevance as a promising preventive intervention for children at serious risk for enduring antisocial syndromes.

METHOD

Data from 5 RCTs of IY in which a history of parental externalizing behavior was systematically acquired were included in this reanalysis. Inclusion characteristics for the studies are summarized as follows: the child was 3 to 8 years old (RCT 4-5: 4 to 7 years old); the child had no debilitating physical impairment, intellectual deficit, or history of psychosis and was not receiving any form of psychological treatment at the time of referral; the primary referral problem was child misconduct (e.g., noncompliance, aggression, oppositional behaviors) that had been occurring for at least 6 months; parents had to have reported a clinically significant number of child behavior problems (>1 SD above the mean [RCT 4-5: 2 SD above the mean] on the Eyberg Child Behavior Inventory[20]); (RCT 4-5 only) the child met criteria for oppositional-defiant disorder and CD in accordance with the *DSM-III-R;* and pre- and post-treatment behavioral data

were available for all participants. Intervention participants were included in the analysis irrespective of their subjective level of engagement in treatment or their improvement in intermediary indices of parenting skill. Detailed information about these samples can be found in the original published reports cited in Table 1.

The version of the IY curriculum that has emerged as the standard for implementation minimally includes the following elements: engagement of parents in group-based parenting education; delivery by a certified parent group leader or facilitator; and use of video vignettes as a key pedagogic method. In the 5 studies, small subsets of children were randomized to conditions that did not contain all 3 elements. In this meta-analysis, inclusion in the intervention group was restricted to those for whom all 3 key components were delivered. The 5 samples and the authors' process of inclusion and exclusion in this reanalysis are presented in Table 1. All control participants described in the original reports were included.

The purpose of randomizing a sample is to ensure a comparable distribution of participant characteristics that might affect the outcome of treatment. Although the meta-analytic treatment-control groups are not strictly randomized insofar as they are drawn from multiple randomized trials, the authors tested the association of treatment condition with baseline (pretreatment) child and parent characteristics that are known to moderate child externalizing behavior and clinical response to early childhood interventions, namely maternal education, maternal race/ethnicity, child sex, and family history of externalizing problems. The t tests and χ^2 tests showed no significant differences between the pooled treatment and control groups on these variables. Therefore, the authors consider their analytic sample a quasi-randomized sample well suited to testing their hypotheses.

Sample Description

Table 2 lists demographic characteristics, familial risk, and child externalizing behavior of children residing in 2-parent households (in which a family and history of both parents was provided) were differentiated from those residing in 1-parent households (in which only maternal family psychiatric history was reported). The t test and χ^2 tests showed no significant differences between treatment and control participants with respect to baseline externalizing behavior scores and parental Beck Depression Inventory scores.

Child Behavior

The externalizing domain t -score from the Achenbach System for Empirically-Based Assessment Child Behavior Checklist (CBCL) was used to characterize child externalizing behavior at baseline and after treatment.[44]

TABLE 1 Data Included and Excluded in the Analytic Sample by Original Trial and Treatment Condition

Original Samples		Analytic Sample, n			
Trial	**Conditions**	**Tx**	**Cx**	**Excl**	**Reason Excluded**
RCT1[22,23,26]	PT	27			
	GD			23	no video modeling
	IT			27	self-administered
	WLC		28		
RCT2[30]	IT + CONSULT			16	self-administered
	IT			17	self-administered
	WLC		13		
RCT3[24]	PT + ENHANCE	37			
	PT	41			
RCT4[25]	CT			25	no parent training
	PT	35			
	CT + PT	24			
	WLC		15		
RCT5[27]	CT			30	no parent training
	PT	25			
	PT + TT	24			
	CT + TT			23	no parent training
	PT + CT + TT	24			
	WLC		27		
	TOTAL	237	83	161	

Note: CONSULT = 2 individual therapist consultations; CT = child training; Cx = control group; ENHANCE = couple's counseling enhancement delivered after post-treatment measure; Excl = excluded; GD = group discussion (no video); IT = individually self-administered video training; PT = videotape group parent training with therapist; TT = teacher training; Tx = treatment group; WLC = waitlist control.

TABLE 2 Baseline Demographic and Risk Characteristics by Treatment Condition and Household Type

	2-Biological-Parent Households		1-Biological Mother-Households	
	Control (n = 58)	Treatment (n = 157)	Control (n = 15)	Treatment (n = 50)
Child's sex				
Female	22.4 (13)	19.8 (31)	26.7 (4)	26.0 (13)
Male	77.6 (45)	80.3 (126)	73.3 (11)	74.0 (39)
Maternal education				
≥4-y college	55.2 (32)	49.7 (78)	33.3 (5)	26.0 (13)
Some college	31.0 (18)	29.3 (46)	46.7 (7)	44.0 (22)
HS diploma only	13.8 (8)	20.4 (32)	20.0 (3)	30.0 (15)
Without HS diploma	0.0 (0)	0.6 (1)	0.0 (0)	0.0 (0)
Maternal race				
Caucasian	93.1 (54)	95.5 (150)	93.3 (14)	88.0 (44)
Hispanic	1.7 (1)	2.6 (4)	6.7 (1)	4.0 (2)
Black	0.0 (0)	0.0 (0)	0.0 (0)	4.0 (2)
Asian	3.5 (2)	0.6 (1)	0.0 (0)	0.0 (0)
Native American	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Pacific Islander	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Other/mixed race	1.7 (1)	1.3 (2)	0.0 (0)	4.0 (2)
Mother depression at baseline (BDI)	7.0 ± 0.8 (58)	7.8 ± 0.4 (155)	12.3 ± 1.9 (15)	9.9 ± 1.3 (50)
Father depression at baseline (BDI)	5.1 ± 0.6 (56)	5.2 ± 0.4 (46)	N/A	N/A

Note: BDI = Beck Depression Inventory; HS = high school; N/A = not applicable.

Family History of Externalizing Disorders

An intake interview with questions about family history was administered to each parent involved in the parent-training intervention. Mothers and fathers were asked about their own and their parents' mental health history. The child's family members were deemed to reflect familial risk if the informant endorsed a history of alcohol problems, drug problems, or incarceration. Studies of twins and families have demonstrated highly overlapping components of genetic liability for these conditions, which extend generally to antisocial behavior.[45,46] The validity of brief family history methods for ascertaining familial risk for substance use and antisocial disorders has been strongly supported in previous research in populations similar to those comprising the IY RCTs.[47,48] The child's familial risk for externalizing behavior was coded into 3 categories across 2 strata: 0, "absent," i.e., no parent or grandparent with a reported externalizing behavior problem; 1, externalizing problems present in grandparents only; 2, externalizing problems present in parents only; and 3, externalizing problems present in parents and grandparents (thus first- and second-degree relatives, suggesting slightly higher continuity/penetrance of intergenerational risk in data acquired from 1-parent households). The 2 strata were 1-biological-parent households (in which family history was available only from a single parent and restricted to that side of the child's family) and 2-biological-parent households.

Data Analysis

Separate analyses were conducted for 1-parent and 2-parent households because the former reflected only half the familial liability information available in the latter.

Univariate. Differences between 1-biological-mother and 2-biological-parent households were examined with respect to the child's sex, maternal education, child race or ethnicity, maternal depression scores derived from the Beck Depression Inventory at baseline, and mother-reported externalizing behavior at baseline.

To examine the association of familial risk for externalizing behavior with child externalizing behavior and the differential effect of the intervention on change in child externalizing scores, paired t tests on pre- and post-treatment CBCL mother- and father-reported externalizing t scores were performed household type, intervention/control group, and familial risk level (Table 3).

Multivariate. Because familial liability indexed by family history represents only 1 of many domains of influence on behavioral outcomes and the impact of the intervention, a set of linear regression analyses (separately for preintervention and postintervention data) was conducted that controlled for relevant variables for which data were available, including baseline depressive symptomatology of the parental reporter,[49,50] maternal education, maternal race/ethnicity, and child's sex. The results of these preparatory analyses (essentially supporting the appropriateness of inclusion of the variables in the tests of the study's primary hypotheses) are presented in supplementary Tables S1 and S2 (available online).

The study's central hypothesis was tested using analysis of covariance to test treatment efficacy while controlling for baseline child externalizing behavior,

TABLE 3 Change in Mother- and Father-Reported Child Externalizing Behavior by Intervention Group and Degree of Familial Risk

	Mother-Reported CBCL Externalizing									Father-Reported CBCL Externalizing								
	Baseline			Posttreatment			Change			Baseline			Posttreatment			Change		
	n	Mean	SD	n	Mean	SD	Mean	Paired *t*	*p*	n	Mean	SD	n	Mean	SD	Mean	Paired *t*	*p*
Intervention group																		
2-parent households																		
NO first- or second-degree risk	48	64.6	7.4	48	56.8	8.8	7.8	7.3	<.0001	46	63.1	7.6	46	54.9	8.2	8.2	7	<.0001
Presence of externalizing disorder in any first- or second-degree relative	108	67.5	8.1	108	60.1	9.8	7.5	10.5	<.0001	93	64.9	8.5	93	58.6	9.8	6.3	7.3	<.0001
First- and second-degree risk	44	69.8	6.4	44	62.7	7.7	7.1	7.2	<.0001	36	67.4	7.1	36	60.7	8	6.8	4.4	<.001
First-degree risk only	13	68.8	8.5	13	61.8	11.3	7.1	3.1	<.05	10	64.3	13.7	10	58.8	14	5.5	5.9	<.001
Second-degree risk only	51	65.3	8.8	51	57.3	10.4	7.9	7.1	<.0001	47	63.1	7.7	47	57	9.9	6	5	<.0001
Single-biological-mother households																		
NO first- or second-degree risk	18	68.4	8.6	18	60.7	9.9	7.7	3.1	<.01									
Presence of externalizing disorder in any first- or second-degree relative	32	70.2	7.1	32	60.5	7.2	9.7	7.2	<.0001									
First- and second-degree risk	14	70.6	7.3	14	58.9	6.8	11.8	5.5	<.001									
First-degree risk only	5	75.2	6.6	5	72	8.8	13	6	<.01									
Second-degree risk only	13	68.8	7.7	13	62.8	8.1	6.1	3.2	<.01									
Control group																		
2-parent households																		
NO first- or second-degree risk	18	64.4	7.9	18	62.7	8.2	1.7	1.2	NS	17	64.9	9.1	17	62.7	7.5	2.2	1.9	NS
Presence of externalizing disorder in any first- or second-degree relative	40	68.6	8.6	40	64.7	8.7	3.9	4.5	<.0001	36	65.8	8.5	36	63	8.7	2.8	2.2	<.05
First- and second-degree risk	11	69.5	10.2	11	66.1	8.7	3.4	2.1	NS	10	67.9	8.6	10	65.3	8.9	2.6	1.4	NS
First-degree risk only	4	61	12.3	4	55.5	8.2	5.5	1.3	NS	4	65.8	7.6	4	60.5	11.6	5.3	1.6	NS
Second-degree risk only	25	69.4	6.8	25	65.5	8.3	3.9	3.7	<.01	22	64.8	8.8	22	62.4	8.3	2.4	1.4	NS
Single-biological-mother households																		
NO first- or second-degree risk	6	66.5	6.7	6	64	5.4	2.5	1.9	NS									
Presence of externalizing disorder in any first- or second-degree relative	9	75.3	5.1	9	71.1	8.9	4.2	1.9	NS									
First- and second-degree risk	5	75.2	6.6	5	72	8.8	3.2	1.3	NS									
First-degree risk only	1	79	—	1	70	—	9	—	—									
Second-degree risk only	3	74.3	2.9	3	70	12.5	4.3	0.7	NS									

Note: CBCL = Child Behavior Checklist; NS = not significant.

TABLE 4 Analysis of Covariance: Analysis of Treatment Effect on Child Externalizing Behavior by Household Type and Mother/Father Report, Controlling for Baseline Child Externalizing Behavior, Familial Risk, and Relevant Demographic Characteristics

	2-Biological-Parent Households					1-Biological-Mother Households	
	Maternal Report			Paternal Report		Maternal Report	
	DF	F	Pr > F[a]	F	Pr > F[a]	F	Pr > F[a]
Baseline CBCL externalizing behavior	1	149.15	<.0001	94.90	<.0001	16.54	<.001
Treatment	1	7.48	<.01	7.84	<.01	8.91	<.01
Family hx of externalizing disorders	3	0.40	NS	0.19	NS	0.84	NS
Treatment × family hx of externalizing disorders	3	0.83	NS	0.60	NS	—	—
Child's sex	1	0.06	NS	4.03	<.05	2.22	NS
Maternal education	2	0.07	NS	1.35	NS	0.71	NS
Maternal race	1	0.26	NS	0.53	NS	0.76	NS
Reporter depression at baseline	1	0.39	NS	2.75	NS	0.01	NS

Note: CBCL = Child Behavior Checklist; DF = degree of freedom; hx = history; NS = not significant.
[a]Pr > F p value; the probability of obtaining the F value if the null hypothesis is true.

familial risk, and relevant demographic characteristics, separately considering maternal and paternal reports (when available). *P* values reported for these central analyses of the study were not adjusted for number of statistical tests, because they represent the test of the primary hypothesis, and the other statistical tests reported fundamentally establish the validity of these primary tests. In the 2-biological-parent model, the interaction between familial risk and treatment group was included. Effective sample size (n = 65) prevented inclusion of the interaction term in the 1-biological-parent multivariate model. SAS Proc GLM (SAS Institute, Cary, NC) was used for all multivariate analyses.

In addition, the authors sought to characterize the impact of family history on clinically significant treatment response. A child's response to the intervention was considered clinically significant if his or her caregiver reported externalizing behavior above the clinical threshold of 60 before the intervention and below the clinical threshold after the intervention. SAS Proc Logistic was used to model a clinically significant response on treatment condition and family history of externalizing problems.

RESULTS

Household Differences

Children in 1-biological-mother households were significantly more likely than children in 2-biological-parent households to have a lower level of maternal education (Mantel-Haenszel $\chi^2_{1,280} = 8.44$, $p < .01$). There was no significant difference in race or ethnicity of children in 1-biological-mother and 2-biological-parent households ($\chi^2_{1,280} = 2.65$, $p = .10$). Maternal depression scores were significantly higher in 1-biological-mother than in 2-biological-parent households ($t_{279} = 2.42$, $p < .05$; Table 2). Mother-reported baseline child externalizing behavior was significantly higher in 1-biological-mother than in 2-biological-parent households ($t_{279} = 2.88$, $p < .01$), as was maternal familial history of externalizing disorders (Mantel-Haenszel $\chi^2_{1,280} = 18.06$, $p < .0001$).

Intervention Effects and Their Interaction With Familial Risk

Table 3 summarizes the positive responses associated with IY intervention in child externalizing behavior scores which occurred irrespective of familial risk group. All 15 household and risk groups who received the intervention showed a significant decrease in child externalizing behavior from baseline to after treatment, with a magnitude of change ranging from 3.1 to 10.5 points. Only 3 of 15 household and risk groups who received no intervention showed a significant decrease in child externalizing behavior.

A linear regression analysis examining predictors of CBCL, externalizing scores separately at each time point showed that membership in the treatment group was not significantly associated with a difference in child externalizing behavior at baseline in 1-biological-mother or

2-biological-parent households. In 2-biological-parent households (Table S1, available online), combined first- and second-degree familial risk was significantly associated with higher mother- and father-reported CBCL externalizing t scores at baseline and after treatment. In 2-biological-parent households, maternal race was associated with higher father-reported externalizing behavior at baseline but not after treatment. Paternal depression predicted increased father-reported externalizing behavior at baseline and after treatment. Demographic characteristics, familial liability, and maternal depression did not predict differences in child externalizing behavior in 1-biological-mother households (Table S2, available online). Intervention condition (treatment versus control) consistently predicted postintervention but not preintervention externalizing scores across family and rater types.

Treatment Effects

Analyses of covariance exhibited significant intervention effects in 1-biological-parent and 2-biological-parent households (Table 4). In 2-biological-parent households, familial history of externalizing behavior did not interact with treatment in predicting child externalizing behavioral outcome. Child's sex was a significant predictor of change in father-reported externalizing behavior across time. The *magnitude* of decrease in externalizing behavior in each participant group is appreciable from estimations of the influence of treatment on pre- and postintervention scores presented in Table 3 and is on the order of 1 SD of the mean t score at baseline (i.e., an effect size of 1).

Categorical Designation of Clinical Affectation

To complement the quantitative analyses and to contextualize the range of clinical disability in which quantitative shifts occurred, proportions of children in the treatment and control groups who moved from clinical-level affectation to subclinical-level affectation during the study period were compared. Of children in 2-biological-parent households who demonstrated clinical-level externalizing behavior at baseline (CBCL externalizing t score $\geq$60), those in the treatment group were 3.4 (by mother report, 95% CI 1.5-7.9) and 3.2 (by father report, 95% CI 1.3-7.5) times more likely than controls to be rated below clinical-level symptomatology by parent report after treatment. Children with no family history of externalizing behavior were more likely to cross the clinical threshold, as would be expected because, on average, they were affected less severely at baseline. Children in 1-biological-parent households randomized to intervention were 5.1 (95% CI 0.9-28.5) times more likely than those in the control group to cross the threshold from clinical to subclinical affectation; family history of externalizing behavior did not significantly moderate clinically significant response in 1-biological-parent households.

DISCUSSION

This study is comprised of secondary familial risk analyses of a combined meta-analytic sample drawn from 5 RCTs of the IY parent-training intervention to treat conduct problems in children 3 to 8 years old. The findings support and extend previously reported findings on the impact of the IY intervention—namely that children with clinical-level externalizing behavior benefit from the intervention. Moreover, the present analyses confirm that the treatment effect occurs irrespective of the presence of family history of adult antisocial behavior. This clarification of effect offers hope that children at serious risk based on inherited liability are as likely to benefit from effective parent training as those without such liability. Because persistent antisocial behavior throughout life is strongly influenced by genetic factors, this finding underscores the relevance of successful parent training for children with such profiles of risk and supports the possibility that judicious implementation of parent training for such children could serve to offset the risk incurred by inherited liabilities.

A limitation of this study was that 1-parent households were informative only with respect to the parent living in the home; this was an important reason for segregating the sample and examining separately a sample that was more fully informative based on the family history data collected. The results were highly congruent, whether considering 1-parent or 2-parent households. A second limitation is that this analysis was restricted to published RCTs and does not address unpublished results in which this intervention might not have had a positive impact. A third limitation is a lack of follow-up measurement beyond the immediate period after treatment. Ideally, parent-training interventions

impart change through iterative effects as parents practice new parenting skills and children adapt to positive parenting practices. One-year[51] and 2-year[52] outcome studies of the IY interventions have shown that treatment effects substantially persist over time, and promising results from recent research on other parent-focused interventions have similarly demonstrated enduring gains over time.[53]

In conclusion, the IY intervention, as delivered in multiple RCTs, resulted in significant decreases in externalizing behavior irrespective of whether a child's clinical condition was associated with familial loading for antisocial behavior. The effects observed in clinically affected children 3 to 8 years old also inform a rationale for providing such training to parents of children at increased risk before the development of disruptive patterns of behavior. Constantino[54] reported that families of infants at increased risk for antisocial behavior can be successfully engaged in group-based preventive intervention involving parent training. The magnitude of impact of such targeted early parenting education on developmental outcomes is being addressed in a next generation of controlled studies.[55] &

Accepted May 29, 2014.

This article was reviewed under and accepted by Deputy Editor John Piacentini, PhD.

Dr. Constantino and Mr. Presnall are with Washington University in St. Louis. Dr. Webster-Stratton is with the University of Washington.

The data collection was supported by the National Institutes of Health National Center for Nursing Research (grant 5 R01 NR01075-11) and the National Institute of Mental Health Research Scientist Development Award (MH00988 to C.H.W.-S.). The reanalysis was supported by the Administration for Children and Families (60329 to J.N.C.), by an anonymous donor, and the Centers for Disease Control and Prevention through the Brown Center for Violence and Injury Prevention (grant R49CE001510-01).

The views expressed do not necessarily reflect the opinions of the funders.

The authors thank the families who participated in the original intervention trials, whose efforts made this study possible.

Disclosure: Dr. Webster-Stratton has disseminated these treatments and stands to gain from favorable reports. Because of this, she has voluntarily agreed to distance herself from certain critical research activities, including recruitment, consenting, primary data handling, and data analysis. The University of Washington has approved these arrangements. Dr. Constantino has received royalties for the authorship of the *Social Responsiveness Scale, Second Edition* (SRS-2), which is published and distributed by Western Psychological Services. Mr. Presnall reports no biomedical financial interests or potential conflicts of interest.

Correspondence to John N. Constantino, MD, 660 S. Euclid Avenue, Campus Box #8134, St. Louis, MO 63110; e-mail: constantino@wustl.edu

0890-8567/$36.00/©2014 American Academy of Child and Adolescent Psychiatry

http://dx.doi.org/10.1016/j.jaac.2014.04.024

REFERENCES

1. Robins LN. Deviant Children Grown Up: A Sociological and Psychiatric Study of Sociopathic Personality. Baltimore: Williams and Wilkins; 1966.
2. Moffitt TE, Caspi A, Harrington H, Milne BJ. Males on the life-course-persistent and adolescence-limited antisocial pathways: follow-up at age 26 years. Dev Psychopathol. 2002;14:179-207.
3. Scott S, Knapp M, Henderson J, Maughan B. Financial cost of social exclusion: follow up study of antisocial children into adulthood. BMJ. 2001;323:191.
4. Wolfgang ME, Figlio RM, Sellin T. Delinquency in a Birth Cohort. Chicago: University of Chicago Press; 1987.
5. Jonson-Reid M, Presnall N, Drake B, *et al*. Effects of child maltreatment and inherited liability on antisocial development: an official records study. J Am Acad Child Adolesc Psychiatry. 2010; 49:321-332; quiz 431.
6. Jaffee SR, Caspi A, Moffitt TE, *et al*. Nature X nurture: genetic vulnerabilities interact with physical maltreatment to promote conduct problems. Dev Psychopathol. 2005;17:67-84.
7. Kim-Cohen J, Caspi A, Taylor A, *et al*. MAOA, maltreatment, and gene-environment interaction predicting children's mental health: new evidence and a meta-analysis. Mol Psychiatry. 2006;11:903-913.
8. Moffitt TE. The new look of behavioral genetics in developmental psychopathology: gene-environment interplay in antisocial behaviors. Psychol Bull. 2005;131:533-554.
9. Widom CS. Does violence beget violence? A critical examination of the literature. Psychol Bull. 1989;106:3-28.
10. Widom CS. The cycle of violence. Science. 1989;244:160-166.
11. DiLalla LF, Gottesman II. Biological and genetic contributors to violence—Widom's untold tale. Psychol Bull. 1991;109:125-129; discussion 130-132.
12. Hicks BM, Krueger RF, Iacono WG, McGue M, Patrick CJ. Family transmission and heritability of externalizing disorders: a twin-family study. Arch Gen Psychiatry. 2004;61:922-928.
13. D'Onofrio BM, Slutske WS, Turkheimer E, *et al*. Intergenerational transmission of childhood conduct problems: a Children of Twins Study. Arch Gen Psychiatry. 2007;64:820-829.
14. Viding E, McCrory EJ. Genetic and neurocognitive contributions to the development of psychopathy. Dev Psychopathol. 2012;24: 969-983.
15. Belsky J, Jonassaint C, Pluess M, Stanton M, Brummett B, Williams R. Vulnerability genes or plasticity genes? Mol Psychiatry. 2009;14:746-754.
16. Gunnar M, Quevedo K. The neurobiology of stress and development. Annu Rev Psychol. 2007;58:145-173.
17. Gunnar MR, Donzella B. Social regulation of the cortisol levels in early human development. Psychoneuroendocrinology. 2002;27: 199-220.
18. Mills-Koonce WR, Propper C, Gariepy JL, *et al*. Psychophysiological correlates of parenting behavior in mothers of young children. Dev Psychobiol. 2009;51:650-661.
19. Ursache A, Blair C, Stifter C, Voegtline K. Emotional reactivity and regulation in infancy interact to predict executive functioning in early childhood. Dev Psychol. 2013;49:127-137.
20. Eyberg SM, Nelson MM, Boggs SR. Evidence-based psychosocial treatments for children and adolescents with disruptive behavior. J Clin Child Adolesc Psychol. 2008;37:215-237.
21. Webster-Stratton C, Reid MJ, Beauchaine TP. Combining parent and child training for young children with ADHD. J Clin Child Adolesc Psychol. 2011;40:1-13.
22. Webster-Stratton C, Kolpacoff M, Hollinsworth T. Self-administered videotape therapy for families with conduct-problem children: comparison with two cost-effective treatments and a control group. J Consult Clin Psychol. 1988;56:558-566.
23. Webster-Stratton C. Long-term follow-up of families with young conduct problem children: from preschool to grade school. J Clin Child Psychol. 1990;12:144-149.

24. Webster-Stratton C. Advancing videotape parent training: a comparison study. J Consult Clin Psychol. 1994;62:583-593.
25. Webster-Stratton C, Hammond M. Treating children with early-onset conduct problems: a comparison of child and parent training interventions. J Consult Clin Psychol. 1997;65: 93-109.
26. Webster-Stratton C, Hollinsworth T, Kolpacoff M. The long-term effectiveness and clinical significance of three cost-effective training programs for families with conduct-problem children. J Consult Clin Psychol. 1989;57:550-553.
27. Webster-Stratton C, Reid MJ, Hammond M. Treating children with early-onset conduct problems: intervention outcomes for parent, child, and teacher training. J Clin Child Adolesc Psychol. 2004;33:105-124.
28. Webster-Stratton C, Rinaldi J, Jamila MR. Long-term outcomes of Incredible Years Parenting Program: predictors of adolescent adjustment. Child Adolesc Ment Health. 2011;16:38-46.
29. Webster-Stratton C, Reid MJ, Beauchaine TP. One-year follow-up of combined parent and child intervention for young children with ADHD. J Clin Child Adolesc Psychol. 2013;42:251-261.
30. Webster-Stratton C. Enhancing the effectiveness of self-administered videotape parent training for families with conduct-problem children. J Abnorm Child Psychol. 1990;18: 479-492.
31. Menting ATA, Orobio de Castro B, Matthys W. A trial of parent training for mothers being released from incarceration and their children. J Clin Child Adolesc Psychol. 2014;43:381-396.
32. Hutchings J, Gardner F, Bywater T, *et al*. Parenting intervention in Sure Start services for children at risk of developing conduct disorder: pragmatic randomized controlled trial. BMJ. 2007; 334:1-7.
33. Posthumus JA, Raaijmakers MAJ, Maassen GH, Engeland H, Matthys W. Sustained effects of Incredible Years as a preventive intervention in preschool children with conduct problems. J Abnorm Child Psychol. 2012;40:487-500.
34. Drugli MB, Larsson B, Fossum S, Morch W. Five-to six-year outcome and its prediction for children with ODD/CD treated with parent training. J Child Psychol Psychiatry. 2010;51: 559-566.
35. Scott S, Briskman J, O'Connor TG. Early prevention of antisocial personality: long-term follow-up of two randomized controlled trials comparing indicated and selective approaches. Am J Psychiatry. 2014;171:649-657.
36. Gardner F, Burton J, Klimes I. Randomised controlled trial of a parenting intervention in the voluntary sector for reducing child conduct problems: outcomes and mechanisms of change. J Child Psychol Psychiatry. 2006;47:1123-1132.
37. Scott S, Spender Q, Doolan M, Jacobs B, Aspland H. Multicentre controlled trial of parenting groups for childhood antisocial behaviour in clinical practice. BMJ. 2001;323:194-198.
38. Lyons MJ, True WR, Eisen SA, *et al*. Differential heritability of adult and juvenile antisocial traits. Arch Gen Psychiatry. 1995;52: 906-915.
39. Menting AT, Orobio de Castro B, Matthys W. Effectiveness of the Incredible Years parent training to modify disruptive and prosocial child behavior: a meta-analytic review. Clin Psychol Rev. 2013;33:901-913.
40. Bakermans-Kranenburg MJ, Van IMH, Pijlman FT, Mesman J, Juffer F. Experimental evidence for differential susceptibility: dopamine D4 receptor polymorphism (DRD4 VNTR) moderates intervention effects on toddlers' externalizing behavior in a randomized controlled trial. Dev Psychol. 2008;44:293-300.
41. Chou CY, Ma MC, Yang TT. Determinants of subjective health-related quality of life (HRQoL) for patients with schizophrenia. Schizophr Res. 2014;154:83-88.
42. Charman T. Commentary: glass half full or half empty? Testing social communication interventions for young children with autism—reflections on Landa, Holman, O'Neill, and Stuart (2011). J Child Psychol Psychiatry. 2011;52:22-23.
43. Kazdin AE. Treatments for aggressive and antisocial children. Child Adolesc Psychiatr Clin North Am. 2000;9:841-858.
44. Achenbach TM, Edelbrock CS. Manual for the Child Behavior Checklist and Revised Child Behavior Profile. Burlington, VT: University Associates in Psychiatry; 1991.
45. Markon KE, Krueger RF. Categorical and continuous models of liability to externalizing disorders: a direct comparison in NESARC. Arch Gen Psychiatry. 2005;62:1352-1359.
46. Witkiewitz K, King K, McMahon RJ, *et al*. Evidence for a multidimensional latent structural model of externalizing disorders. J Abnorm Child Psychol. 2013;41:223-237.
47. Rice JP, Reich T, Bucholz KK, *et al*. Comparison of direct interview and family history diagnoses of alcohol dependence. Alcoholism Clin Exp Res. 1995;19:1018-1023.
48. Waldron M, Madden PA, Nelson EC, *et al*. The interpretability of family history reports of alcoholism in general community samples: findings in a Midwestern U.S. twin birth cohort. Alcoholism Clin Exp Res. 2012;36:1091-1098.
49. Gartstein MA, Bridgett DJ, Dishion TJ, Kaufman NK. Depressed mood and maternal report of child behavior problems: another look at the depression-distortion hypothesis. J Appl Dev Psychol. 2009;30:149-160.
50. Webster-Stratton C, Hammond M. Maternal depression and its relationship to life stress, perceptions of child behavior problems, parenting behaviors, and child conduct problems. J Abnorm Child Psychol. 1988;16:299-315.
51. Webster-Stratton C. The long-term effects of a videotape modeling parent-training program: comparison of immediate and 1-year follow-up results. Behav Ther. 1982;13:702-714.
52. Reid MJ, Webster-Stratton C, Hammond M. Follow-up of children who received the Incredible Years intervention for oppositional-defiant disorder: maintenance and prediction of 2-year outcome. Behav Ther. 2003;34:471-491.
53. Eyberg S, Boggs S, Jaccard J. Does maintenance treatment matter? J Abnorm Child Psychol. 2014;42:355-366.
54. Constantino J. Child mental health: status of the promise, the reality, and the future of prevention. In: Cottler LB, ed. Mental Health in Public Health: The Next 100 Years. Oxford: Oxford University Press; 2011.
55. Meyer A, Fortunato C. Parenting interventions in early Head Start: the Buffering Toxic Stress Consortium. Zero Three. 2013;34:73-80.

TABLE S1 Two-Biological-Parent Households: Multivariate Analysis of Mother- and Father-Reported Child Externalizing Behavior as a Function of Demographic Characteristics, Family History of Externalizing Disorders, and Treatment Condition

	Mother Report								Father Report							
	Baseline				Posttreatment				Baseline				Posttreatment			
Parameter	**B**	**SE**	**t**	***p***	**B**	**SE**	**t**	***p***	**B**	**SE**	**t**	***p***	**B**	**SE**	**t**	***p***
Intercept	62.41	3.32	18.81	<.0001	61.09	3.83	15.95	<.0001	57.07	3.79	15.05	<.0001	57.30	4.16	13.77	<.0001
Treatment/control (ref = control)																
Treatment	−1.27	1.24	−1.02	0.31	−5.71	1.43	−3.99	<.0001	−1.35	1.31	−1.03	0.31	−5.77	1.44	−4.01	<.0001
Combined hx of externalizing disorders (ref = NO first- or second-degree risk)																
First- AND second-degree risk	5.25	1.53	3.43	<.001	5.24	1.77	2.96	<.01	4.02	1.63	2.47	<.05	3.90	1.78	2.18	<.05
First-degree risk only	2.60	2.22	1.17	NS	2.06	2.56	0.81	NS	2.01	2.44	0.82	NS	2.14	2.68	0.80	NS
Second-degree risk only	1.91	1.36	1.40	NS	1.16	1.57	0.74	NS	−0.07	1.43	−0.05	NS	0.82	1.56	0.53	NS
Child's sex (ref = female)																
Male	0.82	1.36	0.60	NS	0.51	1.57	0.32	NS	−0.97	1.44	−0.67	NS	2.04	1.58	1.29	NS
Maternal education (ref = high school or less)																
≥4-y college	0.19	1.53	0.13	NS	−0.12	1.77	−0.07	NS	1.21	1.66	0.73	NS	−1.24	1.83	−0.68	NS
Some college	−0.67	1.63	−0.41	NS	−0.81	1.88	−0.43	NS	2.82	1.77	1.59	NS	−0.44	1.95	−0.23	NS
Maternal race (ref = non-white)																
White	1.15	2.54	0.45	NS	−0.15	2.93	−0.05	NS	5.63	2.83	1.99	<.05	1.81	3.10	0.58	NS
Maternal/paternal depression at baseline[a]																
BDI	0.18	0.10	1.78	NS	0.20	0.12	1.71	NS	0.28	0.13	2.18	<.05	0.39	0.14	2.71	<.01
Model statistics (r^2)	0.085				0.122				0.104				0.158			

Note: BDI = Beck Depression Inventory; hx = history; NS = not significant; ref = reference; SE = standard error.

[a]*Depression score corresponds with the reporter of child behavior in the model.*

TABLE S2 Single-Biological-Mother Households: Multivariate Analysis of Mother-Reported Child Externalizing Behavior as a Function of Demographic Characteristics, Family History of Externalizing Disorders, and Treatment Condition

	Mother Report							
	Baseline				Posttreatment			
Parameter	**B**	**SE**	**t**	***p***	**B**	**SE**	**t**	***p***
Intercept	66.92	4.90	13.65	<.0001	67.43	5.49	12.29	<.0001
Treatment/control (ref = control)								
Treatment	−2.35	2.24	−1.05	NS	−7.94	2.50	−3.17	<.01
Combined hx of externalizing disorders (ref = NO first- or second-degree risk)								
First- AND second-degree risk	3.47	2.30	1.51	NS	0.64	2.58	0.25	NS
First-degree risk only	4.39	3.57	1.23	NS	0.38	3.99	0.09	NS
Second-degree risk only	2.44	2.45	1.00	NS	3.77	2.74	1.37	NS
Child's sex (ref = Female)								
Male	1.19	2.16	0.55	NS	−2.54	2.42	−1.05	NS
Maternal education (ref = high school or less)								
≥4-y college	−4.09	2.58	−1.58	NS	−3.93	2.89	−1.36	NS
Some college	−0.57	2.32	−0.25	NS	−3.04	2.60	−1.17	NS
Maternal race (ref = non-white)								
White	2.91	3.20	0.91	NS	4.35	3.58	1.22	NS
Caregiver depression at baseline								
BDI	0.08	0.12	0.69	NS	0.03	0.13	0.24	NS
Model statistics (r^2)	0.155				0.227			

Note: BDI = Beck's Depression Inventory; hx = history; NS = not significant; ref = reference; SE = standard error.