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# Effects of Parental Depression Symptoms on Parents and Children with Autism Spectrum Disorder in the PLAY Project Home Consultation Program

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## Abstract

Solomon, et. al. (2014) reported a randomized controlled trial of the PLAY Project Home Consultation Intervention Program (PLAY) with 112 parents and preschool children with ASD. PLAY, a parent implemented model of early intervention for ASD, had significant intervention effects on parents' interactive style, children's social engagement and ADOS social affect, as well as on parents' depression symptoms. This secondary analysis investigated whether parents' depression symptoms moderated PLAY intervention outcomes. Regression analyses indicated that parents' depression symptoms did not moderate PLAY effects on parents' interactive style, children's social engagement and ADOS social affect behaviors. Parents at high risk for depression were as successful implementing PLAY as parents at low risk for depression. However clinical levels of parent depression symptoms at Time 1 did moderate PLAY effects on parents' depression symptoms. PLAY parents with high depression symptoms displayed greater reductions in their depression symptoms than PLAY parents with low depression symptoms. Findings from this study are clinically significant insofar as they suggest that high levels of depression symptoms do not impede parents' participation in RBIs. Rather, results suggest that RBIs, such as PLAY, may be effective both at enhancing children's social functioning while having a secondary effect on reducing parents' depression symptoms.

**Keywords:** Autism, Autism Spectrum Disorders, preschool children, parental depression, Relationship Based Intervention

## Introduction

The PLAY Project Home Consultation Model [PLAY (Solomon et. al. (2014))] is a parent-implemented intervention that operationalized the Developmental, Individual-differences, Relationship-based intervention (DIR) developed by Greenspan and Weider (1998). As a Relationship Based Intervention (RBI), PLAY was derived from child development

theory and research which postulates that parental responsiveness has a major causal impact on children's development, social competence and emotional well-being [See Binns and Cardy, (2019); Greenspan and Weider (1998); Mahoney and Nam (2011) for a review of RBIs]. PLAY focuses on teaching and encouraging parents to engage in social, play and communicative interactions characterized by high levels of responsiveness and affect and moderate to low levels

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of directiveness as a method for both reducing children's autistic characteristics and enhancing their developmental functioning. Through regular home visits, PLAY Consultants provide social support and coach parents to use Responsive Interaction (RI) strategies that emphasize: (1) following children's lead; (2) responding to children's intentions; and (3) engaging in reciprocal social interaction.

Solomon et al. (2014) reported a randomized control trial (RCT) of PLAY with 112 preschool aged children with diagnoses of Autism Spectrum Disorder (ASD) and their parents. Subjects were randomly assigned to a community standard (CS) intervention *plus* PLAY versus a CS intervention only. PLAY consultants made monthly home visits during which they coached parents on the use of PLAY strategies. Results indicated significant PLAY effects on the quality of parents' interactions with their children as well as on the number of depression symptoms that parents experienced. There were also significant improvements in PLAY children's social engagement and Autism Diagnostic Observation Schedule (ADOS) classifications which were primarily attributable to decreases in children ADOS social affect scores (Mahoney & Solomon, 2016). These effects occurred despite the fact that one third of the parents who implemented PLAY reported clinical levels of depression symptoms at the start of intervention.

#### *Parental Depression and ASD*

Most investigations of depression among parents of children with ASD have been based upon self-report screening instruments that assess the number of depression symptoms to which parents ascribe. Bailey, Golden, Roberts and Ford (2007) reported from a review of 42 studies of depression in parents of children with autism and other disabilities that 85% used rating scales to assess parental depression, the most common of which were the CES-D (Radloff, 1977) and the Beck Depression Inventory (Beck and Steer, 1987; Beck et al., 1996). While these instruments provide cutoff scores for various probabilities of clinical depression (e.g., minimal, mild, moderate, severe), they neither provide sufficient evidence for a diagnosis of depression nor do they specify the type of

depression for which respondents may be at-risk. Nonetheless, they have been useful in understanding the nature and correlates of depressive symptoms and are better suited to empirical analyses than clinical diagnoses (Bailey, et. al., 2007).

Results from these studies consistently indicate that mothers of children with ASD experience significantly higher levels of depression symptoms than either mothers of typically developing children or mothers of children with other disabilities (e.g., Abbeduto et al., 2004; Singer, 2006). The likelihood that these findings point to a significant mental health concern are reinforced by a report from a large national claims database (Cohrs and Leslie, 2017) that mothers of children with autism are nearly 3 times more likely to have a clinical diagnosis of depression than mothers of children without autism. In addition, maternal depression appears to be a chronic problem that continues, at least, throughout the early years of their children's lives. A longitudinal study of 143 mothers of toddlers with confirmed diagnoses of autism (Carter et al., 2009) reported that 35% displayed clinical levels of depression symptoms when their children were less than 3 years of age, and 42% displayed clinical depression symptoms two years later. These data not only point to the scope and persistence of this problem, but also highlight need to target depressive symptoms of parents of children with autism as an important outcome of early intervention.

Although there is considerable research interest in the psychosocial consequences of having a child with autism, little, if any, research has been reported on how depression impacts parents' ability to care for their children. Presumably depression, particularly clinical depression, has similar effects on mothers of children with autism as on mothers of any other children. That is, depression likely has a debilitating effect on mothers' general mood and quality of life (Zablotsky, Anderson and Law, 2013). It is also likely to have a negative influence on mothers' ability to interact with their children, not only making it more difficult to engage them (NICHD, 1999) but also interfering with their capacity to interact sensitively and responsively (Kurstjens and Wolke, 2001). Furthermore, highly depressed mothers are likely to over-react to their children's crying or

acting out behaviors (Field, 2002), thereby exacerbating their children's emotional distress.

The effect of depression on parents' participation in parent-mediated interventions has also yet to be evaluated despite the increasing use of this type of early intervention practice. However, there has been some research examining the effects of parenting stress on parent participation in children's intervention. Osborne, McHugh, Saunders and Reed (2008) reported that high levels of parenting stress impeded parents of children with ASD from implementing Intensive Behavioral Intervention with their preschool aged children. Yet, an evaluation of an RBI which, similar to PLAY, focused on promoting parental responsiveness (Alquraini and Mahoney, 2015) reported that parents of preschool children with ASD who had high levels of parenting stress were more effective at learning RI strategies than parents with lower levels of parenting stress, thereby enhancing the developmental outcomes their children attained.

However, parenting stress and depression are different mental health constructs that may have different effects on parents' ability to participate in parent-mediated interventions. Depression is related to, and often triggered by high levels of parenting stress. Depression has many of the same characteristics as stress, but is complicated by additional mood disorders such as: feeling sad and hopeless; lack of energy and enthusiasm; feeling bad or guilty; and thoughts of suicide (American Psychiatric Association, 2013). In addition, the high levels of depression reported by parents of children with ASD prior to their child's birth (Hodge, Hoffman and Sweeney, 2011) suggest these parents may have a strong genetic predisposition for depression.

#### *Parental Depression and Relationship Base Intervention*

Insofar as parental depression could mitigate the capacity of parents to interact with their children, even if depressed parents who participate in RBIs were successful at learning RI Strategies, their depression might moderate the effectiveness of this type of intervention both by reducing the frequency they interact with their children as well as by impeding them from using RI

strategies when they do interact. Furthermore, the responsibilities parents assume in RBIs by becoming the primary agent of their children's intervention might be overwhelming, especially for parents with clinical levels of depression. To the extent this occurs, participation in RBIs might aggravate rather than reduce parents' depression symptomatology (Turnbull, Blue-Banning, Turbiville, et al., 1999; Winton, Sloop and Rodriguez, 1999).

#### *Purpose and Hypotheses*

Since one third of the parents who participated in Solomon et al., (2014) reported clinical levels of depression at the start of intervention, data from this study provide a unique opportunity to examine the impact of depression on parents' ability to participate in a relationship-based intervention. Thus the purpose of this study is to examine how parent depression symptoms were associated with the 4 major treatment effects reported in this investigation. These included (1) improvements in parents' style of interaction as indicated by increased responsivity and affect as well as decreased directiveness; (2) increases in children's social engagement (SE); (3) reductions in children's autism symptomatology which were associated with improvements in their ADOS social affect (ADOS-SA) scores (Mahoney & Solomon, 2016); and (4) reduction in parent depression symptoms. We hypothesized that each of these intervention effects would be greater for parent/child dyads in which parents had less severe depression symptoms at the start of intervention.

#### **Method**

##### *Participants*

Families were recruited from April 2010 to June 2012 through local physician offices in 4 cities in the United States (Solomon et al. (2014). Two consecutive cohorts ( $N_{\text{Cohort1}} = 69$ ;  $N_{\text{Cohort2}} = 59$ ) participated for one year each. Inclusion criteria were age 3:0 to 5:11 (actual 2 years 8 months to 5 years 11 months) at the time of intervention; previous clinical diagnosis of ASD according to DSM-IV criteria and meeting criteria for autism or ASD on the Autism Diagnostic Observation Schedule [ADOS (Lord et al., 2002) and Social Communication

Questionnaire (SCQ) (Rutter et al., 2003). Exclusion criteria included a diagnosis of Asperger's Syndrome, genetic disorders, severe medical conditions, a parent with severe psychiatric disorder or cognitive impairment, and/or families in which English was not the primary language. None of the participants in the study were receiving other intensive interventions (e.g. ABA/Discrete Trial). The Peabody Picture Vocabulary Test - Fourth Edition (Dunn and Dunn, 2007) was used to screen parents for cognitive functioning that would permit understanding of the intervention processes, with a minimum requirement of a 6th-grade vocabulary. Easter Seals administrators obtained written informed consent. Of the 148 families screened, 128 met criteria and chose to participate, with 112 completing the study (See Solomon et al. (2014) for more details regarding sample).

Table 1 displays child and family demographic characteristics by group for subjects who completed the study. At baseline, children's average age was around 50 months (range = 32 to 71 months). In accordance with the prevalence of autism, the majority of children were male. About one-quarter were African-American, Asian, and/or Hispanic.

Most were from two-parent families, with more than half reporting family incomes under \$60,000 (U.S. median income in 2011 was \$51,100). Most primary parents (responsible for participating in the intervention) were mothers. About half of primary parents had Bachelor's degrees. There were no significant group differences in the CES-D scores for primary parents or in the percentage of primary parents whose CES-D scores were above the clinical cutoff (33%).

*Randomization* (Note: See RCT CONSORT Diagram in Solomon, et. al., 2014)

De-identified demographic and diagnostic data for enrolled families were sent to an independent research team for randomization to community-standard intervention (CS) or PLAY plus CS. Randomization occurred within sites using a matched-pair design with primary blocking variables of age ( $\leq 4.49$  years v.  $\geq 4.5$  years), ADOS-related autism categories (autism v. autism spectrum) and child gender. Each group was allocated 64 families. Retention over the study year was 89.0% of PLAY families and 85.9% of control families for a total of 112 families. Retained and non-retained families did not differ significantly on any demographic or outcome variables.

**Table 1.**  
*Baseline Child and Family Characteristics*

Variable	CS <sup>1</sup> (N = 55)	PLAY (N = 57)	Test Statistic
<u>Child</u>			
Age in months	50.5 (9.7)	49.3 (9.8)	0.64 <sup>a</sup>
Males	85.5%	82.5%	0.19 <sup>b</sup>
African-American, Asian and/or Hispanic	20.0%	28.1%	1.00 <sup>b</sup>
ADOS <sup>2</sup> autism diagnosis (vs. ASD <sup>3</sup> )	69.1%	71.9%	0.11 <sup>b</sup>
<u>Family</u>			
Two-parent household	84.9%	91.1%	0.99 <sup>b</sup>
Primary caregiver is mother	90.2%	92.6%	0.19 <sup>b</sup>
Primary caregiver education Bachelor's degree or above	49.1%	52.6%	0.14 <sup>b</sup>
Income less than \$60,000	53.7%	56.1%	0.07 <sup>b</sup>
<u>Parent CES-D Scores at Pre-Intervention</u>			
CES-D Symptom Scores	12.5 (9.9)	12.4 (11.8)	0.06 <sup>a</sup>
Parents Above Clinical Cutoff (16 or above)	33%	33%	0.07 <sup>a</sup>

*Note.* <sup>1</sup> CS = Community standard Control Group; <sup>2</sup> ADOS = Autism Diagnostic Observation Schedule; <sup>3</sup> ASD = Autism Spectrum Disorder.

<sup>a</sup> *t*, *df* = 110. Not significant.

<sup>b</sup>  $\chi^2$ , *df* = 1. All values not significant.

### *Intervention*

The intervention was carried out for two 12-month cohorts. For each Cohort, PLAY and CS subjects received intervention during the same 12-month period of time.

**Treatment Group.** The PLAY Project Home Consultation program is a clinical model that operationalized the Developmental, Individual-differences, Relationship-based (DIR) theoretical framework (Greenspan and Weider, 1998). PLAY typically supplements existing services (e.g. special education, language and occupational therapies, and/or ABA/behavioral interventions) but has been implemented as a primary intervention for ASD in early intervention settings.

Six PLAY consultants who were occupational therapists, language therapists, or special educators and employed by Easter Seals, were trained to certification. Consultants provided the standard PLAY Project intervention consisting of a 3-hour home visit monthly for 12 months ( $M$  visits = 11.5,  $SD$  = 0.8). Before the first visit, parents received written and DVD-based training materials that described PLAY principles, methods, activities, and techniques. During all subsequent visits, consultants obtained a 15-minute sample of coached parent PLAY and consultant modeling during the visit. Parents were taught to sensitively interpret their children's subtle and hard to detect cues, as well as to use RI strategies to respond contingently to their children's intentions, and effectively engage their children in reciprocal exchanges. They were also taught to provide appropriate developmental challenges to promote progress in their children's functional development as defined by Greenspan and Wieder's six functional developmental levels (Greenspan & Weider, 1998).

A written video analysis, sent between visits, reviewed the parent-child video interactions, summarized the child's developmental profile, and recommended methods and techniques for improvement. The program was revised over time to address the child's evolving developmental profile. Consultants were available between visits as needed by email or phone. Families were encouraged to engage their child in 15- to 20-minute PLAY sessions and throughout daily/routines for a total of two hours/day. Parents completed monthly

logs of time spent using PLAY methods with their child as well as hours of CS interventions. Consultants collected logs at the PLAY home visit.

**Control Group.** CS groups participated in special education public preschool (12 hours per week on average), as well as approximately 100 hours/year of private speech and language therapies. Participation in other intensive interventions (i.e., at least 10 hours/week) made families ineligible because of the potential confound with PLAY; one family from each group was removed for this reason. Two families from the CS group chose to pay for PLAY services and were dropped from the study.

### *Measures*

Baseline measures were collected within one month prior to randomization and 12 months after the PLAY intervention began. (See Solomon, et. al. (2014) for a detailed description of data collection procedures). The following describes each of the assessments used for this investigation

#### *Autism Diagnosis and Severity.*

The Autism Diagnostic Observation Schedule –Generic was, at the time of the study, a well-established, valid and reliable diagnostic tool with high interrater reliability that assessed social and communication behaviors representing ASD. The ADOS-G has four 30 minute modules each designed to be administered to different individuals according to their level of expressive language (Lord et al., 2000 (ADOS-G)). The ADOS evaluates joint referencing, social relatedness, and communication skills. Additionally, this measure allows for evaluation of restrictive interests, and repetitive and socially maladaptive behaviors.

Inter-rater reliability was assessed with mean multirater kappas of all items for each module ranging from .65 to .78 and intraclass correlations above .82 for all subdomain and domain scores. Test-retest reliability varied by subdomain ranging from .59 to .82. ADOS algorithms (i.e., sets of rules that allow classification of autism or ASD) generally achieved 94% correct classification. The exceptions were the ASD versus non-spectrum (NS) module 2 specificity of 87%, and the PDD-NOS

versus NS Module 2 specificity of 88% and sensitivity of 89% (Lord et al., 2002).

Autism severity was calibrated from the raw totals of the ADOS-SA (Social Affect) and ADOS-RRB (Restricted and Repetitive Behaviors) domains. Calibrated Severity Scores (CSS) (Hus et al., 2014) are based upon a 10-point scale: scores from 1-3 are in the “Nonspectrum” range; 4-5 is in the “ASD” range; and 6 -10 in the “Autism” range. CSS scores are reported to be less influenced by child characteristics such as verbal IQ, nonverbal IQ, age and race than raw domain scores (Hus et al., 2014).

#### *Parent Style of Interaction.*

The Maternal Behavior Rating Scale (MBRS) (Mahoney, 2008) was used to assess parents' style of interaction. Parent-child play with toys in the home was video recorded for 7.5 minutes at pre- and post-assessment and coded by raters blind to group allocation and assessment time. Items were coded on a scale of 1 (low) to 5 (high). The MBRS assesses four interactive style dimensions: Responsive/Child Oriented (3 items,  $\alpha = .87$  at baseline,  $.91$  at follow-up); Affect/Animation (5 items,  $\alpha = .85$  at baseline,  $.89$  at follow-up); Achievement Orientation (2 items,  $\alpha = .22$  at baseline,  $.58$  at follow-up); and Directiveness (2 items,  $\alpha = .64$  at baseline,  $.53$  at follow-up).

Interrater reliability was assessed through intraclass correlations (ICCs) for 20% of videos randomly selected and distributed over the time of the study. ICCs for MBRS scales were  $.64$  for Responsiveness/Child Oriented,  $.70$  for Affect/Animation,  $.73$  for Achievement Orientation, and  $.61$  for Directiveness.

#### *Children's Social Engagement (SE).*

The Child Behavior Rating Scale [CBRS (Mahoney and Wheeden, 1999)] was used to assess children's SE from the video recorded observations of parent-child interaction described above. The CBRS is comprised of 7 items that assess two interactive style dimensions for children: Attention (4 items,  $\alpha = .88$  at baseline,  $.89$  at follow-up) and Initiation (3 items,  $\alpha = .70$  at baseline,  $.83$  at follow-up). Interrater reliability was assessed through intraclass correlations (ICCs) for 20% of videos randomly

selected and distributed over the time of the study. ICCs for CBRS scales were  $.75$  for Attention and  $.77$  for Initiation. This investigation used CBRS Total scores (i.e., CBRS Initiation plus CBRS Attention) to assess children's SE.

#### *Parent Depression.*

The Center for Epidemiologic Studies Depression Inventory [CES-D (Radloff, 1977)] is a widely used self-report scale that is designed to assess depressive symptoms in adults. It contains 20 items about symptoms that occurred in the week prior to the interview with response options from 0 to 3 that refer to frequency of the symptoms. The score ranges between 0 (best possible) to 60 (worst) and the cut-off point typically recommended for depression is 16 (Lewinsohn et al., 2007). Individuals with a score of 16 or more must have had either at least 6 of the 20 symptoms in the CES-D with persistence for most of the previous week, or a majority of the symptoms on the scale for shorter periods of time. The CES-D literacy level has been defined as easy, and it takes between 2 and 5 minutes to complete. For this investigation the scale was completed by parents in their homes.

The CES-D has high internal consistency ( $\alpha = .84$ -.90), modest test-retest reliability (ranging from  $.51$ -.67) for 2- and 4-week intervals), and good criterion and discriminant validity (Radloff, 1977). A recent meta-analysis of 28 studies (10,617 participants) regarding the performance of the CES-D for detecting depression in the general population indicated that at the cut-off 16, sensitivity was 0.87 (95% CI: 0.82-0.92), specificity 0.70 (95% CI: 0.65-0.75), and DOR 16.2 (95% CI: 10.49-25.10), indicating that the CES-D has acceptable screening accuracy (Vilagut, Forero, Barbaglia and Alonso, 2016). For the present sample, internal consistency was in the acceptable range ( $\alpha = .93$  for pretest and  $\alpha = .92$  for post-test).

#### *Analytic Procedures*

Analyses were performed using the SPSS statistical package, version 24. Hierarchical multiple regressions were computed to investigate possible moderating effects of parent depression symptoms on PLAY parent and child outcomes. Parent

Depression was based upon the number of depression symptoms parents reported at Time 1 as indicated by their CES-D Time 1 (T1) scores.

## Results

Preliminary analyses indicated that parent CES-D T1 scores were highly correlated with the Treatment x CES-D T1 interaction ( $r = .91$ ). To avoid collinearity, the regression model used to examine the moderating effects of Parent Depression Symptoms did not include CES-D T1. Instead the model included Treatment in Step 1 and Treatment plus Treatment x CES-D T1 in Step 2.

As reported on Table 2, results from each of the Model 1 analyses indicated that PLAY subjects made significantly greater improvements than CS subjects on all dependent variables, replicating the PLAY Treatment outcomes reported in the original study (Solomon, et. al., 2014).

### *Moderating Effects of Parent Depression on PLAY Treatment Outcomes.*

The *Treatment x CES-D T1* interactions examined in Model 2 were used to assess the moderating effects of Parent Depression on PLAY Treatment outcomes. As highlighted on Table 2, these interactions were not significant for: (1) all four measures of parenting style of interaction; (2) children's engagement; as well (3) children's autism symptomatology ( $ps > .05$ ). However, the *Treatment x CES-D T1* effect was a significant ( $p > .001$ ) for Parent Depression Symptoms. Since this interaction accounted for the Treatment effect indicated on Model 1, this result indicates that the PLAY treatment effect on Parent Depression was significantly greater for parents with high as versus low levels of depression symptoms at T1.

### *Post Hoc Analyses.*

A within-subjects ANOVA with Treatment as a between-group variable was used to further explore the moderating effect of Parent Depression on parents' CES-D scores. Since one of the primary uses of the CES-D is to screen for clinical depression, we classified parents into two Depression Risk groups based upon CES-D clinical criteria described by Lewinsohn et. al. (2007). Parents with CES-D T1 scores of 16 and above were categorized as High Risk for clinical depression ( $N_{PLAY} = 19$ ;  $N_{CS} = 19$ ) while parents with CES-D T1 scores below 16 were classified as Low Risk ( $N_{PLAY} = 37$ ;  $N_{CS} = 37$ ). Results indicated significant main effects for Treatment ( $F(1, 108) = 7.80$ ,  $p < .01$ ), Depression Risk ( $F(1, 108) = 38.36$ ,  $p < .001$ ) as well as the interaction between Treatment and Depression Risk ( $F(1, 108) = 3.90$ ,  $p < .05$ ).

These results, which are illustrated on Figure 1, indicate that the significant effect of PLAY on reducing parent depression symptoms occurred primarily among parents who initially had High Risk scores. CES-D scores for Low Risk parents remained stable during intervention both for PLAY as well as CS parents. Yet, High Risk parents in both the PLAY and Control groups made substantial decreases in their CES-D scores during intervention. However, as depicted on Figure 1, the rate of symptom reduction, as indicated by pre-post changes in CES-D scores, was 2.5 times greater for High Risk PLAY than for High Risk CS parents. In addition, while there were no significant changes in the percentage of CS parents classified as High Risk over the course of intervention, the percentage of High Risk PLAY parents declined by more than 50%, from 33% at pre-intervention to 16% at post intervention.

**Table 2.**

*Relationship of Treatment and Parent Depression Symptoms at Time 1 to PLAY treatment outcomes*

Dependent Variable	Model	Independent Variables	Beta	T Value	Significance	R <sup>2</sup>
<b>1. Parenting Style of Interaction</b>						
Responsiveness Change <sup>3</sup>	1	Treatment	.48	5.74	.000	.22***
	2	Treatment	.45	5.13	.000	.22***
Affect Change <sup>3</sup>		<i>Treatment X CESD T1</i>	.08	0.93	.355	.22***
	1	Treatment	.59	6.25	.000	.26***
	2	Treatment	.50	5.72	.000	.25***
Achievement Change <sup>3</sup>		<i>Treatment X CESD T1</i>	.05	0.55	.582	.25***
	1	Treatment	.37	3.69	.000	.10***
	2	Treatment	.37	3.88	.000	.11***
Directiveness Change <sup>3</sup>		<i>Treatment X CESD T1</i>	.11	1.17	.246	.11***
	1	Treatment	.30	3.31	.001	.08***
	2	Treatment	.27	2.79	.006	.08**
		<i>Treatment X CESD T1</i>	.10	1.07	.289	.08**
<b>2. Child Engagement</b>						
Social Engagement Change <sup>4</sup>	1	Treatment	.42	4.81	.000	.17***
	2	Treatment	.37	4.02	.000	.18***
		<i>Treatment X CESD T1</i>	.16	1.78	.079	.18***
<b>3. Child Autism Symptomatology</b>						
Social Affect Improvement <sup>1</sup>	1	Treatment	.18	1.98	.050	.03*
	2	Treatment	.22	2.26	.026	.03*
		<i>Treatment X CESD T1</i>	.13	1.30	.198	.03*
<b>4. Parent Depression Symptoms</b>						
CES-D Improvement <sup>2</sup>	1	Treatment	.18	1.96	.050	.03*
	2	Treatment	.01	0.04	.971	.32***
		<i>Treatment X CESD T1</i>	.58	7.03	.000	.32***

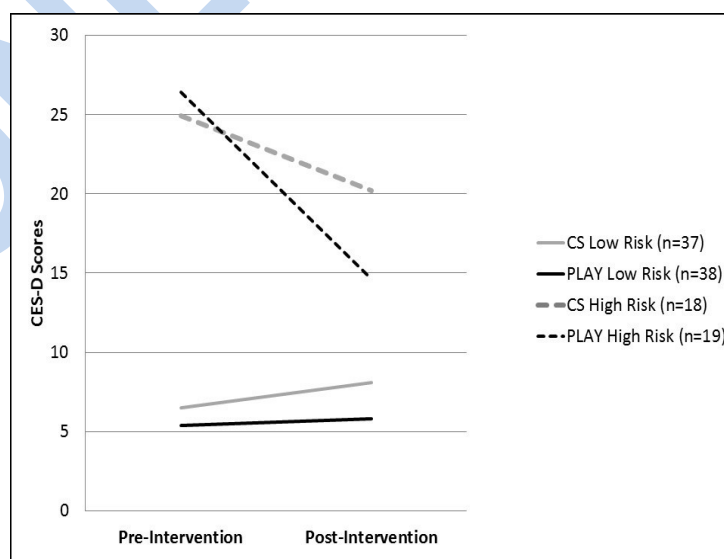
<sup>1</sup> Pre- post- changes in SA Calibrated Severity Scores

<sup>2</sup> Pre- post- changes in CES-D scores

<sup>3</sup> Pre- post- changes in MBRS Scale scores

<sup>4</sup> Pre-post- changes in Total CBRS Scale Scores

\* p< .05; \*\* p< .01; \*\*\* p<.001



**Figure 1.**

*Parental Depression Symptoms by Group and Depression Risk Status at Pre- and Post-Intervention*



## Discussion

This investigation examined whether the number of depression symptoms parents reported at the start of intervention moderated the intervention effects of PLAY reported by Solomon et al. (2014). Results from our analyses produced two sets of findings pertaining to our study hypotheses.

First, parents' depression symptoms at the beginning of intervention did not moderate their ability to modify their style of interaction or promote their children's SE and reduce their ADOS-SA behaviors. Even though one third of the PLAY parents reported clinical levels of depression symptoms at the beginning of intervention, these parents were as successful at participating in PLAY, as were PLAY parents with depression symptoms in the non-clinical range.

Second, parents' level of depression symptoms had an unexpected moderating effect on changes in depression observed for PLAY parents during intervention. PLAY parents with high levels of depression symptoms at the start of intervention made significantly greater reductions in depression symptoms during intervention than did PLAY parents with lower levels of depression symptoms.

*Post hoc* analyses in which we examined this effect by grouping parents according to their risk for clinical depression provided additional insight to the effects of PLAY on parental depression. At the start of intervention, two thirds of the parents in both the PLAY and CS groups were categorized as Low Risk for depression. These parents had extremely low levels of depression symptoms, averaging CES-D scores of 6. In contrast, High Risk parents had average CES-D scores of 25, which is nine points above the clinical cutoff. Since the scores for Low Risk parents were so low, the probability of their reducing their depression symptoms during intervention was extremely low. Conversely, since High Risk parents had CES-D scores that were considerably above the clinical cutoff, there was a high probability their scores would regress toward the mean. In fact, this phenomenon was observed. For both the PLAY and CS groups, Low Risk parents made only small changes in their depression symptoms while High Risk parents made substantial changes. Yet,

among High Risk parents, reduction in depression symptoms was 2.5 times greater for PLAY than for CS parents. In addition, the percentage of parents who remained at high risk for depression at the end of intervention was 50% lower for PLAY than for CS parents.

### *Theoretical Implications*

Clinical levels of depression are generally associated with parents having difficulty not only spending time with their children, but also engaging in responsive and supportive interactions. Insofar as the CES-D provided a valid index of parental depression, the main question raised by this study is why were High Risk parents not only as successful at participating in PLAY as Low Risk parents, but also benefitted more in terms of the impact of PLAY on their depression symptoms. We believe the answer to this question lies in current understanding of psychosocial conditions that are thought to contribute to parental depression as well as to factors that have been reported to be associated with depression among parents of children with autism.

One psychosocial condition commonly identified as a trigger for depression is the feeling of helplessness - that there is nothing a person feels capable of doing to change their life circumstances (Peterson, Maier & Seligman, 1995). Consistent with this notion are research reports that depression among parents of children with autism is associated with low feelings of parenting self-efficacy (Hastings & Brown, 2002). Goldberg (1977) proposed a model of parenting which posited a causal relationship between parents' effectiveness at engaging in mutually enjoyable interactions with their children with their feelings about their role as a parent. According to this model, the more successful parents are at engaging in reciprocal social interaction with their children, the more likely they are to enjoy their children and feel good about their own competence as a parent. Insofar as feelings of parenting competence may be associated with the amount of depression parents experience, one implication of Goldberg's model is that parental depression may be related to parents' feelings of inadequacy which result from their inability to engage in

responsive, reciprocal interactions with their children.

Research indicates that RI Strategies are causally related to changes in children's social engagement (Karaaslan & Mahoney, 2015; Mahoney & Solomon, 2016) such that soon after parents use these strategies they experience improvements in their children's social engagement. To the extent that High Risk PLAY parents learned and used RI Strategies, this may have had an immediate impact on their ability to engage their children. Not only might this have helped to improve their feelings of parenting competence, it might have also motivated them to continue using RI Strategies. To the extent these parents experienced continued success with RI Strategies, this may have enhanced their feelings of parenting competence, which resulted in a reduction of the severity of their depression symptoms.

While this explanation is consistent with both the data presented in this study as well as with Goldberg's model of parent-child interaction, future research is needed to examine how RI Strategies affect parenting competence and whether this might moderate the effects of having a child with ASD on parental depression.

### Conclusion and Limitations

This is the first investigation to examine the moderating effects of depression symptoms on parents' ability to participate in a RBI with preschool children with ASD. Given the high levels of depression symptoms reported by parents of young children with ASD, results from this investigation address two practical issues regarding the feasibility of RBIs for this population.

First, they address the question as to whether parents with high levels of depression symptoms are capable of participating in a RBI such as PLAY in which they assume the responsibility of learning and implementing RI strategies during their routine interactions with their children. Our results indicated that not only were these parents capable of participating in this RBI, but they also attained the same level of success as parents who reported subclinical levels of depression symptoms.

Second, our results address the question as to whether the additional

responsibilities parents assume when they participate in a RBI might have detrimental effects on their psychosocial functioning, particularly if they are currently experiencing high levels depression symptoms. PLAY intervention procedures not only improved the quality of these parents' interactions with their children and enhanced their children's Social Affect behaviors, but also reduced, rather than aggravated, their depression symptoms. Both of these findings highlight the viability of this low cost approach to intervention [i.e., \$5,000 per year (Solomon, et. al., 2014)] at meeting some of the most critical needs of young children with autism and their parents.

While our results indicating that PLAY had a significant role in helping to reduce parent depression symptoms are promising, this finding must be interpreted with caution. Depression is a complex psychological construct, and there are several factors that could affect both the severity of depression as well as the degree to which parents recover from their depressive episodes. For example, to the extent parents have strong genetic propensities for depression and other psychopathologies, raising a child with autism may result in their experiencing severe levels of depression that may be highly resistant to behavioral interventions such as PLAY. Conversely, parents who receive medical or psychological treatment for depression may be more responsive to behavioral interventions than parents who do not receive such treatments. In addition, the quality of social support parents receive while experiencing depression can have a significant impact on the degree to which they recover from these episodes (Folk, Norris, & Quinn, 2014; Zablotsky, Anderson & Law, 2013).

Because parent depression was not the primary focus of this investigation, we did not collect data regarding these and other extraneous factors that might affect this condition. Nonetheless, because this investigation was a relatively large RCT, it is reasonable to assume that extraneous factors associated with parent depression were randomly distributed across the two groups. To the extent this assumption is valid, findings from this study provide compelling evidence that PLAY had a significant role in helping to reduce parents' depression symptoms. Nonetheless, a more

accurate estimate of the actual effects of PLAY on parent depression will require future research that controls for extraneous factors associated with depression.

At least three other limitations should be considered when interpreting results from this study. First, the number of symptoms parents ascribed to on a survey instrument was used to assess their depression. Although, this is a common procedure for assessing depression, there may be substantial differences between parents with diagnoses of depression versus depression as inferred from self-reports. Second, nearly 90% of the parents in the study came from two-parent households. This suggests that many of these subjects likely had considerable social support that may have lessened the effects of depression symptoms on their ability to participate in this RBI. Third, because Control parents did not receive comparable intervention supports as did PLAY parents, the effects of PLAY on parent depression symptoms may have had less to do with the PLAY intervention itself and more to do with the additional support they received from participating in PLAY. Because of these limitations, future research is needed to replicate findings from this study with more diverse samples of parents, using different methods for assessing parent depression, as well as research designs that can control for the effects of the intervention support that parents receive.

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