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S.I. : PARENTING CHILDREN WITH ASD

Examining the Links Between Challenging Behaviors in Youth with ASD and Parental Stress, Mental Health, and Involvement: Applying an Adaptation of the Family Stress Model to Families of Youth with ASD

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Abstract
Raising a child with autism spectrum disorder (ASD) poses unique challenges that may impact parents' mental health and parenting experiences. The current study analyzed self-report data from 77 parents of youth with ASD. A serial multiple mediation model revealed that parenting stress (SIPA) and parental mental health (BAI and BDI-II) appears to be impacted by challenging adolescent behaviors (SSIS-PBs) and, in turn, affect parental involvement (PRQ), controlling for social skills (SSIS-SSs). Further, the study explored the malleability of parents' mental health over the course of a social skills intervention, and provides modest evidence that parent depressive symptoms decline across intervention. This study illustrates the importance of considering the entire family system in research on youth with ASD.

Keywords Autism spectrum disorder · Families · Parenting · Stress · Social skills intervention

Introduction

Raising a child with autism spectrum disorder (ASD) poses unique challenges that have been shown to impact parents' stress, mental health, and parenting experiences. Ample evidence suggests that parents of youth with ASD report heightened stress compared to those of typically developing (TD) youth (Hayes and Watson 2013) and are particularly likely to present with symptoms of anxiety and depression (Bitsika and Sharpley 2004). Parenting stress and mental health appear to be interrelated and may have important implications for parental involvement.

Parenting Stress and Youth with ASD

One of the most frequently examined aspects of parenting in families of youth with ASD is parenting stress (Hayes and Watson 2013). Parenting stress can be broadly defined as an "aversive psychological reaction to the demands of being a parent" (Deater-Deckard 1998) and is, thus, distinct from other domains of stress (i.e., work-related stress) as well as general daily hassles and annoyances. Parenting demands are thought to be many and varied (Deater-Deckard 2008) and parenting stress may manifest when there is an incongruence between perceptions of parenting demands and expected parental supports (Goldstein 1995). For families of youth with ASD, there may be a discrepancy between perception of demands and expected resources (Johnson et al. 2011), in turn eliciting parenting stress.

Although most parents experience some degree of parenting stress (Deater-Deckard 2008), parents of youth with ASD have been shown to experience heightened levels compared to parents of TD youth (Davis and Carter 2008).

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Parenting a child with ASD may involve factors such as navigating diagnostic and treatment services (Ruble et al. 2005), financial burden (Kogan et al. 2008), and modifying typical family activities and routines (Schaaf et al. 2011), which many families of TD youth do not experience.

Furthermore, the degree of parenting stress among parents of youth with ASD is thought to be contingent upon child factors, including autism severity, emotional dysregulation, and especially, challenging/problematic child behaviors (Bundy and Kunce 2009; Davis and Carter 2008; Estes et al. 2009; Hodgetts et al. 2013; Lecavalier et al. 2006; McStay et al. 2014). Such challenging behaviors are broadly conceptualized as those that are socially unacceptable (Matson et al. 2009) and may include internalizing and externalizing behaviors, such as aggression towards others, hyperactivity, self-harm, and conduct problems. Challenging behaviors are commonly observed among youth with ASD and are associated with greater autism severity (Jang et al. 2011; Matson et al. 2009). Although challenging behaviors are often chronic throughout childhood and adolescence for those with ASD (Matson et al. 2010), the transition into adolescence can be an especially turbulent developmental period, laden with social and emotional difficulties for youth with typical and atypical development (Seltzer et al. 2003). Therefore, adolescence is a particularly important phase of development in which to examine challenging behaviors and parenting stress in ASD.

Mental Health of Parents of Youth with ASD

Parenting stress can have a negative impact on parents; studies have found links between levels of stress in parents of youth with ASD and their emotional well-being—that is, high stress is associated with poorer mental health (e.g., Johnson et al. 2011). Parents of youth with ASD have an increased vulnerability for psychological disorders such as anxiety and depression, compared to parents of TD youth and youth with other developmental delays, such as Down syndrome (Abbeduto et al. 2004; Hamlyn-Wright et al. 2007). Studies suggest that between one-fourth (Machado Junior et al. 2016) to two-thirds (Bitsika and Sharpley 2004) of parents of youth with ASD exhibit symptoms of depression, and a third (Machado Junior et al. 2016) to nearly half (Bitsika and Sharpley 2004) display symptoms of anxiety. Parental mental health concerns are associated with characteristics of their child, in particular, behavioral challenges (Abbeduto et al. 2004; Estes et al. 2009; Hastings and Brown 2002; Machado Junior et al. 2016), as well as co-occurring psychiatric disorders (Zablotsky et al. 2013). Such concerns may be amplified during particular phases of the child's development; among families of TD youth, parents often experience lowered self-esteem, increased anxiety and depression, and a decline in life satisfaction when the child reaches adolescence (Steinberg 2001).

Parental Involvement in Youth with ASD

A fair amount of empirical work has focused on parenting behaviors among parents of youth with ASD (e.g., Hirschler-Guttenberg et al. 2015); the degree of parental involvement (sometimes termed "engagement") in families of youth with ASD, however, has received a dearth of attention. Parental involvement has been conceptualized in a variety of ways in the current literature, including specific types of involvement such as involvement in their child's education (Grolnick and Slowiaczek 1994). For the purposes of this study, however, parental involvement more broadly refers to behavioral and personal involvement, that is, the frequency of parent–child interactions and parental awareness of events and activities in their child's life. High levels of parental involvement may present increased opportunities for social, cognitive, and language development among youth with ASD, as evidenced by literature on TD youth. Parental involvement has been found to predict academic achievement (Froiland et al. 2013), language and cognitive development (Tamis-LeMonda et al. 2004), and competence in forming friendships (Freitag et al. 1996). Parental involvement is likely as important for youth with ASD as TD youth for a multitude of developmental processes (e.g., self-determination: Field and Hoffman 1999) and, thus, it is crucial to better understand parental child involvement in ASD.

Meeting the demands of parenting and, in particular, having an active and involved role as a parent, may be especially challenging for those parents experiencing mental illness and those parenting a child with a high degree of challenging behaviors. Literature suggests that anxiety and depression may each have unique implications for parenting behaviors for parents of TD children. For example, parents with symptoms of anxiety may be more prone to make critical statements and be less likely to encourage autonomy (Hirshfeld et al. 1997; Turner et al. 2003; Whaley et al. 1999), while parents with depression may be more likely to exhibit behaviors such as negative facial expressions, withdrawal, and ignoring (Lovejoy et al. 2000). Therefore, considering the specificity of anxious and depressive symptoms (e.g., Beck et al. 1987), these constructs are important to examine independently, especially in the context of families and parenting. Research to date has examined parenting stress, parental mental health, parenting in families of youth with ASD using a piecewise approach. No study to the authors' knowledge, however, has examined a potential pathway by which challenging behaviors of adolescents with ASD might impact parenting stress and parental mental health, and in turn influence parental involvement.

Literature on TD children suggests that stress can become pervasive throughout the family; distress may influence parental well-being and, in turn, parenting behavior. The strongest support for these processes originates from a foundational study of economic hardship and family processes, from which the family stress model (FSM) was developed (Conger et al. 1994) and has since been replicated (Conger et al. 2002). This seminal study identified a path by which economic hardship and pressure leads to parental distress and emotional problems, causing disrupted family relations (low nurturant-involved parenting) and, ultimately, issues of child adjustment. Although the original application of the FSM comes from an entirely different context (financial hardship), the same conceptual pathway by which familial challenges (raising a child with ASD) influence individual parental functioning and, in turn, parental behavior can be applied to families of children with ASD. Therefore, it is expected, but yet unknown, whether such transmission of stress may be at play among these families.

The PEERS® Intervention

Equally important to consider are avenues to thwart potential spillover of distress due to raising a child with ASD. In other words, in what ways is it possible to impede the process by which stress and tension that originates in one unit or domain of the family impacts another. Family Systems Theory poses that the family is one emotional unit with interdependent pieces; altering one facet of the family is likely to reverberate throughout the family system (Minuchin and Fishman 1981; Papero 1990). Thus, an intervention targeting adolescent social behaviors may, in turn, impact a parent's own well-being. Considering the significant role of parental anxiety and depression in family functioning (e.g., Lovejoy et al. 2000; Turner et al. 2003), these two constructs are important intervention outcomes to examine. Previous work suggests that parent-mediated interventions (e.g., psychoeducational interventions) for ASD may lead to improvements in parental well-being (Bristol et al. 1993; Tonge et al. 2006), while no work to date has examined the impact of a parent-assisted social skills intervention on parental mental health in the United States. Should the proposed pathway from adolescent behaviors to parental functioning (i.e., well-being) hold, this would provide additional rationale for examining changes in parental factors due to intervention.

A parent-assisted social skills intervention for adolescents with ASD, the Program for the Education and Enrichment of Relational Skills (PEERS®) (Laugeson et al. 2012), has been shown to improve adolescents' social skills knowledge, increase frequency of direct peer interactions, and decrease ASD symptomology (Laugeson and Frankel 2011; Laugeson et al. 2012; Schohl et al. 2014). In addition to the didactic content delivered to the adolescents, PEERS® includes a parent component: parents meet in a small group simultaneous to, but separate from the adolescents to discuss successes and challenges with the homework assignments, review the skills being taught, and plan for and troubleshoot any potential issues to arise in the coming week. Throughout the week, parents act as their child's "social coach," assisting with practice of the skills learned during PEERS® and facilitating homework completion. Parental participation is crucial for adolescents to receive the full effect of the intervention (Laugeson et al. 2015). Although the parent component of the intervention is not a formal therapeutic process group, parents often report (albeit anecdotally) that they feel supported by other parents in the group. Further, there is some evidence that PEERS® has an influence on family functioning, specifically, PEERS® was found to increase parental self-efficacy and decrease familial disruption (Karst et al. 2015), and decreases in both parental depressive and anxious symptoms were found following completion of a cultural adaptation of PEERS® in Korea (Yoo et al. 2014). Therefore, participating in PEERS® seems to provide potential benefits to the entire family system.

Study Aims and Hypotheses

The primary aim of the current study was to examine the links between challenging adolescent behaviors, parenting stress, parent mental health (i.e., anxious and depressive symptoms), and parental involvement, controlling for social skills, in a sample of adolescents with ASD. Moreover, the study sought to test a mediation analysis by which parenting stress and decreased parental mental health might be elicited by challenging adolescent behaviors and, in turn, impact parental involvement. The second aim was to investigate the malleability of parent mental health over the course of a well-validated social skills intervention for adolescents with ASD.

It was hypothesized that, controlling for social skills, (1) higher levels of challenging adolescent behaviors prior to the intervention would be predictive of higher levels of parenting stress, (2) higher parenting stress would be predictive of poorer parental mental health (anxious and depressive symptoms), and (3) poorer parental mental health would predict lower levels of parental involvement. It was also hypothesized that challenging adolescent behaviors would indirectly influence parental involvement through both parenting stress and parental mental health (Fig. 1). Regarding the second aim of the study, it was hypothesized that anxious and depressive symptoms would decrease across the intervention for the parents whose adolescents received PEERS®.

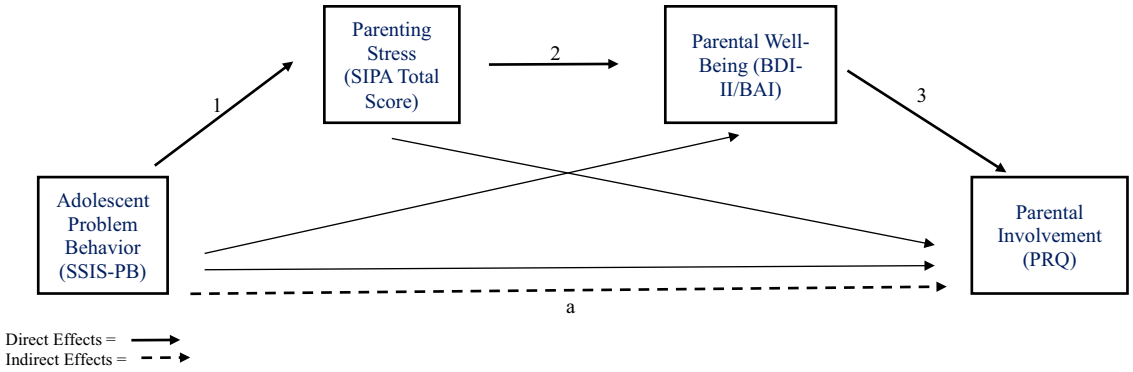

Fig. 1 Conceptual serial multiple mediator model

Method

Participants

This study represents a subsample of participants taken from a larger randomized controlled trial of the PEERS® intervention; efficacy of the intervention is not examined here. For details on recruitment and inclusionary criteria see (Schohl et al. 2014). Seventy-seven parents or guardians of adolescents with ASD completed the measures used in this study (Mothers: $n=59$; Fathers: $n=15$; Female Guardians: $n=3$—there were no male guardians in the present sample). No significant differences were found on any of the outcome variables for males versus female parents or parent versus guardian (hereafter, "parent" will be used to convey mother, father, or female guardian). Adolescents with ASD were randomly assigned to an experimental (EXP) or waitlist control (WL) group for participation in the PEERS® (Laugeson and Frankel 2011) social skills intervention. Only participants, that is, parents, with complete pretest and posttest data were included in the change-over-time analyses; 62 parents (EXP: $n=30$; WL: $n=32$) had complete BDI-II data and 66 parents (EXP: $n=32$; WL: $n=34$) had complete BAI data. Presence of ASD for the adolescent was confirmed using the ADOS-G (Lord et al. 2000), which was administered by graduate student researchers trained to research reliability within the laboratory. Demographics can be found in Table 1.

Table 1 Demographics

Variables	M	SD
Adolescent		
Age	13.58	1.46
FSIQ	99.25	18.01
Gender (% female)	18	
Race (% White)	87.0	
Ethnicity (% non-Latino)	90.9	
Parent/caregiver		
Age	46.60	4.96
Gender (% female)	80.52	
Race (% White)	88.3	
Ethnicity (% non-Latino)	90.9	
Household income (% per category)		
Under 25K	5.2	
25K–50K	14.3	
50K–75K	16.9	
75K–100K	13.0	
Over 100K	45.5	

FSIQ full-scale IQ, *K* Thousand, *M* Mean, *SD* standard deviation

Procedure

This study was approved by the IRB at Marquette University. Parents and adolescents provided informed consent upon the first research visit. Parents completed a battery of questionnaires assessing their own anxious and depressive symptoms, parenting stress, parent–child relationship, and their adolescent's challenging behaviors during the pretest research appointment. Parents completed these same measures approximately 14 weeks later (post-intervention for the EXP group). The present study involved a post-hoc analysis of previously collected data.

Intervention

The PEERS® intervention was delivered as described by the developers (Laugeson and Frankel 2011), covering topics aimed at promoting the development of social skills in adolescents with ASD; topics covered over the course of intervention are presented in Table 2. During sessions, adolescents focused upon homework completion, received information during the didactic lesson, observed and assessed social interactions during role plays, and practiced skills during behavioral rehearsals. Parents discussed homework completion, troubleshot any challenges, and reviewed

Table 2 PEERS® sessions and associated content Reprinted with permission of the authors

Session	Didactic
1	Introduction and conversational skills I: trading information
2	Conversational skills II: two-way conversations
3	Conversational skills III: electronic communication
4	Choosing appropriate friends
5	Appropriate use of humor
6	Peer entry I: entering a conversation
7	Peer entry II: exiting a conversation
8	Get-togethers
9	Good sportsmanship
10	Rejection I: teasing and embarrassing feedback
11	Rejection II: bullying and bad reputations
12	Handling disagreements
13	Rumors and gossip
14	Graduation and termination

didactic information complementary to that delivered to the adolescents. For more details on the delivery of PEERS® at Marquette University, please see (Schohl et al. 2014).

Measures

Social Skills and Challenging Adolescent Behaviors

The Social Skills Improvement System-Rating Scales (SSIS-RS; Gresham and Elliott 2008) is a 75-item scale with two total scores: Social Skills and Competing Problem Behaviors (CPB). The Social Skills scale (46 items) measure social skills, and the Competing Problem Behaviors scale (33 items) measures difficult behaviors that compete with, or get in the way of, appropriate social functioning. The CPB scale covers a broad range of potential problematic behaviors including those that involve internalizing, externalizing, and other behavioral difficulties. An example item from the Competing Problem Behaviors scale is, "Has temper tantrums" (Gresham et al. 2010). The measure has been shown to have high internal consistency, test–retest reliability, and validity (Gresham et al. 2011). The SSIS-RS has been used extensively in studies of children with ASD (Anagnostou et al. 2015; Antshel et al. 2011; Frankel and Whitham 2011). Internal consistency for the Competing Problem Behaviors scale was excellent (α = ..91) and the Social Skills scale was excellent (α = .92) for the current study.

Parenting Stress

The Stress Index for Parents of Adolescents (SIPA; Sheras et al. 1998) is a 90-item questionnaire intended for use with parents of adolescents ages 11–19 that identifies areas of stress in parent–adolescent interactions. It shows strong test–retest reliability and good validity (Sheras et al. 1998). Additionally, the SIPA has been shown to be valid in samples of parents of adolescents with ASD (Ozonoff et al. 2005). The total score was used in this study; internal consistency was excellent (α = .95).

Parental Mental Health

Beck Depression Inventory Parents completed the Beck Depression Inventory, second edition (BDI-II; Beck et al. 1996) as a measure of their own depressive symptoms at pretest and posttest. The BDI-II is a 21-item self-report measure of depressive attitudes and symptoms among adults that uses a Likert scale from 0 to 3. Scores from 0 to 13 indicate minimal depressive symptoms, scores from 14 to 19 indicate mild depression, scores from 20 to 28 indicate moderate depression, and scores from 29 to 63 indicate severe depression. An example asks about loss of energy, with answer choices, "I have as much energy as ever," "I have less energy than I used to have," "I don't have enough energy to do very much," or "I don't have enough energy to do anything" (Beck et al. 1996). Total scores on the BDI-II are calculated by summing the Likert responses. The measure is widely used and has been shown to demonstrate strong internal consistency for both clinical and nonclinical populations and good validity (Dozois et al. 1998). Internal consistency on the BDI for the present study was excellent (α = .93).

Beck Anxiety Inventory The Beck Anxiety Inventory (BAI; Beck and Steer 1990) is a 21-item self-report measure of one's own anxious symptoms. This measure was completed by the parents before and after the intervention. The BAI uses a Likert scale from 0 to 3, where 0 is "Not at all" and 3 is "Severely—it bothered me a lot" to rate how much participants have experienced distress pertaining to anxious symptoms during the past month. Scores from 0 to 9 indicate minimal anxiety, scores from 10 to 16 indicate mild anxiety, 17–29 indicate moderate anxiety, and scores from 30 to 63 indicate severe anxiety. An example item is, "Fear of worst happening" (Beck and Steer 1990). Total scores on the BAI are calculated by summing the Likert responses. This measure is commonly used and has been found to have good reliability and validity in both psychiatric (Beck et al. 1988) and non-psychiatric samples (Creamer et al. 1995). Internal consistency on the BAI for this study was good (α = .87).

Parental Involvement

The Parenting Relationship Questionnaire (PRQ; Kamphaus and Reynolds 2006) is a brief-report measure that captures the parent–child relationship. It is a 71-item scale for use with parents of youth ages 6–18 years (Kamphaus and Reynolds 2006). Although this measure has yet to be

validated in families of youth with ASD, studies have demonstrated that this measure has strong internal reliability and content validity (Hurley et al. 2014), as well as good convergent validity with the Parent–Child Relationship Inventory (Rubinic et al. 2010), and has been previously used in studies of children with developmental disabilities (Lewallen and Neece 2015; Wilkes-Gillan et al. 2017). The measure has seven subscales; only the Involvement subscale (8 items), which measures frequency of parent–child interactions and the parent's knowledge of the child's activities, was used in this study (Kamphaus and Reynolds 2006). An example of item from this subscale is, "My child and I do work on projects together." Internal consistency for the present study was good (α = .83) for the Involvement subscale.

Statistical Analysis

Serial Multiple Mediator Model

Serial multiple mediator models were carried out using PROCESS for SPSS version 2.16.3 (Hayes 2013) in SPSS version 24.0 (IBM Corp. 2016). This approach uses bootstrapping to estimate parameters, which is particularly well suited for small samples. All variables in the mediator models were from Pre-intervention. These analyses examined direct effects from: (1) challenging adolescent behaviors to parenting stress, (2) parenting stress to parental mental health, and (3) parental mental health to parental involvement; separate models were analyzed for depressive and anxious symptoms (i.e., separate constructs of parental mental health) (Fig. 1). Additionally, the models tested the indirect effect from challenging adolescent behaviors to parental involvement through parenting stress and parental mental health (Fig. 1).

Change-Over-Time Analysis

Change-over-time analyses were conducted using SPSS version 24.0 (IBM Corp. 2016). Repeated Measures ANOVAs were used to test group (EXP vs WL) by time (pretest vs posttest) interactions for both anxious and depressive symptoms. Exploratory follow-up paired-samples *t* tests with Bonferroni corrections were employed to examine changes from pretest to posttest within each Group (EXP and WL).

Results

Data were screened for normality and univariate outliers; one outlier (1.61%) on the pre-test BDI-II and one outlier (1.51%) on the post-test BAI were Winsorized to the next highest value (BDI-II 36–32; BAI 32–23). All data were within normal limits following Winsorizing. It was determined that the assumptions of regression were met. Descriptive statistics can be found in Table 3.

Parental Depressive Symptoms

Figure 2 displays the findings for the model that included parental depressive symptom; parameter estimates in this model are unstandardized. Challenging adolescent behaviors were a robust predictor of parenting stress (β = 1.69, SE = 0.43, $p < 0.01$), controlling for social skills, which jointly explained 47.8% of the variance in parenting stress; $F(2, 66) = 30.18$, $p < 0.001$. Parenting stress, in turn, was positively related to parental depressive symptoms (β = 0.09, SE = 0.02, $p < 0.001$), controlling for challenging adolescent behaviors and social skills; 22.5% of the variance in parental depressive symptoms was explained by these predictors; $F(3,65) = 6.27$, $p < 0.01$. Parental depressive symptoms were negatively related to parental involvement (β = − 0.16, SE = 0.08, $p = 0.05$), controlling for challenging adolescent behaviors, social skills, and parenting stress; 15.3% of the variance in parental involvement was explained by these predictors $F(4,64) = 2.90$, $p = 0.02$. Additionally, there was evidence of a significant indirect effect from challenging adolescent behaviors to parental involvement through parenting stress and parental mental health [β = − 0.02 (CI − 0.08, − 0.01)].

Parental Anxious Symptoms

Figure 3 depicts the findings for the model including parental anxious symptoms; parameter estimates in this model are unstandardized. The relation between challenging adolescent behaviors and parenting stress, controlling for social skills, was the similar to the previous model for parental depressive symptoms, such that challenging adolescent behaviors positively predicted parenting stress (β = 1.63, SE = 0.42, $p < 0.01$) and jointly explained 47.13% of the variance in parenting stress; $F(2, 70) = 31.20$, $p < 0.001$. Parenting stress was positively

Table 3 Variables in mediation model

Variables	M	SD	Range
BDI-II total score (pretest)	6.63	6.48	0–29
BAI total score (pretest)	4.53	5.11	0–24
SIPA total score (pretest)	212.76	40.23	140–323
PRQ Involvement subscale (pretest)	11.13	3.82	4–19
SSIS-RS Competing Problem Behaviors subscale (pretest)	153.00	9.15	116–160

BDI-II, Beck Depression Inventory-II, *BAI* Beck Anxiety Inventory, *SIPA total score* stress index for parents of adolescents total score, *PRQ* Parenting Relationship Questionnaire, *SSIS-RS* social skills improvement system-rating scales, *M* Mean, *SD* standard deviation

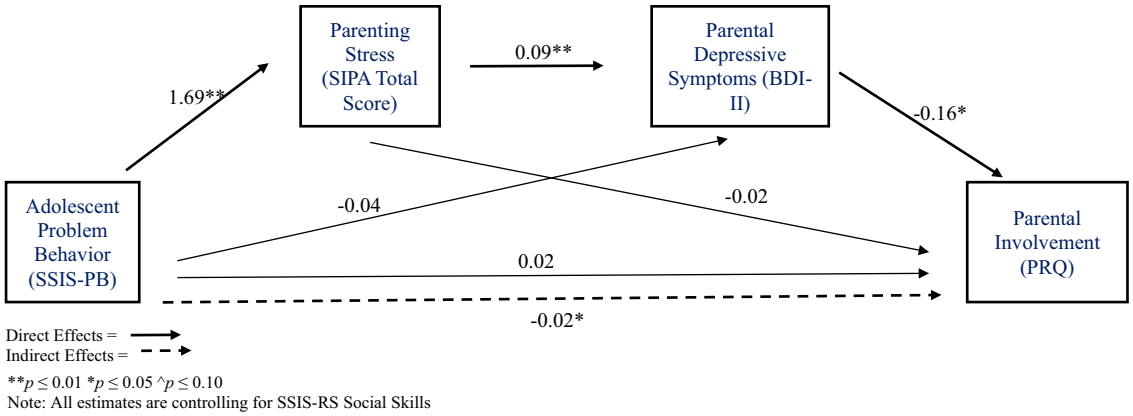

Fig. 2 Serial multiple mediator model results for parental depressive symptoms

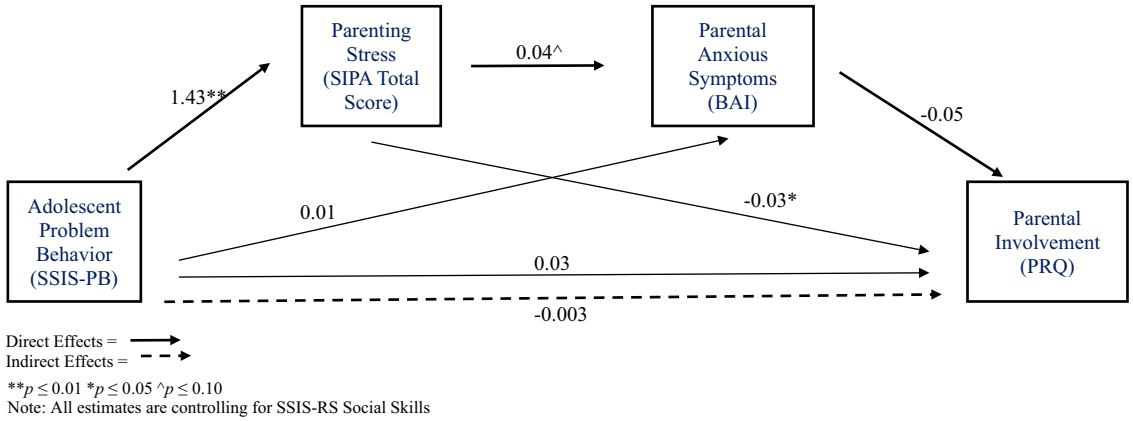

Fig. 3 Serial multiple mediator model results for parental anxious symptoms

related to parental anxious symptoms (β = 0.04, SE = 0.02, $p = 0.07$), controlling for challenging adolescent behaviors and social skills; 8.8% of the variance in parental anxious symptoms was explained by these predictors; $F(3,69) = 2.71$, $p = 0.09$. Unlike the model for parental depressive symptoms, and contrary to the study hypothesis, however, there was no effect of parental anxious symptoms on parental involvement (β = − 0.05, SE = .0.09, p = ns), controlling for parenting stress, challenging adolescent behaviors and social skills. Alternately, there was a significant negative effect of parenting stress on parental involvement (β = − 0.03, SE = 0.01, $p = 0.02$) controlling for challenging adolescent behaviors, social skills, and parental anxious symptoms. Although the indirect effect from challenging adolescent behaviors to parental involvement through both parenting stress and parental anxious symptoms was non-significant, there was evidence for mediation in the relation between challenging adolescent behaviors to parental involvement through parenting stress [β = − 0.06 (CI − 0.11, − 0.02)].

Change-Over-Time Analyses

The group by time interaction was non-significant ($F(1,60) = 2.64$, $p = 0.11$, partial $\eta^2 = 0.04$) for parent self-report of depressive symptoms on the BDI-II. Exploratory analyses via paired-samples t tests with Bonferroni corrections, however, showed a marginally significant decrease from pretest ($M = 7.93$; SD = 6.78) to posttest ($M = 5.72$; SD = 5.66) for the EXP group ($t(29) = 2.07$, $p = 0.09$), while no significant change was evident in the WL group (Pre: $M = 6.45$, SD = 6.84; Post: $M = 7.01$, SD = 9.35); $t(31) = -0.49$, $p > 0.99$).

The group by time interaction was non-significant ($F(1,64) = 0.88$, $p = 0.35$, partial $\eta^2 = 0.01$) for parent self-report of anxious symptoms via the BAI. Similarly, exploratory analysis via paired-samples t tests with Bonferroni corrections showed no significant changes in either the EXP (Pre: $M = 5.44$, SD = 5.65; Post: $M = 4.31$, SD = 4.08); $t(31) = 1.39$, $p = 0.36$) or WL (Pre: $M = 4.41$,

SD = 5.10; Post: $M = 4.50$, SD = 5.44); $t(33) = -0.09$, $p > 0.99$) group across time.

Discussion

Findings from the present study provide support for the hypothesis that stress related to adolescent challenging behaviors is associated with heightened parental depressive symptoms and, in turn, decreased parental involvement. This study provides support for a potential pathway between challenging adolescent behaviors and lesser parental involvement via heightened parenting stress and parental depressive symptoms.

In relation to parental anxious symptoms, however, findings were less clear, as the link from parental anxious symptoms to parental involvement was not evident. Thus, only portions of the hypothesis for parental involvement were supported. Alternately, a direct relation between parenting stress and parental involvement was evident above and beyond challenging adolescent behaviors and parental anxious symptoms. This seems to suggest that, while parental anxious symptoms may be influenced by the stress of coping with challenging adolescent behaviors, anxious symptoms do not seem to impact parental involvement. It might be that parents with anxiety present with two divergent forms of parenting behaviors: parents may exhibit intrusive behaviors or, conversely, display detached behaviors, depending upon the manifestation of anxiety. The possible presentation of alternate forms of parenting elicited by anxious symptoms would eliminate the ability to detect associations between anxiety and parental involvement.

Managing challenging adolescent behaviors appears to be a source of stress for parents of youth with ASD. The presence of behaviors such as aggression may increase the need for, and expectation of, additional parental supports. If such expectations are not completely met, current theory suggests that this process would elicit significant parenting stress. Experiencing prolonged periods of heightened stress levels may result in depletion of parental mental health. When mental health challenges present as depressive symptoms, the likelihood of engaging in activities together decreases as well, perhaps as a result of decreased motivation to pursue activities of interest. This is particularly problematic for parents of adolescents with ASD who may themselves lack intrinsic motivation to engage in activities or socialization opportunities. Identifying potential sources of decreased parental involvement has important implications, as increased parental involvement likely provides opportunities for the cultivation of positive social, emotional, academic, and behavioral outcomes.

The differential findings in the association between anxious versus depressive symptoms and parental involvement might be related to the core distinctions between the presentation of these psychological difficulties. For example, a core symptom of depression is lack of energy and motivation (APA 2013), while anxiety is characterized by excessive worry and physiological arousal (APA 2013). It is clear how feelings of lethargy might impede caregivers' engagement in parental activities with their child. Anxiety, however, may manifest as over-arousal or rumination, which may not prevent engagement with the adolescent unless the anxiety was specific to parenting interactions. Additionally, these findings may be related to the specific components of anxiety that the BAI measures; the BAI asks mostly about physiological symptoms, with only a few questions about worry, and does not assess for rumination (Beck and Steer 1990).

Regarding the second aim of the study, there was very modest evidence to support the hypothesis that parental depressive symptoms, but not parental anxious symptoms, may have demonstrated sensitivity to a parent-assisted intervention. However, it is imperative that these results are interpreted with caution, considering the non-significant interaction term in the RM-ANOVA, marginally significant changes over time, and overall low mean scores in the BDI. Potential changes in parental depressive symptoms might be related to support from the other parents in the group and/or observing their adolescent's success in improving social skills and forming friendships. These potential mechanisms may have been operating in the current sample; considering the relatively low mean scores on the BDI, however, it would be fruitful to examine these indices and processes in a more severely depressed sample of parents. Nevertheless sub-threshold depressive manifestation can be associated with significant distress and dysfunction (Lewinsohn et al. 2000). Even though the mean level was within the subclinical range, our sample still displayed variability on the BDI-II with some participants in the mild to moderate range.

The clear lack of improvements in parental anxious symptoms might also be explained by the relatively low scores on the measure prior to the intervention. The average BAI score at pretest was 5.44, which falls in the "minimally anxious" range clinically, thus, there was little room for improvement on these scores on a mean level. It might also be that parental anxious symptoms are not reduced immediately following PEERS® because of the inherent structure of the intervention itself. The PEERS® intervention facilitates adolescent engagement in social encounters that are generally out of their comfort zone; parents may feel apprehensive about these new occurrences. It may take time for parents to feel comfortable with their adolescent attempting new social interactions, especially if such interactions had been unsuccessful prior to intervention. Further, there is hope that the high level of parent involvement necessary to facilitate successful interactions during and shortly after the PEERS intervention will eventually be less essential. Over time, it

is possible that parents may experience reduced anxiety as they are less directly involved in managing their adolescent's social engagements.

Overall, the implications of this study highlight the importance of approaching intervention for adolescents with ASD from a familial perspective. The specific implications are twofold. First, as stress may become pervasive throughout the family, in turn, impacting parenting behavior, parenting stress and parental mental health should be a focus of intervention. Second, in aiming to reduce parenting stress, addressing both direct and indirect avenues might be most effective, such that intervention targeting adolescent behavior may improve parental mental health, which might be bolstered even more through direct intervention with parents.

Although this study found evidence to support the mediational path from challenging adolescent behaviors to parental involvement through parenting stress and parental depressive symptoms, it is important to recognize that the data analyzed in the serial multiple mediator models were not longitudinal, and thus, limit the ability to make causal claims or deterministic statements; temporal ordering of variables was theoretically driven. Further, the current analytic approach assumes error-free measurement of our observed variables. Additionally, these most of these measures have yet to be validated in an ASD sample and were only self-report. The inherent issue with self-report is the potential of social desirability bias (Van de Mortel 2008). Perhaps parents were apprehensive to report extreme symptoms of either anxiety or depression prior to treatment due to fear of judgement. Relatedly, parents in this sample reported mean levels below the clinical cutoff on anxious and depressive symptoms and, thus, these findings may not be generalizable to more severely anxious or depressed parents. Further, this study investigated degree of parental involvement but did not measure specific child rearing practices or quality of parental involvement; quality of parenting behaviors, such as the degree of sensitivity and warmth, have important implications for child adjustment (e.g., Deater-Deckard 2000; Repetti et al. 2002). Similarly, challenging adolescent behaviors included internalizing, externalizing, and hyperactivity, among others and, thus, this study did not distinguish which behaviors were the most influential. This study did not include a treatment as usual control or treatment comparison group; therefore, it cannot be concluded that these findings are specific to PEERS®. Finally, the sample of the study was limited in terms of racial and ethnic diversity, as well as SES, therefore, findings may not fully capture the experiences of all families of youth with ASD. Further, the sample was limited to those who were willing and able to participate in a 14-week long intervention program; perhaps parents with extreme mental health challenges or limited resources are less likely to participate and thus not adequately represented in our sample. These limitations hinder the generalizability of the findings.

To address some of the limitations of the current study, in particular the issues inherent in self-report, future work may benefit from the use of observational methods in conjunction with both parent and adolescent report of these constructs. Further, research has shown important connections between the broader autism phenotype and depression (Ingersoll and Hambrick 2011) and, thus, investigating individual differences among parents in terms of the broader autism phenotype and how this may alter the experience of parenting stress and parental involvement may also be important. Additionally, future work should seek to investigate quality of parental involvement and consequences of differential levels of parental involvement and to piece apart any potential differential influences of specific challenging adolescent behaviors (internalizing, externalizing, hyperactivity, etc.) in the context of family relations. The marital relationship likely plays a key role in familial functioning, and thus examination of marital and parenting dynamics in tandem may provide deeper insight into these processes. Lastly, investigating these associations among a more diverse sample with a wider range of SES, as well as cognitive abilities in both parent and their child would be fruitful for future work.

This study presents a potential mediational pathway through which parenting stress may impact parental involvement in families of youth with ASD, in addition to providing promising evidence that an intervention targeting adolescent social skills, such as PEERS®, may lead to improvements in parental depressive symptoms. Thus, this study illustrates the importance of considering the entire family system in research on youth with ASD.

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Author Contributions HS conceived of the study, participated in delivery of the intervention, conducted the statistical analyses and interpretation of the data, and drafted the manuscript; AM participated in the delivery of the intervention and data acquisition, assisted with interpretation of the data, and revised the manuscript; BM assisted in conducting statistical analysis, interpretation of the data, and revised the manuscript; BD, KW, SP, JK, and AC participated in the delivery of the intervention and data acquisition; CC and EV participated in the delivery of the intervention; AVVH assisted in the conception, design,

and coordination of the study, reviewed the statistical analyses and interpretation of the data, and revised the manuscript. All authors read and approved the final manuscript.

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Compliance with Ethical Standards

Conflict of interest Hillary K. Schiltz declares that she has no conflict of interest. Alana J. McVey declares that she has no conflict of interest. Brooke Magnus declares that she has no conflict of interest. Bridget K. Dolan declares that she has no conflict of interest. Kirsten S. Willar declares that she has no conflict of interest. Sheryl Pleiss declares that she has no conflict of interest. Jeffrey Karst declares that he has no conflict of interest. Audrey M. Carson declares that she has no conflict of interest. Christina Caiozzo declares that she has no conflict of interest. Elisabeth Vogt declares that she has no conflict of interest. Amy Vaughan Van Hecke declares that she has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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