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# Socio-Emotional Adjustment in Couples with Children with Autism Spectrum Disorder: Dyadic and Individual Effects of Problem Behavior in Mothers and Fathers

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# SOCIO-EMOTIONAL ADJUSTMENT IN COUPLES WITH CHILDREN WITH AUTISM SPECTRUM DISORDER: DYADIC AND INDIVIDUAL EFFECTS OF PROBLEM BEHAVIOR IN MOTHERS AND FATHERS

By

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The prevalence of autism spectrum disorder (ASD) has seen a sharp rise in recent years, with as many as 1 in 68 children affected by ASD. While the impact of caring for a child with ASD is individualized and varied, the lifelong and pervasive nature of the disorder may put parents at risk for negative outcomes. Previous research with this population suggests that problem behavior associated with autism is one factor that may be related to adverse outcomes among parents. The present study aimed to elucidate the individual and dyadic experiences of parents of children with ASD using the Actor-Partner Interdependence Model. Results revealed that self-reported perceptions of ASD-related problem behavior, positive affect, and negative affect were highly concordant within couples, suggesting interdependence within the family unit. Additionally, the individual or intrapersonal effects of ASD-related problem behavior were associated with parental negative affect, but not positive affect. No gender differences emerged. Exploratory analyses examining dyadic or interpersonal effects were not significantly associated with positive or negative affect. These associations did not vary as a function of child age. Lastly, exploratory analyses found that discrepancies in ASD-related problem behavior was associated with paternal negative affect, but not maternal negative affect, maternal positive affect, or paternal positive affect. This research adds to the existing literature examining functioning within families, highlighting the importance of

also examining positive aspects of parent functioning. Implications for family-focused interventions are discussed.

## DEDICATION

This dissertation work and entire journey is dedicated to my amazing, strong, warm, hilarious, and incredibly resilient mother.

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## Chapter 1

## Introduction

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder characterized by persistent qualitative impairments in reciprocal social communication and interaction, as well as the presence of restricted and repetitive behaviors, interests, or activities (American Psychiatric Association, 2013). The prevalence of autism spectrum disorder has seen a sharp rise in recent years, with as many as 1 in 68 children affected by ASD (Autism and Developmental Disabilities Monitoring (ADDM) Network: Census, 2013). ASD symptoms are pervasive in nature, presenting in early childhood and generally continuing throughout the lifespan. Consequently, raising a child with ASD may present unique challenges affecting all members of the family, particularly parents (Duarte, Bordin, Yazigi, & Mooney, 2005). Challenges include socio-emotional adjustment following an initial diagnosis, navigating the complex medical, education, and mental health service-delivery systems, and the increased financial burden to accommodate necessary services (Ludlow, Skelly, & Rohleder, 2011). Despite overarching common themes for parents raising children with autism, the impact of caring for a child with autism spectrum disorder is individualized and quite varied. While there is extensive and longstanding research reporting high levels of stress and depression among parents of children with ASD (*see review* Karst & Van Hecke, 2012), not all families report feeling stressed (Sharpley, Bitsika, & Efremidis, 1997) and some actually report benefits to their families (e.g., Ekas, Timmons, Pruitt, Ghilain, & Alessandri, 2015, Hastings & Taunt, 2002; Myers, Mackintosh, & Goin-Kochel, 2009; Risdal & Singer, 2004). Despite discrepancies in the literature, most studies point to negative effects secondary to the lifelong and pervasive nature of the disorder which

likely creates greater risk for parents to experience high levels of stress and a host of other negative outcomes.

*Family Systems Theory.* The socio-emotional impact of having a child with ASD in the family is substantial, affecting immediate family members (i.e., parents and siblings), as well as extended family systems, which is consistent with family systems theory. This theory posits that families are complex, interdependent systems whereby interactions among individuals within the family unit are dynamic in nature, affecting individual and whole family functioning (Minuchin, 1985). Thus, if family members experience a shared stressor, each individual may likely affect each other's psychological adjustment. For example, siblings of children with ASD reportedly have had more emotional and behavioral problems, as well as fewer prosocial behaviors, than siblings of typically developing or other developmental disorders (Fisman, Wolf*,* Ellison, *&* Freeman, 2000; Petalas, Hastings, Nash, Lloyd, & Dowey, 2009). High levels of experienced parental stress may yield cascading effects on relationships and functioning within the family system, including secondary effects, such as exacerbating child problem behavior in young children (Crnic, Gaze, & Hoffman, 2005) or diminishing effective parenting behaviors, such as limit setting, communication, and parent involvement (Osborne & Reed, 2010).

As the prevalence rate of ASD rises, understanding parental functioning and factors that may be associated with parental stress across child development may help families cope and adapt to the unique challenges they may encounter. Furthermore, while existing research has examined individual parental well-being (i.e., maternal or paternal functioning; *see review* Karst & Van Hecke, 2012) among parents of children with ASD,

little research has examined well-being within mother-father dyads from the same family or potential dyadic effects on parental functioning.

*Core Autism Symptomatology and Associated Problem Behavior.* Significant research has focused on the relationship between core autism symptomatology severity (e.g., lack of eye contact, echolalia, restricted and repetitive behaviors), and individual parental adjustment, as measured by parental stress and affective outcomes. For example, core autism symptomatology severity has been associated with greater psychological distress and depression among parents of children with ASD (e.g., Abbeduto, Seltzer, Shattuck, Krauss, Orsmond, & Murphy, 2004, Ingersoll & Hambrick, 2011, Lyons, Leon, Phelps, & Dunleavy, 2010). Children with ASD may also present with other atypical behaviors, not central to the diagnosis, but commonly observed and likely challenging to manage and impactful on families. These associated behavior problems are generally thought to be linked to core symptoms (e.g., temper tantrums resulting from social-communication deficits) and may yield increased distress for families. Common problem behavior among children with ASD, include atypical eating, such as limited food preferences, dysregulated sleep patterns, temper tantrums, and self-injurious behaviors (Dominick, Davis, Lainhart, Tager-Flusberg, & Folstein, 2007). Furthermore, other problem behavior, such as physical aggression towards others and difficulty transitioning from one activity to the next, may get in the way of attaining developmental goals in social skills and academic goals, as well as contribute to negative parent-child interactions. Accordingly, negative interactions may result in increased pressures in parenting demands, as well as decreased parent efficacy (Osbourne & Reed, 2010), which could contribute to increased risk for negative affect. Collectively, problem behavior may

have a cyclic effect on stress and negative emotionality in families with children with ASD, whereby parental stress may exacerbate problem behavior, and problem behavior may exacerbate parental stress and negative affective symptoms (e.g., anxiety and depression) (Baker et al., 2003).

*Individual Parental Functioning***.** Individual adjustment among parents of children with ASD, developmental delays, and those who are neurotypical has been widely researched. While some studies have documented positive outcomes, such as life and spiritual enrichment, positive emotions, and greater relationship satisfaction (e.g., Myers, Mackintosh, & Goin-Kochel, 2009; Lickenbrock, Ekas, & Whitman, 2011; Risdal & Singer, 2003), much of the literature documents that parents of children with ASD experience elevated levels of parenting stress and affective difficulties, compared to parents of other types of developmental delays or parents of typically developing children (e.g., Duarte et al., 2005; Gau et al., 2012; Olsson & Hwang, 2001; Shieve et al., 2011). Furthermore, most studies seem to suggest particularly adverse outcomes for mothers raising a child with ASD (*see review* Karst & Van Hecke, 2012; Tint & Weiss, 2016), whereas empirical data on the experience of fathers raising children with ASD is much more limited and poorly understood. In one of the few studies to examine paternal adjustment of children with developmental disabilities, Hartley and colleagues (2012) found that 135 fathers of adolescents with ASD reported greater levels of depressive symptoms than fathers of adolescents with Down syndrome or Fragile X syndrome. However, compared to parents of children with ASD, previous research suggests wide-ranging paternal experiences, with some reporting elevated levels of parental stress

(Epstein et al., 2008; Hastings et al., 2005) and others reporting low levels of psychological distress (Olsson & Hwang, 2001).

*Gender Differences in Studies with Non-Dyadic Mothers and Fathers.* Gender differences in psychological adjustment and well-being have emerged in studies including non-dyadic mothers and fathers of children with ASD. Among non-dyadic mothers and father of preschool children with ASD, most of the research suggests that mothers, in general, experience more distress than fathers of preschool children with ASD (e.g., Dabrowska & Pisula, 2010). Among non-dyadic parents of school-aged children with ASD, the results revealed similar patterns for mothers, but were not conclusive for fathers of children with ASD. Allik, Larsson, and Smedge (2006) found that mothers reported lower quality of life, poorer health, and fatigue compared to fathers of school-aged children. Similarly, Tehee and colleagues (2009) found that 19 fathers experienced less parental stress than 23 mothers of children and adolescents (age range = 3 – 18 years; mean age = 9.3 years, *SD* = 4.5). In contrast, Epstein and colleagues (2008) found that 38 mothers and 24 fathers of school-aged children reported elevated and comparable levels of stress.

Aside from examining similarities and differences in functioning among parents, understanding potential sources of stress for mothers and fathers is also clinically valuable. Among toddlers and preschool children, emotional and behavioral problems (externalizing and internalizing) predicted elevated stress in mothers of children with autism as compared to mothers of children with other developmental delays (Eisenhower, Baker, & Blacher, 2005) and fathers of toddlers with ASD (Herring, Gray, Taffe, Tonge, Sweeney, & Einfeld, 2006). Among school-aged children with ASD, maternal quality of

life and mental health was related to child behavior problems, including hyperactivity and conduct problems (Allik, Larsson, & Smedje, 2006), while paternal quality of life and mental health were not associated with problem behavior. Lecavalier and colleagues (2006) also found that behavior problems, specifically conduct problems, were related to parental stress among mothers of children and adolescents with ASD ($M_{age}$= 9 years, *SD* = 3.4; range 3-18). In addition to broad-band measures of problem behavior (e.g., externalizing or internalizing problems), prior research has also examined common problem behavior seen in children with ASD (e.g., sleep difficulties, sensory difficulties). For example, Epstein et al. (2007) found executive dysfunction and sensory difficulties significantly associated with maternal but not paternal functioning, despite comparable levels of reported stress among mothers and fathers of school-aged children with ASD. Overall, when examining non-dyadic pairs of mothers and fathers, mothers consistently appear to be more affected by child problem behavior. It is not surprising considering that previous research has proposed that mothers often fulfill the role as the primary caretaker (e.g., Gray, 2003; Tehee et al., 2009).

*Functioning Among Mother-Father Dyads.* Historically, mothers have been the primary informants in studies of child and family development. Nevertheless, the involvement of fathers has been recognized as integral in understanding the dynamics within a family (Parke, 2002). Thus, including multiple informants within the same family (i.e., mothers and fathers) allows for a greater understanding of the family system. In addition, as a child with ASD matures, perceived problem behavior may vary and the demands related to caring for a child with ASD may shift and evolve within families. As the demands evolve, the parent's ability to adapt and make accommodations may reflect

unanticipated changes in parental well-being and outcomes. Accordingly, prior research has revealed mixed results in parent functioning among mother-father dyads with respect to changes in child development in children with ASD.

In one of the few studies examining perceptions of problem behavior and functioning within dyadic couples among families with children with ASD, Davis and Carter (2008) found that 54 married/cohabitating mother-father dyads of toddlers (mean age = 26.9 months) had highly concordant perceptions of problem behavior (e.g., internalizing, externalizing, dysregulation), and comparable levels of stress (e.g., anxiety and depressive symptoms). Similarly, in a sample of preschool children with ASD, Hasting and colleagues (2005) found that maternal and paternal (41 dyadic pairs) perceptions of autism symptoms and problem behavior were significantly and positively correlated ($r$ = .58, $r$ = .74, respectively). However, in the same study, mothers of preschool children with ASD reported more negatively affective symptoms (e.g., depressive symptoms) than fathers (Hastings et al., 2005). Likewise, in a study of 18 married couples of school-aged children and adolescents with ASD (mean = 11.8 years), Hastings (2003) found that mothers reported higher levels of anxiety than fathers. Although the above studies consistently found similar ratings of problem behavior between mothers and fathers in the same family unit, Davis and Carter (2008) uncovered difference sources of stress among parents of preschool children with ASD. Davis and Carter (2008) found that maternal stress was related to regulatory problems (e.g., problems in eating, sleeping, emotion regulation), whereas paternal stress was associated with externalizing behaviors. This information is pertinent to gaining greater

understanding of the unique stressors for parents within the same family, and also provides a roadmap to tailor resources and if necessary, treatment, for each parent.

*Dyadic Effects.* In addition to gaining a greater understanding of similarities and differences between mothers' and fathers' experiences in both perception of problem behavior and socio-emotional adjustment, parent experiences are interdependent in nature, thus, it may be useful to closely examine potential dyadic effects between spouses. Prior research supports that significant life events, which may be stressful, affect the well-being of partners, as well as the quality of marriage (Cohan & Bradbury, 1997). Yet, there is limited literature examining the association between one's perception of problem behavior and the relationship to the partner's adjustment. There is only one published study that examined interpersonal effects of parent perceptions of child behavior among children with ASD and the relationship with their partner's level of stress. Hastings and colleagues (2005) found that paternal ratings of behavior problems were positively correlated with both their own and their partners' reported stress, while maternal ratings of behavior problems were only correlated to their own stress. These results suggest the importance of examining potential interpersonal or dyadic effects of perceptions of problem behavior as these insights may yield more effective clinical interventions.

*Informant Discrepancy Scores.* Parent experiences within a family system are expected to be related to one another, suggesting dyadic mutuality; however mothers and fathers may still report differences in perceptions of child problem behavior. The extent to which perceptions are similar or discrepant, may also be uniquely related to maternal and paternal adjustment, which could hinder effective co-parenting abilities. Informant

discrepancies are often examined by comparing how two informants rate the same child (De Los Reyes & Kazdin, 2005). Furthermore, De Los Reyes and Kazdin (2005) proposed an attribution bias context (ABC) model in understanding informant discrepancies, whereby informant attributions of the causes of child behavior and informant perspectives regarding the necessity of child treatment may lead to discrepancies in reported child behavior. Thus, informant discrepancies may give us a better understanding of the extent to which parents agree or disagree in understanding the causes of a child's misbehavior and if that behavior warrants treatment. Moreover, informant discrepancies have been found to be related to parent, child, and family functioning (De Los Reyes & Kazdin, 2005). For example, several studies have found a positive relationship between informant discrepancies and parental stress and child acceptance (e.g., Kolko & Kazdin, 1993).

While informant discrepancies between parent – child and parent – teacher is a more common area of research (De Los Reyes & Kazdin, 2005), the relationship between psychological functioning and informant discrepancies among parent dyads has been less studied. Only one study to date was found that examined the relationship between informant discrepancies among parents of children from a nonclinical population and parent psychological functioning (Treutler & Epkins, 2003). Treutler and Epkins (2003) found that informant discrepancies in problem behavior between mothers and fathers of children from a nonclinical population were associated with both maternal and paternal psychological distress (measured by the presence of a broad range of psychological symptoms, e.g., somatization, depression, anxiety). It was posited that parent psychological symptoms may be contributing to the discrepancies in ratings of problem

behavior. An alternative hypothesis could be that discrepancies in ratings of problem behavior may be indicative of underlying family conflict or lack of communication between parents, which could plausibly contribute to maladaptive psychological symptoms. It is possible that discrepancies in perceptions of problem behavior between parents of children with ASD may also unfold in a similar way noted above. Therefore, examining the discrepancies in perceptions in their child's behavior may reveal another area of intervention for these families. Furthermore, greater understanding into whether discrepancies serve as a potential protective or perhaps exacerbating factor and for whom, would offer more insight into the complex dynamic relationships within families of children with ASD.

**Limitations of Previous Research**

Much of the research in families of children with ASD focuses on the individual functioning of mothers, as most studies include only mothers or predominantly consist of mostly female participants (Tint & Weiss, 2016). Furthermore, few studies have examined perceptions of problem behavior commonly associated with ASD among dyads that include both mothers and fathers within the same family system. Thus, the current study recruited 124 married/cohabitating mother-father dyads to gain more insight into the individual and dyadic maternal and paternal experience.

Previous studies revealed that most studies incorporating the paternal perspective included small samples, or remarkably unequal comparison groups of mothers and fathers. As a result, empirical data on fathers of children with ASD is notably limited and consequently, their experiences remain poorly understood (Flippin & Crais, 2011; Tint & Weiss, 2016). The current study attempted to address this limitation by recruiting a larger

number of fathers to add to the existing, albeit sparse, literature on the paternal experience of having a child with ASD.

Several methodological shortcomings also existed in the research on the socio-emotional adjustment among mothers and fathers of children with ASD. First, the majority of studies have employed general group study designs. Use of general group designs limits the ability to capture the interdependence of parent perceptions and adjustment. Additionally, failing to account for the interdependence between mothers and fathers experiences may result in statistically biased testing (e.g., increased risk of finding effects that are not true effects due to liberal statistical tests). The current study is among the first to examine parent perceptions and adjustment using the Actor-Partner Interdependence Model (Kenny, Kashy, & Cook, 2006). Furthermore, because it may be challenging to recruit many mother-father dyads, most studies to date employ small samples sizes, which limit our ability to detect true effects (i.e., type II error). In order to explore the individual and dyadic nature of the relationships of interest with greater power and confidence, the present study recruited 124 married/cohabitating mother-father dyads. With this comparatively large sample size, a more comprehensive and accurate portrait of the family, particularly the parental dyad, may be achieved. A final limitation of existing studies was the lack of heterogeneity in terms of ethnicity. The current study aimed to recruit an ethnically diverse sample to increase the generalizability of results.

**The Proposed Study**

The proposed study is among the first to examine intrapersonal and interpersonal effects of maternal and paternal perceptions of problem behavior commonly associated with ASD and parental well-being among couples of children with ASD. The first aim of

the present study was to examine the interdependence of maternal and paternal perceptions of problem behavior and parent well-being. A second aim examined intrapersonal or actor effects (i.e., the extent to which one's own perception of ASD severity is related to one's positive or negative affect). A third aim examined interpersonal or partner effects (i.e., the extent to which a parent's perception of ASD severity is related to their partner's positive or negative affect), using Actor-Partner Interdependence Modeling (APIM) using Structural Equation Modeling. A fourth aim examined these relationships across child development. A fifth and final aim examined the association between informant discrepancies between maternal and paternal perceptions of ASD-related problem behavior and maternal or paternal socio-emotional adjustment. Delineating intrapersonal and interpersonal effects of maternal and paternal perceptions of ASD-related problem behavior and understanding the relationship of such perceptions to parental well-being may aid in enhancing and refining parent-focused interventions.

Preliminary analyses provided descriptive data and inter-correlations between study variables (i.e., problem behavior, positive and negative affect, child age) and demographic variables. Primary analyses used APIM and hierarchical regression analyses to examine the relationship between problem behavior and positive and negative affect. Two APIM models were conducted; one for negative affect (Model 1) and one for positive affect (Model 2).

**Study Aim 1**. The first goal of the study was to measure the interdependence or nonindependence among maternal and paternal perceptions and outcomes. Pearson's product-moment correlations coefficients (*r*) were conducted between the dyad's

exogenous variables (independent variables or predictors) and dyad's endogenous variables (dependent variables or outcomes). These correlations were estimated to test Hypothesis 1.1 and 1.2.

***Hypothesis 1.1.*** It was hypothesized that maternal and paternal perceptions of ASD-related problem behavior, as measured by the Autism Severity Index (ASI; Benson, 2000, unpublished), would be positively and significantly correlated. Therefore, mothers' and fathers' ASI scores were expected to be positively correlated.

***Hypothesis 1.2.*** It was hypothesized that maternal and paternal positive and negative affect, as measured by the Positive and Negative Affect Schedule (PANAS subscales; Watson, Clark, & Tellegen, 1988), would be positively correlated. Therefore, maternal and paternal PANAS positive affect scores were expected to be significantly correlated; and maternal and paternal PANAS negative affect scores were expected to be significantly correlated.

**Study Aim 2.** The second aim examined the individual (intrapersonal) or *actor effects* between perceptions of ASD-related problem behavior and positive and negative affect. In other words, we examined the intrapersonal effect of one's own perceptions of ASD-related problem behavior on their own positive affect or negative affect. It was acknowledged that several factors may have an effect on perceptions and well-being among mothers and fathers of children with ASD. As such, specific demographic variables (i.e., age of the child at diagnosis, time since diagnosis, child gender, age of parent, ethnicity, education level, amount of hours working per week outside of the

home, and household income), were tested as confounds; significant confounding variables were added to the models as covariates.

***Hypothesis 2.1.*** It was hypothesized that maternal and paternal perceptions of ASD-related problem behavior, as measured by the ASI, would be significantly related to their own negative affect, as measured by the PANAS NA. Therefore, maternal ASI score was expected to be positively associated with maternal PANAS negative affect score and paternal ASI score was expected to be positively associated with paternal PANAS negative affect score.

***Hypothesis 2.2.*** It was hypothesized that maternal and paternal perception of ASD-related problem behavior, as measured by the ASI, would be significantly associated with their own positive affect, as measured by the PANAS PA. Therefore, maternal ASI score was expected to be inversely related to with maternal PANAS positive affect score and paternal ASI score was expected to be inversely related to with paternal PANAS positive affect score.

**Study Aim 3.** The third aim examined the dyadic (interpersonal) or *partner effects* between perceptions of ASD-related problem behavior and positive affect and negative affect. In other words, we examined the interpersonal effects or the extent to which one's own perceptions of ASD-related problem behavior predicted their partner's positive or negative affect. The same set of covariates used in testing Aim 2 was statistically controlled for in this model.

***Hypothesis 3.1.*** Hypotheses regarding dyadic associations were not specified due to the lack of previous research examining dyadic associations between perception of

ASD severity and affect. Differences were expected to emerge; however, specific patterns or differences by parent were exploratory due to the lack of previous research.

**Study Aim 4.** The fourth aim of the current study was to examine the extent that these relationships differed among parents of preschool children (2 – 5 years) and parents of school-aged children (6 – 12 years) with ASD.

***Hypothesis 4.1.*** It was hypothesized that group differences would not be found in maternal perceptions of ASD-related problem behavior and positive and negative affect between mothers of preschool and school-aged children. Hypotheses regarding group differences in paternal perception of ASD-related problem behavior and positive and negative affect were not specified due to lack of previous research, and were therefore exploratory.

**Study Aim 5.** The fifth and final aim of the current study was to examine the relationship between informant discrepancies of ASD-related problem behavior (between mothers and fathers) and maternal and paternal affect. In other words, we examined if the difference between mothers' and fathers' ratings of child problem behavior was related to their own well-being, as measured by positive and negative affect.

***Hypothesis 5.1.*** Hypotheses regarding discrepancies in perceptions of ASD-related problem behavior and the association with affect were not specified due to the lack of previous research. While differences were expected to emerge, specific patterns by parent were exploratory due to the lack of previous research.

## Chapter 2

## Method

### Participants

Participants were recruited from a larger study comprised of 139 dyads, where both parents completed the survey. For the current study, 124 married/cohabitating mother-father dyads were retained for analyses. Seven couples were excluded because they indicated they were single, separated or divorced. Five additional couples were excluded because one or both participants did not complete the dependent measure. In addition, two couples were excluded because one of the participants within the dyad completed the independent measure on a different child. One couple was deleted due to an abnormal Cook's distance value. Relative to other values, it was equal to or more than three times the value of the other values.

As shown in Table 1, participants were primarily Hispanic/Latino (mothers, 56.5%; fathers, 52.4%) and Caucasian (mothers, 33.1%; fathers, 39.5%). Participants were also mostly college or post-college graduates (mothers, 80.7%; fathers, 68.6%), with a household income of above $40,000 (mothers, 90.2%; fathers, 88.6%). Participants had at least one child diagnosed with ASD. Several participants had another child with ASD (mothers, 9.7%; fathers, 9.7%) and several others had another child with a non-ASD developmental disability (mothers, 4 %; fathers, 3.3%). No differences were found between mothers and fathers on the above variables.

Parent and child demographic data are displayed in Tables 2 and 3. The mean age for mothers and fathers in our sample was $M$ = 38.84 years ($SD$= 5.95) and $M$ = 41.76 years ($SD$= 6.72), respectively. Mothers worked an average of 22.36 hours ($SD$= 19.24)

per week outside of the home, while fathers worked an average of 36.68 hours (*SD*= 16.94) per week outside of the home. Fathers were significantly older and worked more often outside of the home than did mothers ($p < .001$). With respect to child demographics, the majority of children with were male (83.1%). Children were diagnosed with ASD at an average age of 37.96 months (*SD* = 15.42; range 14.5 – 100.5 months). The mean age of the target children with ASD in this study was 81.13 months (SD = 30.01; range 29.5 – 154 months).

**Procedure**

Institutional Review Board approval of the study was secured. Participants were recruited by referrals from the Center for Autism and Related Disabilities (CARD), a center that provides services to families of children diagnosed with ASD or other related disabilities. Parents of children between the ages of 2 – 12, and who had a documented clinical diagnosis of autism spectrum disorder were recruited for the current study. Participants who met the aforementioned inclusion criteria were provided with an electronic or paper flyer describing the study, including contact information for the study investigators through various approved distribution efforts (i.e., email, listservs, regular mail, autism publications, etc.). Parents contacted the study investigators at their convenience, at which point the study was described in detail and information regarding potential participants obtained. Once parents expressed continued interest and satisfaction of inclusion criteria were established, investigators proceeded with enrollment. Each parent received a gift card or movie and popcorn coupon (valued at approximately $10) upon completion of the surveys.

Parents were given the option to complete some or all of the questionnaires online or with a paper and pencil packet. If parents preferred completing the questionnaires via paper and pencil packet, then a single packet that contained the questionnaires being used in the current study, along with a cover letter and informed consent form were mailed to them. Parents were asked to complete all of the following questionnaires and return them in a prepaid envelope; as noted above, parents could refuse to complete any questionnaire at their discretion. If parents did not return the questionnaire within 30 days they received a reminder phone message. If parents opted to complete the questionnaire online, they were provided with a link to our survey. Qualtrics Survey Software was utilized to distribute and track progress of the questionnaires online. Upon opening the link, parents read through a cover letter and informed consent page. Participants gave consent before being directed to the survey. Parents were instructed to complete the survey on the child who was most recently diagnosed with ASD. Parents were asked to complete all of the measures (e.g., ASD-related problem behavior, parental well-being, and demographic information) but were given the option to stop the questionnaire at their discretion. If parents did not complete the online questionnaires within 14 days, they were sent a reminder email. They received a weekly email reminder until they completed the questionnaire. A total of 708 surveys were sent out to interested participants. Approximately 58% of the surveys were returned. From the returned surveys, 61% percent of the surveys were completed and used in this study.

**Measures**

*Autism Severity Index.* The Autism Severity Index (ASI; Benson, 2000, unpublished manuscript; Benson, 2006), an 18-item measure, was utilized to assess the

presence and frequency of problem behavior commonly associated with ASD. Participants rated the occurrence of each behavior on a 5-point Likert scale ranging from never (1), rarely (2), occasionally (3), often (4), and always (5). A total score was calculated, with a high score indicating greater frequency of problematic behaviors. Total scores range from 18 – 90. The ASI has demonstrated good criterion and construct validity in prior studies of families with children with ASD (Benson, 2006; Benson & Karlof, 2008). Benson and Karlof (2008) reported good internal consistency (αs = 0.80 – 0.85). Satisfactory internal consistency and reliability was found in the present study (α = .85).

*Positive and Negative Affect Schedule.* The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), a 20-item questionnaire, was used to assess a continuum of positive and negative features of parent well-being (i.e., two dimensions of mood). Watson and colleagues (1988) demonstrated that positive and negative affect are highly distinctive dimensions of mood, and as such can be considered orthogonal dimensions. While parents of children with ASD are at higher risk for developing elevated levels of stress, it was important to assess both positive and negative dimensions of adjustment to capture the overall picture of well-being among parents with children with ASD. The measure includes 10 items assessing positive affect and 10 items assessing negative affect. The PANAS has been used as a measure of parental well-being among mothers (Lickenbrock et al., 2011) and among non-dyadic mothers and fathers of children with ASD (Pottie & Ingram, 2008).

Positive affect is characterized as the extent to which one feels enthusiastic, active, and alert. High PA scores indicate high energy, full concentration, and pleasurable

engagement. Low PA scores indicate sadness and lethargy. Negative affect is characterized by one's level of distress, including a variety of aversive mood states such as anger, fear, nervousness, guilt. High NA scores indicate greater subjective distress. Low NA scores indicate experiences of calmness and serenity. Participants rated the extent to which they felt an emotion on a 5-point Likert scale ranging from not at all (1), a little (2), moderately (3), quite a bit (4), and extremely (5). A total score was calculated for the two mood dimensions with high scores indicating greater levels of positive or negative emotion. Scores range from 10 – 50 in both categories. The PANAS is a well-validated measure and has demonstrated high internal consistency, adequate reliability, and external validity with measures of distress and psychopathology (Watson et al., 1988). External validity has been established with measures of distress and psychopathology (Watson et al., 1988). The PANAS PA and NA scale have been found to be significantly and moderately correlated to measures of depression (Beck Depression Inventory, Beck et al., 1961), anxiety (A-State, Spielberger et al., 1970), and general distress and dysfunction (Hopkins Symptom Checklist, Derogatis et al., 1974).

Based on a US student sample, where PA and NA were assessed over the "past few days," the PA mean was 33.3 (SD= 7.2), and NA mean was 17.4 (SD= 6.2) (Watson et al., 1988b). Based on a non-clinical population, where PA and NA were assessed "during the past week," the PA mean was 31.3 (SD = 7.7) and the mean for NA was 16.0 (SD = 5.9) (Crawford & Henry, 2004). Crawford and Henry (2004) also developed normative data where raw scores are converted to percentiles; abnormally high NA is indicated as anything equal to or above a raw score of 29 ($95^{th}$ percentile) and abnormally low PA is indicated as anything below or equal to a raw score of 18 ($5^{th}$ percentile). Good

internal consistency and reliability was found in the present study (αs ranged from .86 - .81).

*Informant Discrepancy in Ratings of ASD-related Problem Behavior.* A difference score was calculated to measure informant discrepancies in maternal and paternal perceptions of ASD-related problem behavior. Paternal ASI scores were subtracted from maternal ASI scores.

*Demographic information.* Participants were asked to complete a background information packet collecting information regarding personal characteristics (e.g., gender, age, marital status, level of education, household income, number of hours per week worked outside of the home, ethnicity), family characteristics (e.g., if more than one child is diagnosed with autism or developmental disability, other siblings), child characteristics (e.g., gender, age of child with ASD, age of child at time of diagnosis), and outside services (e.g., is child receiving school services, is child receiving therapy outside of school).

**Statistical Analysis Plan**

The current study included mother and father dyads in a committed relationship. Therefore, the responses of each individual within the dyad are likely to be influenced by their partner. For example, the psychological adjustment ratings of the wife may be influenced by her own characteristics (intrapersonal effect) as well as the characteristics of the partner (interpersonal effect). This mutual influence or non-independence violates the assumptions of independence that is necessary for traditional statistical analyses, whereby individuals' observations should be unrelated to any other observation (Kenny,

Kashy, & Cook, 2006). Therefore, APIM was used to account for the non-independence between members of a couple (Kenny, Kashy, & Cook, 2006). As shown in Figure 1, the APIM allows for the study of examining both intrapersonal or *actor (i.e. $X_1 \rightarrow Y_1$)* and interpersonal or *partner effects (i.e. $X_1 \rightarrow Y_2$)* simultaneously. An intrapersonal or *actor effect* refers to the effect of an individual's score on the causal variable on their own outcome variable. An interpersonal or *partner effect* refers to the effect of an individual's score on the causal variable on their partner's outcome variable.

Structural equation modeling (SEM) using MPLUS 7 software was used to estimate each of the Actor-Partner Interdependence Models (APIM), which will capture the intrapersonal and interpersonal relationship patterns within a dyad (Kenny, Kashy, & Cook, 2006). APIM in SEM utilized a dyad-level structure, where the couple is a unit of analysis (Kenny, Kashy, & Cook, 2006). Each of the models was tested using the following equation written in the form of two linear equations, one for person 1 ($Y_1$) and one for person 2 ($Y_2$). Predictor variables are person 1's X ($X_1$) and person 2's X ($X_2$). In the APIM, the predictor variables are centered around the grand mean across both person 1 and person 2. Both $X_1$ and $X_2$ predict $Y_1$ and $Y_2$. Specifically, the paths from $X_1 \rightarrow Y_1$ and from $X_2 \rightarrow Y_2$ are the actor effects ($a_1$ and $a_2$) and the paths from $X_1 \rightarrow Y_2$ and from $X_2 \rightarrow Y_1$ are the partner effects ($p_1$ and $p_2$), respectively. The equation for person 1 is:

$$Y_1 = b_0 + a_1 X_1 + p_1 X_2 + e_1,$$

And for person 2, it was:

$$Y_2 = b_1 + a_2 X_2 + p_2 X_1 + e_2.$$

Applied to the current study variables, person 1 is mothers and person 2 is fathers. The predictor variables are perceptions of ASD-related problematic and challenging behavior using the Autism Severity Index (ASI). The outcome variables are ratings of psychological adjustment and well-being (negative and positive affect) using the Positive and Negative Affect Scale (PANAS). The equation for maternal negative affect (Model 1) is rewritten as:

$$\textit{Maternal Negative Affect} = b_0 + a_1\,(\textit{Maternal Autism Severity Index}) + p_1\,(\textit{Paternal Autism Severity Index}) + e_{1,}$$

The equation for paternal negative affect is rewritten as:

$$\textit{Paternal Negative Affect} = b_1 + a_2\,(\textit{Paternal Autism Severity Index}) + p_2\,(\textit{Maternal Autism Severity Index}) + e_{1,}$$

The same equations apply for positive affect (Model 2), where positive affect is in place of negative affect in the equations above. Prior to performing statistical analyses, each participant's independent variable was centered by subtracting the grand mean value across all individuals from each participant's scores (Kenny, Kashy & Cook, 2006). Centering is performed to allow for straightforward interpretation of the main effects in the statistical models in the fitted models.

Two APIM models were tested, one model for negative affect and one model for positive affect. For each model, model fit was examined using the Chi-Square Test of Model Fit, the Comparative Fit Index (CFI; closer to 1), the Root Mean Square Error of Approximation (RMSEA; < .06; Hu & Bentler, 1999), and the Standardized Root Mean Square Residual (SRMR; < .06). A chi-square difference test is performed to see if the

proposed model statistically worsens the fit compared to the unconstrained model. The more parsimonious model with good fit indices will be kept in the following analyses. Within each APIM model, to statistically test if the actor effects are different across mothers and fathers, the two actor paths are set to be equal to each other and that equality constraint is evaluated by a change in fit of the model, compared to the unconstrained model using a chi-square difference test. Next, the two actor effects are constrained equal to each other and evaluated by a chi-square difference test. The final accepted model with the best fitted statistics will be kept, and subsequently used to run the analyses for the child age multiple group path analysis.

Multiple-group path analysis was conducted to examine and test if there were statistically significant group differences in the relationship between perceptions of ASD-related problem behavior and affect among parents of preschool (2-5 years) and school-aged children (6-12 years) with ASD. Cross-group invariance was tested by comparing two nested models: 1) baseline model in which no constraints was placed (all paths were freely estimated) and 2) a second model where all actor and partner paths were constrained to be invariant between groups. The nested models were compared using a chi-square difference test using log likelihood values.

To examine whether informant discrepancies of ASD-related problem behavior is uniquely related to maternal or paternal affect, hierarchical regression analyses were conducted for maternal affect and paternal affect separately. For each of the models, the control variables determined for the APIM models will be included in the first step of the regression analyses, followed by the difference score, calculated by subtracting paternal

raw ASI score from maternal raw ASI score. The unique contribution of the difference score will be examined, adjusting for the covariates.

*Power Analyses.* Power refers to the ability to detect a statistically significant and true effect, and it is affected by sample size, effect size, and alpha level. Power analyses have not been specifically developed to test the overall power of APIM models. However, tests of nonindependence are correlation based and tests of intrapersonal or actor effects, and interpersonal or partner effects are regression based; thus, power analyses for correlation t-tests and linear multiple regression F-tests are used for APIM models (Chung, Moser, Lennie, & Rayens, 2009).

An a priori power analysis was conducted using Cohen (1992) guidelines to determine sample sizes required for the current study in order to achieve 80% power to detect a small to medium effect size. G* Power 3.17 (Faul, 2013) program was used to estimate power. To test non-independence for Aim 1 (nonindependence in ratings of autism severity), a two-tailed, $\alpha = .05$ power test for a *t* test indicated that a sample size of 82 dyads would be required for 80% power to detect a significant, small to medium correlation ($\rho = 0.3$) between mother and father ASD-related problem behavior ratings. The current sample size of 124 dyads resulted in 94% power; therefore, the hypothesis for Aim 1 was adequately powered.

To test Aims 2 – 5, a two-tailed, $\alpha = .05$ power test for an *F* test indicated that a sample size of 166 dyads would be required for 80% power to detect a significant, small to medium actor or partner effect ($f^2 = 0.08$) of one's perception of problem behavior on one's affect over the effect of their partner's perceptions of problem behavior and

covariates for NA (i.e. three covariates for NA model: maternal and paternal hours per week spent working outside of the home, and child gender).The current sample size of 124 dyads resulted in an 64% power; therefore, hypotheses for Aims 2-5 were underpowered for the NA models. To test Aims 2 – 5, a two-tailed, $\alpha = .05$ power test for an *F* test indicated that a sample size of 155 dyads would be required for 80% power to detect a significant, small to medium actor or partner effect ($f^2 = 0.08$) of one's perception of problem behavior on one's affect over the effect of their partner's perceptions of problem behavior and covariates for PA (i.e., two covariates for PA model; maternal and paternal education). The current sample size of 124 dyads resulted in 69% power; therefore, hypotheses for Aims 2-5 were underpowered for the PA models.

## Chapter 3

## Results

*Preliminary Analyses*

Data were checked for normality using skewness and kurtosis indices, linearity, and homoscedasticity, and were also examined for outliers. Absolute values greater than three for skewness and absolute values greater than ten for kurtosis are considered markers of non-normal data (Kline, 2011). Skewness values for all variables were less than three and kurtosis values were less than ten for all study variables, indicating normally distributed data. Data were also linearly related and homoscedastic. Boxplots were used to test for outliers on all of the study variables. Next, influential outliers were determined using Cook's distance and deleted if the outlier was three times the influence of other values. One participant was found to be an outlier and an influential outlier. Bivariate correlations between the study variables were computed with and without the couple with the influential outliers. When the outlier was included, the correlation between maternal and paternal negative affect was non-significant; when the outlier was excluded, the correlation between maternal and paternal negative affect changed to be significantly related. Since the correlation changed significantly with and without the outlier, the couple was deleted from future analyses. Descriptive statistics were conducted for all study variables using SPSS software Version 22 (IBM Corp., 2013). There were no missing data on independent or dependent variables. In terms of demographic data, household income was missing for one couple. Future analyses utilizing household income resulted in a list-wise deletion of this case. Cronbach's alpha

coefficients were calculated for all measures to confirm above adequate internal reliability and consistency and are reported in the measures section above.

*Data Descriptives*

As seen in Table 4, means, standard deviations, and ranges are provided for the study variables of interest for both mothers and fathers. Comparisons of study variables between mothers and fathers were made using paired samples *t*-tests. The analyses revealed that mothers and fathers reported similar perceptions in problem behavior, positive affect, and negative affect (see Table 4). Descriptive analyses also revealed that about 31% of mothers and 22% of fathers reported abnormally high negative affect (indicated as raw scores $\geq$ 29; 95$^{th}$ percentile; Crawford & Henry, 2004). Alternatively, only 1% of mothers and fathers reported abnormally low PA (indicated as raw scores $\leq$ 18). Overall, while some parents reported abnormally high negative affect, all of the parents in this sample demonstrated appropriate levels of positive affect.

As shown in table 5, bivariate Pearson product-moment correlations coefficients (*r*) were conducted between study variables. Maternal perception of ASD-related problem behavior was correlated with one's own positive affect ($r$ = -.180, $p$ = .046) and negative affect ($r$ = .309, $p$ <.001), but was not related to partner positive or negative affect ($r$ = -.094, $p$ = .298*, ns;* $r$ = .087, $p$ = .336, *ns*, respectively). Paternal perception of ASD-related problem behavior was correlated with one's own negative affect ($r$ = .312, $p$ < .001), but was not significantly correlated with one's own positive affect ($r$ = -.027, $p$ =.922, *ns*). Paternal perception of ASD-related problem behavior was not significantly

correlated with partner positive or negative affect ($r$ = -.096, $p$ = .291*, ns; r* = .144, $p$= .112, *ns* respectively).

Covariates for each of the models were determined using Pearson product-moment correlation coefficients for continuous demographic variables and ANOVAs/MANOVAs for categorical demographic variables. Correlations were conducted with both maternal and paternal study variables (i.e., problem behavior, positive affect, and negative affect) and ANOVAs/MANOVAs were conducted separately for mothers and fathers. Parent and child demographic characteristics were tested as possible covariates. Parent characteristics included parent age, parent education, mean household income, number of hours working outside the home per week, and ethnicity. Child characteristics included child gender, mean time since diagnosis, and mean age of child at diagnosis.

Several parent characteristics were found to be correlated with the study variables, with the exception of parent age and ethnicity. Specifically, maternal education was positively and significantly correlated with maternal positive affect ($r$ = .248, $p$ = .006); paternal education, however, was not significantly correlated with any of the study variables. An average household income was calculated using maternal and paternal individual household income ratings. Average household income was significantly and inversely related to maternal and paternal perceptions of ASD-related problem behavior (mothers, $r$ = -.209, $p$ = .020; fathers, $r$ = -.201, $p$ = .026). Number of hours worked outside the home was not correlated to any study variables for mothers or fathers; however paternal number of hours worked outside the home was significantly correlated with maternal negative affect ($r$ = .184, $p$ =.041). In contrast, maternal age and paternal

age were not correlated with any of the study variables. A MANOVA was conducted to determine the effect of ethnicity on the study variables. No significant differences were found among the ethnicity groups on the study variables among mothers, Wilks's $\lambda$ = .875, $F$ (5, 118) = 1.060, $p$ = .393, *ns*, or among fathers, Wilks's $\lambda$ = .947, $F$ (5, 118) = .423, $p$ = .972, *ns*.

With regard to child characteristics, time since diagnosis was reported by both mothers and fathers; while the reports were mostly consistent with each other, some reports differed slightly, therefore an average time since ASD diagnosis was calculated using maternal and paternal individual time since diagnosis ratings. Average time since diagnosis was significantly correlated with paternal perceptions of ASD-related problem behavior ($r$ = .188, $p$ = .037), but not for maternal perceptions. ANOVAs were conducted to evaluate the relationship between child gender and study variables for each parent separately. The only significant finding was that maternal ratings of negative affect changed as a function of child gender, $F$ (1, 122) = 6.330, $p$ = .013). Maternal ratings of negative affect were higher if she had a female child ($M$ = 28.19, $SD$ = 7.84), than for a male child ($M$ = 24.04, $SD$= 6.69). Fathers' ratings did not change as a function of child gender.

Final covariates tested in the APIM models included: maternal and paternal number hours working outside of the home, maternal and paternal parent education, average household income, average time since diagnosis, and child gender. To produce a more parsimonious model, a model with only covariates and the outcome of interest (i.e., NA or PA) was tested to eliminate non-significant demographic predictor variables. For NA, child gender and paternal hours working outside of the home were significantly

related to maternal ratings of NA, whereas none of the demographic variables were related to paternal ratings of NA; therefore, child gender and maternal and paternal hours working outside of the home were used as covariates in the subsequent analyses for NA. For PA, maternal education was significantly and positively related to PA, whereas none of the demographic variables were related to paternal ratings of PA; thus, maternal and paternal education were each included as covariates in the subsequent analyses for PA.

*Primary Analyses*

**Study Aim 1**. The first goal of the study was to measure the interdependence or nonindependence among maternal and paternal perceptions and outcomes. Pearson's product-moment *r* correlations were conducted between the dyad's exogenous variables (independent variables or predictors) and dyad's endogenous variable (dependent variables or outcomes). The predictor variables were maternal and paternal perceptions of problem behavior associated with ASD, as measured using the Autism Severity Index (ASI) total score. The outcome variables were maternal and paternal ratings of positive affect (PA) and negative affect (NA), as measured using the Positive and Negative Affect Scales (PANAS). These correlations were estimated to test Hypothesis 1.1 and 1.2.

*Hypothesis 1.1 Results.* Consistent with our hypothesis, maternal and paternal ASI scores were significantly and positively correlated (Pearson's $r = .617$, $p < .001$), suggesting interdependence.

*Hypothesis 1.2. Results.* Consistent with our hypothesis, maternal and paternal PA scores were significantly and positively correlated (Pearson's $r = .376$, $p < .001$). In

addition, consistent with our hypothesis, maternal and paternal NA scores were significantly and positively correlated (Pearson's $r = .180$, $p = .046$).

**Study Aim 2.** The second aim examined the individual or *actor effects* between perceptions of autism-related problem behavior and positive and negative affect. In other words, the current study examined the intrapersonal effect of one's own perceptions of child problem behavior on their own positive or negative affect. The following covariates were included in the NA APIM model: maternal and paternal hours working outside of the home and child gender; PA APIM model: maternal and paternal level of education.

*Hypothesis 2.1 Results.* Consistent with our hypothesis, mothers' and fathers' ASI scores were significantly and positively associated with their own PANAS negative affect score ($b = 0.230$, $p < .001$), controlling for the proposed covariates and all other variables in the model. Compared to a baseline model where actor paths were constrained and partner paths were freely estimated, when mothers' and fathers' actor and partner paths were constrained equal, the constraints did not worsen the fit, (chi-square difference test $X^2 = .979$, $df = 1$, $p = .322$, *ns*). Therefore the more parsimonious model was kept. In addition, this model yielded great fit to the data (*RMSEA*=.025*, CFI*=.985*, SRMR*= .42). In other words, the intrapersonal or actor effect of perceptions of ASI on one's own rating of PANAS negative affect were similar for mothers and fathers (no significant gender effects emerged) (refer to Table 6).

*Hypothesis 2.2 Results.* Contrary to our hypothesis, maternal and paternal ASI scores were not significantly associated with their own PANAS positive affect score,

controlling for the proposed covariates and all other variables in the model (refer to Table 7).

**Study Aim 3.** The third aim examined the dyadic or *partner effects* between perceptions of ASD-related problem behavior and positive and negative affect. In other words, we examined the interpersonal effects in the APIM model or the extent to which one's own perceptions of ASD-related problem behavior was associated with their partner's positive or negative affect. The same set of covariates used in testing Aim 2 were statistically controlled for in this model.

*Hypothesis 3.1 Results.* These analyses were considered exploratory due to the lack of previous research examining dyadic associations between parental perception of ASD-related problem behavior and affect. Results revealed that maternal and paternal ASI scores were not significantly associated with their partners' PANAS negative affect score (refer to Table 6) or positive affect scores (refer to Table 7), controlling for the proposed covariates and all other variables in the model.

**Study Aim 4.** The fourth aim of the proposed study was to examine the extent that these relationships differed among parents of preschool children (2 – 5 years) and parents of school-aged children (6 – 12 years) with ASD.

*Hypothesis 4.1 Results.* For the negative affect model, constraining the actor and partner paths equal across the groups (i.e., parents of preschool children and parents of school-aged children) resulted in a non-significant chi-square difference test, indicating that the constraints did not worsen the model fit (chi-square difference test $X^2 = 2.568$, $df = 18$, $p = .49$, *ns*; see Table 8). These results indicated that the paths are the same across

the two subgroups. The constrained path model yielded a more than adequate fit to the data (*RMSEA*=.000*, CFI*=1.00*, SRMR*= .065*)*. Consistent with our hypothesis for mothers, the relationship between maternal perceptions of ASD-related problem behavior and negative affect was similar across mothers of preschool and school-aged children with ASD. Similarly, no differences were found in this relationship for fathers of preschool and school-aged children with ASD. Due to the non-significant actor and partner findings for positive affect, multiple group analyses were not conducted.

**Study Aim 5**. The fifth and final aim of the proposed study examined the relationship between informant discrepancies (between mothers and fathers) in perceptions of ASD-related problem behavior and parent affect. These relationships were examined separately for maternal affect and paternal affect.

*Hypothesis 5.1 Results.* These analyses were also considered exploratory due to the lack of previous research. To reiterate, mother – father informant discrepancy scores were obtained by subtracting the paternal raw score on the ASI from the maternal raw score on the ASI. The mean informant discrepancy score was *M* = - .94 (*SD* = 8.94). The discrepancy scores were normally distributed, with most parents having consistent (similar) perceptions of ASD-related problem behavior.

Hierarchical regression analyses were conducted to evaluate if discrepancy scores in ASD-related problem behavior uniquely predicted negative affect, controlling for the 3 covariates (i.e., maternal and paternal number of hours per week working outside of the home, and child gender). With respect to paternal negative affect, results of the analysis indicated that discrepancy scores in ASD-related problem behavior accounted for a

significant proportion of paternal PANAS negative affect variability, while controlling for the 3 covariates, $R^2$ change = .054, $F$ (4, 119) = 3.375, $p$ = .012 (see Table 9). These results suggest that fathers who report greater severity of ASD-related problem behavior than their wives, have increased negative affect. In contrast, discrepancy scores in ASI scores were not significantly associated with maternal PANAS negative affect, while controlling for the 3 covariates, $R^2$ change = .020, $F$ (4, 119) = 3.375, $p$ = .106, *ns* (see Table 10*)*. In other words, discrepancies in ASD-related problem behavior were not significantly related to maternal negative affect.

Hierarchical regression analyses were also conducted to evaluate if discrepancy scores in ASD-related problem behavior uniquely predicted positive affect, controlling for the 2 covariates (i.e., maternal and paternal education). With respect to maternal positive affect, discrepancy scores in ASI scores were not significantly associated with maternal positive affect, while controlling for the 2 covariates, $R^2$ change = .003, $F$ (3, 120) = 2.790, $p$ = .539, *ns* (see Table 11*)*. Furthermore, results of the analysis indicated that discrepancy scores in ASD-related problem behavior did not account for a significant proportion of paternal positive affect variability, while controlling for the 2 covariates, $R^2$ change = .004, $F$ (3, 120) = .456, $p$ = .485, *ns* (see Table 12). In other words, discrepancies in ASD-related problem behavior were not significantly related to paternal or maternal negative affect.

## Chapter 4

## Discussion

The socio-emotional impact of having a child with ASD in the family is substantial, affecting immediate family members, particularly parents. While the impact of caring for a child with ASD is individualized and varied, the lifelong and pervasive nature of the disorder may put parents at risk for negative outcomes. While core symptoms of ASD are typically examined in studies of parental stress and coping, challenging problem behavior commonly associated with ASD may also leave parents at risk for negative outcomes. Previous research has primarily examined this in small parent samples comprised of non-dyadic parents and in samples of mostly female participants. Therefore, this study aimed to understand the relationship between ASD-related problem behavior and parental well-being, measured by positive and negative affect, among 124 mother – father dyads. Results demonstrated that self-reported perceptions of ASD-related problem behavior, positive affect, and negative affect were highly concordant within couples, suggesting interdependence within the family unit. Additionally, the intrapersonal effect of one's own perception of ASD-related problem behavior was positively associated with one's own negative affect; ASD-related problem behavior was unrelated to one's own positive affect. Furthermore, no gender differences emerged. Exploratory analyses examining interpersonal or dyadic effects, as well as discrepancies in perceptions of ASD-related problem behavior, were not statistically significant for parental positive affect or negative affect. Lastly, these associations did not differ across development when examining these relationships as a function of child age.

*Study Aim 1.* The hypothesis for the first study aim, examining interdependence of self-report measures, was supported. Mothers and fathers within the same family unit reported highly concordant perceptions of ASD-related problem behavior. These findings are in keeping with previous studies examining problem behavior among children without ASD (e.g., Achenbach, McConaughy, & Howell, 1987), and ASD-related problem behavior in preschool and school-aged children with ASD (e.g., Davis & Carter, 2008, Baker et al., 2003; Pottie & Ingram, 2008). Specifically, moderate correlations between maternal and paternal ratings of problem behavior were demonstrated among children (6-11 years of age) without ASD (Achenbach et al., 1987; Pearson's $r$ = .60) and children with ASD (e.g. Davis & Carter, 2008; Pearson's $r$ = .59). The concordance between maternal and paternal perceptions of ASD-related problem behavior suggests that in the absence of having both parents complete forms, information from one parent could be representative of the child's behavior predominantly within the home. On the other hand, using multiple informants within one setting would give a better idea of the stability and persistence of the problem behavior within the home, and therefore provide potential target areas for treatment. Future directions for clinical implications are provided in the sections below.

With regard to parental affect, results demonstrated that maternal and paternal perceptions of positive affect and negative affect were also significantly and positively correlated. This is in support of prior research examining emotional connectedness and emotional regulation among couples in the general population (e.g., Butler & Randall, 2013). For example, Butler and Randall (2013) found that among individuals in intimate and close relationships, emotions that are expressed by one member can also affect the

partner's emotional expression. While interdependence between parents of children with ASD has not been commonly studied, formal assessment of interdependence between family members enables greater understanding of between-group comparisons of caregivers within the same family unit. Therefore, the interdependent findings provide further support for the emotional interconnectedness often seen in intimate relationships. Finally, accounting for the interdependence in perceptions and affect also allows for more accurate estimation of effects within families of children with ASD.

*Study Aim 2.* The hypothesis for the second aim, which examined the intrapersonal or actor effects of perception of ASD-related problem behavior and affect, was supported for negative affect, but was not supported for positive affect. Maternal and paternal perceptions of ASD-related problem behavior were positively associated with increased negative affect, while ASD-related problem behavior was not significantly related to positive affect for mothers or fathers. No significant gender effects emerged, suggesting that the effects were consistent across male and female caregivers. In addition, results support that positive and negative affect, are in fact, orthogonal in nature (Watson et al., 2008) and not opposite extremes of the same spectrum.

The current findings were consistent with previous studies and add to the existing literature on perceptions of ASD-related problem behavior and negative affect in parents (e.g., Davis & Carter, 2008; Lickenbrock et al., 2011). Conversely, the current study found that ASD-related problem behavior, a negative dimension of child behavior, was not significantly associated with parental positive affect. Similar associations were found in another study examining both positive and negative dimensions of child behavior as well as positive and negative dimensions of parent well-being among mothers of children

with ASD (i.e., positive and negative affect; Lickenbrock et al., 2011). Lickenbrock and colleagues (2011) found that maternal perceptions of ASD-related problem behavior were associated with maternal negative affect but not positive affect. Moreover, maternal perceptions of positive dimensions of child behavior, such as social competence, were associated with maternal positive affect, but not negative affect. Although the current study did not examine perceptions of positive child behavior, the current results support the previous findings that positive and negative aspects of parental well-being may have different relationships with various dimensions of child behavior (e.g., positive and negative aspects) (e.g., Hastings et al., 2005, Lickenbrock et al, 2011). Implications for studying positive and negative dimensions of child behavior and parental well-being are discussed further in the future directions section below.

While most studies examining ASD-related problem behavior and functioning among non-dyadic mothers and fathers supported gender differences in the effect of problem behavior on parental well-being, the present study did not find gender differences among dyadic couples who were married or living in the same home. Although gender differences were not found in this study when examining these relationships in the APIM model, the correlation matrix was consistent with past studies which suggest that gender differences may emerge due to differences in parenting roles with the family, time spent with the child, and level of engagement in child activities (e.g., Gray, 2003; Tehee et al., 2009). Specifically, maternal perceptions of child behavior were inversely related to their own positive affect, while paternal perceptions of child behavior were not related to their own positive affect. Applied to the current study results, descriptive analyses indicated that while fathers reportedly worked significantly

more hours outside of the home per week than mothers in our sample, both parents indicated similar levels of negative affect, as well as positive affect. It may be that the parents participating in this study who are married and living in the same home are sharing childcare responsibilities more so than those parents in studies where only one parent participates. To our knowledge, this study is the first to include a large sample of dyadic couples of children with ASD, and thus equal numbers of mothers and fathers. The findings provide further insight into functioning among couples of children with ASD and suggest that mothers and fathers may indeed share more commonalities than previously thought. Clinical implications for future directions are discussed below.

*Study Aim 3.* The third aim, which examined potential dyadic or interpersonal effects of perceptions of problem behavior on their partner's positive or negative affect, was exploratory. No dyadic effects were found for the negative or positive affect model. Parental perceptions of ASD-related problem behavior may be less subjective or open to interpretation, and therefore produce less of an adverse spillover effect in their partner. It is also possible that parent perceptions may vary more on the subtle dimensions of ASD, such as joint attention, social engagement, and pragmatic language abilities, but less so on more obvious aberrant problem behavior. Also, parents of children within this age range may be better equipped to handle problem behaviors considering that most of the intervention research, and thus available evidenced-based resources and interventions, has primarily focused on early intervention for preschool and school-aged children with ASD, and less so on adolescent and adult children with ASD (Taylor et al., 2012; Wong et al., 2015). Conceivably, with limited interventions specifically for adolescence and adults with ASD (Taylor et al., 2015), the presence of problem behavior in older children

with ASD may require more time and effort to manage, which may yield a significant effect on family functioning, and possible dyadic effects on parent well-being.

It is possible that statistically speaking, there may not have been enough variability between parents in their perceptions of ASD-related problem behavior, given the highly correlated perceptions of ASD-related behavior between mothers and fathers ($r$ = .61). Results of descriptive analyses revealed that mothers and fathers within the same family unit generally reported similar mean levels in overall ratings of ASD-related problem behavior, consequently reducing the power to detect potential interpersonal effects. Future directions for other types of relational or family process factors are discussed in the future directions section.

It is also important to keep in mind that parents in this study were recruited from the Center for Autism and Related Disabilities (CARD), where they are likely already receiving considerable support and services for their family and children. For example, families within the CARD program are provided with significant resources such as support groups for mothers and fathers, and additional instrumental support in finding treatments for their children. Therefore, the benefits of having additional resources to help manage and address the challenges that are typically present in raising a child with ASD, may be protective against possible diminishing dyadic effects on partner functioning. Accordingly, the results may not generalize to families who do not receive extensive support and resources, such as those offered through CARD.

*Study Aim 4.* The fourth aim, which examined the relationship between ASD-related problem behavior and affect among parents of preschool children (2 – 5 years)

and parents of school-aged children (6 – 12 years) with ASD, was partially supported. Consistent with our hypothesis for mothers, group differences were not found among mothers of preschool and school-aged children with ASD. Results for fathers were considered exploratory given the lack of research involving fathers. For fathers, group differences were not found for fathers of preschool and school-aged children with ASD. Due to the non-significant actor and partner findings for positive affect, moderation analyses were not conducted.

The present study added to the existing literature supporting an association between the presence of ASD-related problem behavior in children with ASD and negative affect in parents of preschool and school-aged children with ASD. While some studies have documented changing associations over time, such developmental differences were not detected in this study. Although the current study recruited a large age range (2 – 12 years), it is possible that this particular age range was insufficient to detect differences across development in families of children with ASD. As mentioned previously, ASD is a life-long disorder; therefore, the behavioral presentation and challenges may change considerably from preschool to school-age to adolescence and through adulthood. It is possible that parents of children with ASD who are in preschool or in grade school may face more similar problem behavior than parents of adolescents or adults with ASD. Also, interventions for managing ASD-related problem behavior are more available for parents of young children with ASD, and less so for parents of adolescent or adult children with ASD (*see review* Taylor et al., 2012; Wong et al., 2014). Subsequently, parents of adolescents and adult children may face unique challenges, such as transitioning out of high school, loss of services, and greater reliance on parents for

care (Shattuck, Narendorf, Cooper, Sterzing, Wagner, & Taylor, 2012), that are more challenging to manage. Thus, future studies should incorporate parents of individuals with ASD across the lifespan to understand and identify prospective target areas for intervention.

The current study also did not account for child developmental age, which may be an important determinant in the presentation and interpretation of child problem behavior. It is likely that children with a lower developmental age relative to their chronological age may exhibit more problem behavior due to lower language abilities and cognitive functioning. As such, examining group differences in parents of children with ASD using chronological age may not accurately capture which groups may be more or less affected by problem behaviors. Furthermore, it is also possible that parents of children with ASD with a greater difference between child developmental age and chronological age may face unique stressors, in addition to stressors related to ASD-problem behavior. For example, parents of children with ASD who present with significant developmental delays in addition to core ASD symptomatology may require placements in more specialized and/or segregated school settings, as well as a wider range of therapies that require more time and effort to organize and manage. Taken together, these families may be at greater risk for experiencing additional pressures in parenting, isolation, and stress. Future studies should take into account developmental age of children with ASD.

*Study Aim 5.* The fifth and final aim, which examined the relationship between discrepancies in parent perceptions of challenging behaviors and affect, was exploratory. For negative affect, discrepancy scores were significantly associated with paternal negative affect, but not for maternal negative affect, while controlling for the 3

covariates. For positive affect, discrepancy scores were not significantly associated with paternal or maternal positive affect, after controlling for the 2 covariates.

Consistent with findings by Treutler and Epkins (2003), informant discrepancies in ASD-related problem behavior were found to be associated with increased negative affect for fathers in the present study. In particular, fathers who reported greater severity in ASD-related problem behavior, compared to their spouses, exhibited increased negative affect. Given that fathers in the present study worked significantly more hours outside of the home per week than mothers, they may be spending less time with their children, and thus have less exposure to their child's problem behavior. It could also be that fathers have less of a role in parenting and less experience in handling disruptive behaviors. As a result, fathers may rate their child's problem behavior as more frequently occurring, which may lead to increased negative affect. This finding could represent more traditional caregiving responsibilities, where mothers have historically been the primary caretakers in daily functioning (e.g., Cidav, Marcus, & Mandell, 2012, Gray, 2003; Tehee et al., 2009). These results should be replicated in future studies since paternal functioning is understudied in this population.

In contrast to our findings for fathers, informant discrepancies in ASD-related problem behavior were not associated with maternal negative affect, after controlling for several covariates (child gender, paternal and maternal hours per week spent outside of the home), or maternal positive affect, after controlling for maternal and paternal education. Interestingly, both child gender and paternal number of hours per week spent outside of the home were significantly and uniquely related to maternal negative affect. With respect to child gender, mothers of female children with ASD reported significantly

more negative affect than mothers with male children. ASD symptom presentation has been found to be significantly different among males and females. Females have been found to have milder forms of autism, and thus may not be diagnosed until a later age (Hiller, Young, & Weber, 2016). Therefore, females may not receive appropriate behavioral interventions early on, and could likely exhibit more problematic and challenging emotional behaviors, including weaker adaptive skills and greater externalizing problems relative to males (Frazier, Georgiades, Bishop, & Hardan, 2014). Future studies should explore the presentation of ASD among females in larger samples to try to disentangle and understand the association between gender and maternal functioning. Paternal number of hours working outside of the home was also found to be uniquely related to maternal negative affect. It is possible that longer work hours among fathers may affect their ability to provide instrumental (e.g., parenting responsibilities) and emotional support to their spouses, which can adversely affect maternal well-being. In contrast, maternal number of hours working outside of the home was not related to maternal negative affect. Previous research has supported that mothers are often the primary caretakers and decision makers in families with children with ASD (e.g., Civa, Marcus, & Mandell, 2012). Mothers of children with ASD were also more likely to leave their careers to become full-time caretakers of their children with special needs more so than typical children (Civa, Marcus, & Mandell, 2012). Future studies could further elucidate the impact that may have on maternal well-being.

Although the above results suggested that discrepancy scores were associated with paternal negative affect, most of the parents in our sample exhibited highly concordant perceptions of challenging ASD-related problem behavior, with little

variability in perceptions. In addition, all of the couples who participated in this study were either married or cohabitating. It is possible that the agreement between parents in understanding their child's behavior represents a piece of a larger construct that may be protective in nature, at least for mothers. It is likely that parents who view their child's behavior similarly may communicate their concerns with the other parent more frequently and provide more support towards one another, which could contribute to greater parental well-being and relationship satisfaction. For instance, Scorgie and Sobsey (2000) found that, among couples with reportedly satisfying relationships, the unique challenges that parents face in raising a child with disabilities may help strengthen and enrich their relationship. Consequently, we did not see a relationship between discrepancies in perceptions of ASD-related problem behavior and negative affect and that may be due, in part, to the possibility that strength in having shared perceptions may buffer against experiencing increased negative affect.

Given that all participating parents were cohabitating in this study, they were rating the ASD-related problem behaviors within the same home setting. Since children with ASD may have difficulty adjusting to different settings or settings with less predictability, it is possible that ratings of ASD-related problem behavior may vary significantly among families where the child may be living in several different settings, such as in the case of parents who are separated or divorced and not living together. Changes in settings may produce more significant discrepancies in reported ASD-related problem behavior among parents, and consequently may affect individual as well as dyadic functioning with families.

*Conclusions, Limitations, Future Directions*

To our knowledge, this study is among the first study to examine individual and dyadic associations between perceptions of ASD-related problem behavior and parental well-being among dyadic couples of children with ASD. Results from this study revealed that among mothers and fathers within the same family system, parents in general have similar perceptions of ASD-related problem behavior and affective outcomes. Furthermore, parental perceptions of ASD-related problem behavior were associated with negative affect, but they were not associated with positive affect. Surprisingly, while prior research has consistently documented gender differences in the relationship between ASD-related problem behavior and affect, no gender differences were found in the current study. These results suggest that mothers and fathers may share more commonalities in their perceptions of child behavior and the impact of those behaviors on their well-being, than what previous research has demonstrated. Several reasons for this outcome should be considered. First, descriptive analyses revealed that mothers and fathers within the same family unit generally reported similar mean levels in overall ratings of problem behavior in their children with ASD. Secondly, mothers and fathers in this study reported comparable mean levels of positive and negative affect. Whereas previous studies with dyadic pairs of mothers and fathers have revealed that mothers, in general, reported higher levels of stress than fathers of preschool and school-aged children with ASD, the current study revealed that mothers and fathers of preschool and school-aged children reported comparable levels of negative affect. Notably, it is also important to point out that these parents also shared high levels of positive affect. In fact, parents in this study reported generally higher rates of positive affect compared to

another ASD-parent sample (Pottie & Ingram, 2008), and compared to the general population (Crawford & Henry, 2004). Collectively, this research highlights the need to assess both negative and positive dimensions of parent well-being, and demonstrates that many families with ASD present with resilience and strength in adjusting to an ASD diagnosis and the subsequent challenges of raising a child with ASD.

The current findings have several important clinical implications for child and family interventions, as well as policies. Clinical interventions involving intensive behavioral therapy or applied behavior analysis have been found to be effective in reducing the presence of challenging problem behavior, and in turn, increase positive affect between parent-child dyads, as well as within parent dyads (e.g., Chorpita et al., 2011; Soloman, Ono, Timmer, & Goodlin-Jones, 2008). Targeting challenging behaviors may also reduce parent negative affect by strengthening their sense of self-efficacy (Baker et al., 2005). For example, a recent study examined the effectiveness of an evidence-based treatment involving parent behavioral management, parent child interaction therapy (PCIT; Eyberg et al, 1995), among parents of children with ASD (Soloman et al., 2008). Soloman et al. (2008) found that parents of boys (age 5-12) with high functioning ASD and clinically significant behavioral problems who participated in a PCIT intervention showed reductions in parent perceptions of problematic and atypical behavior and increased adaptive behavior. Parents also reported increased positive affect and shared positive affect with their child after the completion of therapy. During the intervention, effective parenting strategies, such as labeled praise, were tailored to address specific deficits often seen in ASD, such as lack of social initiation or social withdrawal. Interventions that include parent behavioral management strategies, such as

those mentioned above, will not only improve the presence of challenging behaviors, but also individual, parental, and family functioning.

Other clinical interventions involving emotional and instrumental practical support for parents should also be implemented. While challenging behaviors may certainly be ameliorated through interventions above, parents may also need extra supports in place in order to deal and cope with significantly challenging behaviors (e.g., aggressive behaviors, self-injurious behaviors), which have been found to produce feelings of isolation, exhaustion, and safety concerns, as well as financial strain related to home expenses, necessary alternative housing, and respite needs (Hodgetts, Nicholas, & Zwaigenbaum, 2013). Prior research supports that parents who had access to services, including support from other parents with developmental disabilities or practical support in understanding services available, reported that they felt less isolated, reduced stress, and hopeful (Cassidy, McConkey, Truesdale-Kennedy, & Slevin, 2008).

*Limitations.* There are several limitations in the current study. While the current study included a relatively large sample compared to previous studies, the analyses utilizing the APIM models were underpowered. With an even larger sample it would be possible to further elucidate possible effects in the APIM models. A larger sample could also provide a closer examination of other child factors that maybe associated with unique stressors for parents over the developmental lifespan. For example, a larger sample would allow for clustering of different developmental and behavioral profiles in children with ASD, such as children with ASD with and without language impairment, intellectual disability, and severity in social communication or repetitive behaviors.

Self-report measures were utilized in this study, and it is possible that affective state (i.e., negative or positive affect) may play a role in the appraisal of problem behavior, thus biasing the report of problem behavior. However, due to the cross-sectional nature of the study, causality cannot be determined between affect and perceptions of problem behavior. Future studies could include objective measures of behavior and affect in order to cross-validate or compare with parent report. While the current study utilized a measure that taps into conceptually distinct dimensions of child functioning, examining ASD-related problem behavior in children with ASD, it may not have elucidated ASD-related problem behavior as well as was hoped. While the measure has been used in other studies (e.g., Benson, 2009), parents were asked to rate the frequency of behaviors *currently* and did not specify a specific time frame. It may also be helpful to know if the problem behavior were present over a longer time period (e.g., past two weeks or past three months) to indicate if such behavior represented persistent problem behavior.

Although this study included a large sample of dyadic couples by providing the survey online to parents, self-selection bias is a possible limitation to the current study. Participants who chose to participate in the study may simply have been more willing to share their experiences, and these parents could very well be distinct from those who chose not to or were unable to complete the survey. Additionally, all of the participants were recruited from an autism center which provides informational, resources, referrals and support services. Therefore, participating families are perhaps more engaged with community resources and less isolated than those not affiliated with such an organization. Accordingly, the current study results may not accurately represent families with limited

resources or those who have received a diagnosis but not yet taken advantage of resources.

With respect to parent demographics, the current sample was substantially more ethnically diverse than most other samples assessing parent well-being, however, generalizability of the results was limited due to the fact that parents in this study were highly educated and within the middle to upper socioeconomic status. Future studies are needed in order to examine these processes in families of low SES to get an accurate scope of the challenges faced by families with ASD. Despite the ethnically and racially diverse sample recruited in the current study, with 50% of parents identifying as Hispanic, participants were required to be able to read and write in English, which may not accurately reflect the larger Hispanic population. More importantly, there is great variability within Hispanic culture. Future studies should examine differences in immigration or generational status, country of origin, or level of acculturation with Hispanic families and how that could alter adaptation within families with children with ASD. The current study was also cross-sectional, therefore causality may not be established between affect and report of problem behavior. Future research utilizing longitudinal designs should be employed to examine developmental trajectories of children with ASD and the association of problem behavior with parental functioning over time. Moreover, following these families from time of diagnosis through adulthood would help clarify if problem behavior continues to have an effect or if the association between problem behavior and parental affect attenuates as families acclimate and utilize learned strategies or accommodations to address the unique demands of raising a child with autism. For example, Gray (2002) found that well-being among parents of children

with ASD improved over a 10 year period. Therefore, a longitudinal study offers a more optimal methodology to explore the study of intrapersonal as well as interpersonal processes over the course of child's life.

*Future Directions.* Although several suggestions for modifications are mentioned above, additional study enhancements are described below. To reiterate, the current study results indicated that a negative dimension of child behavior, ASD-related problem behavior, were significantly related to negative parental affect, but *not* with positive parental affect. These findings support that there is an independent relationship between positive and negative affect. Also, this suggests that different dimensions of child behavior may be related to different dimensions of parental well-being. Thus, future studies should examine both adaptive and maladaptive characteristics of child behaviors in children with ASD in order to gain a more comprehensive picture of overall parental well-being. For example, identifying children's competencies and abilities across various developmental domains (e.g., behavior, social, cognitive, emotional, motor), will give us a better idea of which characteristics are associated with positive affect and well-being in parents. Perhaps more importantly, research is needed to examine the complex and multifaceted nature of positive experiences within families of children with ASD, including more strength-based family research (Tint & Weiss, 2016). Also, given that about 14% of families indicated they had another child with autism, another area of focus could examine the relationship between child behavior and parental functioning in these multiplex families.

While the present study results did not support interpersonal or dyadic effects between perceptions of ASD-related problem behavior and partner affect, future studies should also examine relational or familial processes, which may be more subjective in nature and likely to produce a secondary interpersonal effect. For example, a recent study by Ekas and colleagues (2016) examined predictors of relationship satisfaction. Results indicated that parents' perceptions of benefit finding, use of emotional support, and perceived partner support predicted greater relationship satisfaction in their partner. Research involving familial or relational processes that underlie parental well-being will also reveal potential moderators or mechanisms of the relationship between perceptions of challenging behaviors and parental outcomes. Lickenbrock et al. (2011), for example, found that marital adjustment moderated that relationship between perceptions of negative child behaviors in children with ASD and negative affect in mothers. Specifically, negative maternal perceptions of the child were positively associated with negative affect among mothers with reportedly low levels of marital adjustment. The same study also found that marital adjustment mediated the relationship between positive perceptions of child behaviors and positive affect.

In conclusion, understanding parental well-being among mothers and fathers of children with ASD is a significant area of study since caregivers play a valuable role in supporting individuals with autism across the developmental lifespan. The current study supported the longstanding finding that ASD-related problem behavior is associated with adverse maternal well-being, and now provides evidence that fathers also have a similar experience within the same family system. More importantly, this study highlighted that while parents with children with ASD likely report negative affect, they also experience

elevated levels of positive affect compared to the general population, suggesting significant benefits to having a child with autism. Taking this into account, the field should move towards a more comprehensive assessment of family functioning to include positive aspects of functioning.

## Tables

Table 1
*Sample Demographics (n = 124 dyads)*

| | Mothers % (*n*) | Fathers % (n) |
|---|---|---|
| Ethnicity | | |
| White/Caucasian | 33.1 (41) | 39.5 (49) |
| African American | 3.2 (4) | 2.4 (3) |
| Caribbean American | 1.6 (2) | .8 (1) |
| Hispanic/Latino(a) | 56.5 (70) | 52.4 (65) |
| Asian | 2.4 (3) | 1.6 (2) |
| Mixed Ethnicity/Other | 3.2 (4) | 3.2(4) |
| Household Income | | |
| < $7,500 | .8 (1) | 1.6 (2) |
| $7,500 - $14,999 | 1.6 (2) | .8 (1) |
| $15,000 - $24,999 | .8 (1) | .8 (1) |
| $25,000 - $$39,999 | 6.5(8) | 8.1(10) |
| $40,000 - $74,999 | 26.8 (33) | 23.6(29) |
| $75,000 - $99,000 | 21.1(26) | 20.3(25) |
| >$100,000 | 42.3(52) | 44.7(55) |
| Education | | |
| High School | 5.6 (7) | 9.7 (12) |
| Vocational Education | 2.4 (3) | 4.8 (6) |
| Some College Classes | 11.3(14) | 16.9 (21) |
| College Degree | 46.0 (57) | 35.5 (44) |
| Post College Degree | 34.7(43) | 33.1 (41) |
| Family Has Another Child with Autism | 9.7 (12) | 9.7 (12) |
| Family Has Another Child with Developmental Disability | 4.0(5) | 3.3(4) |

*Note.* Percentages are based on parent-report information. Household Income: one mother and one father did not complete item.

Table 2
*Parent and child demographics (n=124)*

| *Variable* | *Mean (SD)* | |
|---|---|---|
| | Mothers | Fathers |
| Parent Age<br>Minimum – Maximum | 38.84 (5.95)**<br>27 – 55 years | 41.76 (6.72)**<br>30 – 62 years |
| Number of hours working outside<br>Minimum – Maximum | 22.36 (19.24)**<br>0 – 52 hours | 36.68 (16.94)**<br>0 – 70 hours |
| Age of child with ASD (Months)<br>Minimum – Maximum | 81.09 (30.17)<br>29 – 154 | 81.16 (29.91)<br>30 – 154 |
| Age of Child at diagnosis (Months)<br>Minimum – Maximum | 38.27 (15.94)<br>14 – 105 | 37.73 (16.27)<br>15 - 96 |
| Time since diagnosis (Months)<br>Minimum – Maximum | 42.83 (31.47)<br>0 - 127 | 43.37 (31.53)<br>1 - 127 |
| Number of siblings<br>Minimum – Maximum | 1.22(0.87)<br>0 - 4 | 1.23(0.89)<br>0 - 4 |

*Note.* ** * indicates a significant difference a*t p <.001*

Table 3
*Additional child demographics (n=124)*

| | Mothers % (*n*) | Fathers % (*n*) |
|---|---|---|
| Child gender | | |
| Male | 83.1 (103) | 83.1 (103) |
| Female | 16.9 (21) | 16.9 (21) |
| Child Participates in school programs | 86.3(107) | 89.4(110) |
| Child receives therapy outside of school | 72.6 (90) | 74.8 (92) |

Note. School programs and therapy: one father did not complete items.

Table 4
*Study variables means and standard deviations (n = 124 dyads)*

| | Mothers | Fathers | *t-test p – value* |
|---|---|---|---|
| | *M (SD)* | *M (SD)* | |
| Autism Severity Index (ASI) | 49.91 (10.18) | 50.85 (10.24) | .242 |
| Minimum – Maximum | 19 - 74 | 20 - 80 | |
| PANAS Positive Affect | 36.50 (7.32) | 35.48 (6.33) | .143 |
| Minimum – Maximum | 17 - 50 | 17 - 50 | |
| PANAS Negative Affect | 24.74 (7.04) | 23.42 (6.10) | .084 |
| Minimum –Maximum | 11 - 41 | 10 - 41 | |

Table 5
*Bivariate correlations within and between study variables*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Mother - ASI | - | | | | | |
| 2. Mother -NA | .309** | - | | | | |
| 3. Mother -PA | -.180* | -.007 | - | | | |
| 4. Father - ASI | .617** | .144 | -.096 | - | | |
| 5. Father – NA | .087 | .180* | -.122 | .312** | - | |
| 6. Father – PA | -.094 | .009 | .376** | -.027 | -.202* | - |

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 6
*Final model for Negative Affect*

| Effect | Coefficient | *SE* | *p* |
|---|---|---|---|
| Intercept | | | |
| Wife | 11.319 | 2.880 | <.001 |
| Husband | 13.127 | 2.792 | <.001 |
| Actor Effects of ASD-related Problem Behavior | | | |
| Wife | .230 | .045 | <.001 |
| Husband | .230 | .045 | <.001 |
| Partner Effects of ASD-related Problem Behavior | | | |
| Wife | -.049 | .045 | .273 |
| Husband | -.049 | .045 | .273 |

*Note. N = 124; control variables include: child gender, maternal hours working outside of the home, paternal hours working outside of the home; Model fit indices, RMSEA=.025, CFI=.985, SRMR= .042.*

Table 7
*Final model for Positive Affect*

| Effect | Coefficient | *SE* | *p* |
|---|---|---|---|
| Intercept | | | |
| Wife | 33.46337.297 | 4.059 | <.001 |
| Husband | | 3.861 | <.001 |
| Actor Effects of ASD-related Problem Behavior | | | |
| Wife | -.029 | .047 | .533 |
| Husband | -.029 | .047 | .533 |
| Partner Effects of ASD-related Problem Behavior | | | |
| Wife | -.037 | .047 | .424 |
| Husband | -.037 | .047 | .424 |

*Note. N = 124; control variables include: paternal and maternal education; Model fit indices, RMSEA=.025, CFI=.977, SRMR= .042.*

Table 8
*Unstandardized path coefficients from constrained multiple-group model by age group for negative affect*

| Effect | Coefficient | *SE* | *p* |
|---|---|---|---|
| *Group 1: Preschool* | | | |
| Intercept | | | |
| Wife | 11.504 | 3.408 | <.001 |
| Husband | 14.377 | 3.204 | <.001 |
| Actor Effects of ASD-related Problem Behavior | | | |
| Wife | .237 | .045 | <.001 |
| Husband | .237 | .045 | <.001 |
| Partner Effects of ASD-related Problem Behavior | | | |
| Wife | -.062 | .045 | .170 |
| Husband | -.062 | .045 | .170 |
| *Group 2: School-Age* | | | |
| Intercept | | | |
| Wife | 11.740 | 3.188 | <.001 |
| Husband | 12.802 | 3.076 | <.001 |
| Actor Effects of ASD-related Problem Behavior | | | |
| Wife | 237 | .045 | <.001 |
| Husband | .237 | .045 | <.001 |
| Partner Effects of ASD-related Problem Behavior | | | |
| Wife | -.062 | .045 | .170 |
| Husband | -.062 | .045 | .170 |

*Note. N = 124; control variables include: child gender and maternal and paternal hours working outside of home. Model fit indices, RMSEA=.000, CFI=.1.000, SRMR= .065.*

Table 9
*Hierarchical Regression Analyses for Paternal Negative Affect*

| **Variables** | ***B*** | ***SE*** | ***β*** | ***$R^2$ change*** | ***p – value*** |
|---|---|---|---|---|---|
| *Step 1* | | | | .048 | .116 |
| Child Gender | -1.966 | 1.455 | -.121 | | |
| Maternal Number of Hours per week working outside of the home | -.040 | .028 | -.125 | | |
| Paternal Number of Hours per week working outside of the home | .038 | .032 | .107 | | |
| *Step 2* | | | | .054 | .009* |
| Child Gender | -1.299 | 1.441 | -.080 | | |
| Maternal Number of Hours per week working outside of the home | -.034 | .028 | -.107 | | |
| Paternal Number of Hours per week working outside of the home | .041 | .031 | .116 | | |
| ASI Informant Discrepancy | -.162 | .061 | -.237* | | |

Note. * $p < .05$

Table 10
*Hierarchical Regression Analyses for Maternal Negative Affect*

| **Variables** | ***B*** | ***SE*** | ***β*** | ***$R^2$ change*** | ***p – value*** |
|---|---|---|---|---|---|
| *Step 1* | | | | .095 | .007 |
| Child Gender | 4.275 | 1.635 | .229* | | |
| Maternal Number of Hours per week working outside of the home | .012 | .032 | .032 | | |
| Paternal Number of Hours per week working outside of the home | .088 | .036 | .214* | | |
| *Step 2* | | | | .020 | .106 |
| Child Gender | 3.810 | .1.649 | .204* | | |
| Maternal Number of Hours per week working outside of the home | .007 | .032 | .020 | | |
| Paternal Number of Hours per week working outside of the home | .085 | .035 | .209* | | |
| ASI Informant Discrepancy | .113 | .069 | .143 | | |

Note. *p < .05

Table 11
*Hierarchical Regression Analyses for Maternal Positive Affect*

| **Variables** | ***B*** | ***SE*** | ***β*** | ***$R^2$ change*** | ***p – value*** |
|---|---|---|---|---|---|
| *Step 1* | | | | .062 | .021* |
| Maternal Education | 1.181 | .652 | .257** | | |
| Paternal Education | -.176 | .547 | -.030 | | |
| *Step 2* | | | | .003 | .539 |
| Maternal Education | 1.757 | .662 | .248** | | |
| Paternal Education | -.185 | .548 | -.031 | | |
| ASI Informant Discrepancy | -.045 | .073 | -.055 | | |

Note. * $p < .05$, **$p < .001$

Table 12
*Hierarchical Regression Analyses for Paternal Positive Affect*

| **Variables** | ***B*** | ***SE*** | ***β*** | ***$R^2$ change*** | ***p – value*** |
|---|---|---|---|---|---|
| *Step 1* | | | | .062 | .021* |
| Maternal Education | .543 | .581 | .089 | | |
| Paternal Education | -.097 | .487 | -.019 | | |
| *Step 2* | | | | .004 | .485 |
| Maternal Education | .479 | .589 | .078 | | |
| Paternal Education | -.106 | .488 | -.021 | | |
| ASI Informant Discrepancy | -.046 | .065 | -.065 | | |

Note. * $p < .05$, **$p < .001$

## Figures

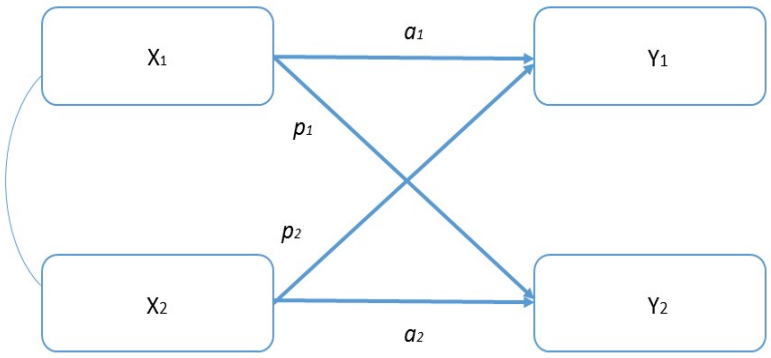


*Figure 1*. Hypothesized Actor-Partner Interdependence Model (APIM). X represents the independent variable and Y represents the dependent variable; *a* is the actor effect and *p* is the partner affect.

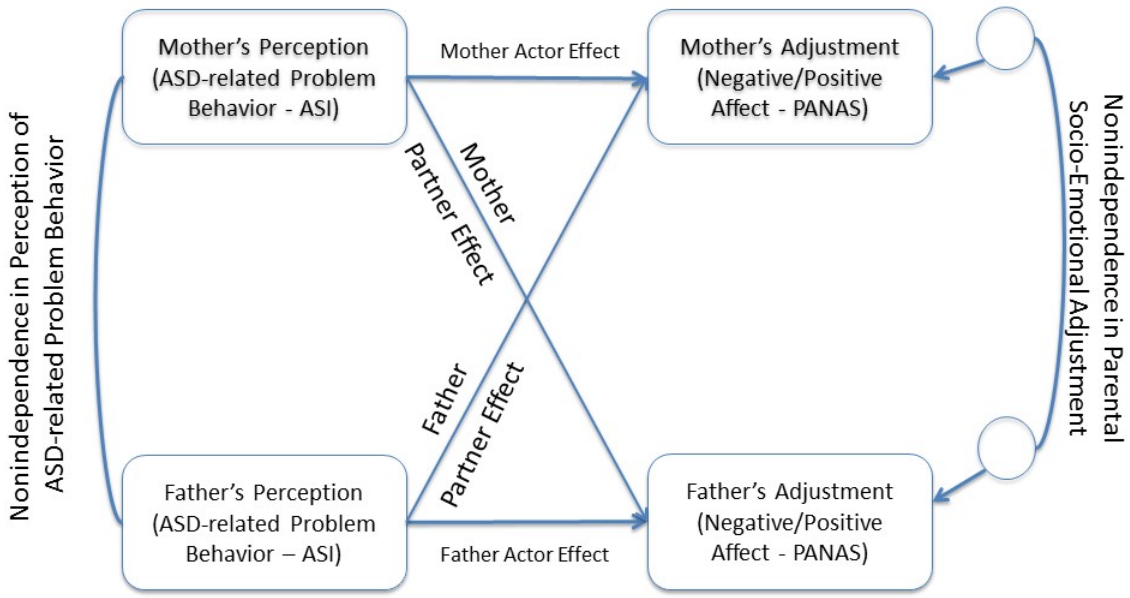


*Figure 2.* Proposed APIM Model with Socio-Emotional Adjustment in Couples with Children Autism Spectrum Disorder: Individual and Dyadic Effects of ASD-related Problem Behavior in Mothers and Fathers. Aim 1 tests significance of nonindependence among mothers' and fathers' perception of ASD-related Problem Behavior, as measured by the ASI, and socioemotional adjustment, as measured by the negative and positive affect from the PANAS, respectively. Aim 2 tests significance of actor effects of one's own perception of ASD-related Problem Behavior, on their own socio-emotional adjustment. Aim 3 tests significance of partner effects of one's own perception of ASD-related Problem Behavior on their partner's socio-emotional adjustment.

## APPENDIX A

DEMOGRAPHIC INFORMATION

Gender:
- □ Male
- □ Female

Marital Status:
- □ Single
- □ Married
- □ Separated
- □ Divorced
- □ Widowed

Your age:

Spouse/Partner's age:

Your level of education:
- □ High school
- □ Vocational education
- □ Some college classes
- □ College degree
- □ Post college professional degree (MA, PhD, MD, Law, other)

Spouse/partner's Level of education:
- □ High school
- □ Vocational education
- □ Some college classes
- □ College degree
- □ Post college professional degree (MA, PhD, MD, Law, other)

Household income:
- □ Less than $7,500
- □ $7,500 - $14,999
- □ $15, 000 - $24,999
- □ $25,000 - $39,999
- □ $40,000 - $74,999
- □ $75,000 - $99,999
- □ Over $100,000

Please indicate the number of hours you work outside the home per week: _____

Please indicate the number of hours your spouse/partner works outside the home per week:

Please indicate your ethnic background: (Check the one that best fits)
- □ White/Caucasian
- □ African American
- □ Caribbean American
- □ Hispanic or Latino
- □ Asian
- □ Mixed ethnicity/other (please specify): _____

Please indicate your spouse/partner's ethnic background: (Check the one that best fits)

- □ White/Caucasian
- □ African American
- □ Caribbean American
- □ Hispanic or Latino
- □ Asian
- □ Mixed ethnicity/other (please specify): _____

If you have more than one child with autism, please provide information on your child with the most recent diagnosis below.

Date of birth of child with autism: _____
(Month) (Date) (Year) (Age)

Gender of child with autism:

- □ Male
- □ Female

What is the official diagnosis of your child with autism? Please choose one.

- □ Autistic Spectrum disorder
- □ PDD-NOS
- □ Asperger's Syndrome

Please provide the age of child at the time of diagnosis: _____

Does your child with autism participate in any school programs?

- □ Yes
- □ No

Does your child with autism receive therapy outside of school?

- □ Yes
- □ No

Please indicate how many siblings your child has: _____

Do you have another child with autism? If so, please list their age and gender below.
(Age)(Gender)

Do you have another child with a developmental disability, other than autism? If so, please list their age and gender below.
(Age)(Gender)

## APPENDIX B

AUTISM SEVERITY INDEX

(Benson, 2000, unpublished manuscript)

**Autism Severity Index**

**For all questions, check the box (□) that corresponds to your answer.**

**Below is a list of behaviors that children may display. Please indicate how frequently your child currently displays the following behaviors:**

| | Never | Rarely | Occasionally | Often | Always |
|---|---|---|---|---|---|
| Receptive communication difficulties | □ | □ | □ | □ | □ |
| Expressive communication difficulties | □ | □ | □ | □ | □ |
| Limited food preferences/other eating problems | □ | □ | □ | □ | □ |
| Hyperactivity | □ | □ | □ | □ | □ |
| Rapid mood swings | □ | □ | □ | □ | □ |
| Shrieking or screaming | □ | □ | □ | □ | □ |
| Tantrums | □ | □ | □ | □ | □ |
| Social withdrawal | □ | □ | □ | □ | □ |
| Lack of eye contact | □ | □ | □ | □ | □ |
| Self-stimulatory behaviors | □ | □ | □ | □ | □ |
| Repetitive behaviors | □ | □ | □ | □ | □ |
| Sadness or depression | □ | □ | □ | □ | □ |
| Sleep problems | □ | □ | □ | □ | □ |
| Difficulty adjusting to change | □ | □ | □ | □ | □ |
| Noncompliance | □ | □ | □ | □ | □ |
| Pica/eating inedible objects | □ | □ | □ | □ | □ |
| Self-injury | □ | □ | □ | □ | □ |
| Aggression towards others | □ | □ | □ | □ | □ |

## APPENDIX C

POSITIVE AND NEGATIVE AFFECT SCALE

*(PANAS; Watson, Clark, & Tellegen, 1988)*

Positive and Negative Affect Schedule

This scale consists of a number of words that describe different feelings and emotions. Please mark the number that best describes the extent to which you feel each emotion in general. Use the following scale.

| **Not at all 1** | | **A little 2** | | | | **Moderately 3** | | **Quite a bit 4** | | | **Extremely 5** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interested | j | k | l | m | n | Irritable | j | k | l | m | n | |
| Distressed | j | k | l | m | n | Alert | j | k | l | m | n | |
| Excited | j | k | l | m | n | Ashamed | j | k | l | m | n | |
| Upset | j | k | l | m | n | Inspired | j | k | l | m | n | |
| Strong | j | k | l | m | n | Nervous | j | k | l | m | n | |
| Guilty | j | k | l | m | n | Determined | j | k | l | m | n | |
| Scared | j | k | l | m | n | Attentive | j | k | l | m | n | |
| Hostile | j | k | l | m | n | Jittery | j | k | l | m | n | |
| Enthusiastic | j | k | l | m | n | Active | j | k | l | m | n | |
| Proud | j | k | l | m | n | Afraid | j | k | l | m | n | |

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