What Drives Parental Concerns about their 18-Month-Olds at Familial Risk for Autism Spectrum Disorder?

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Abstract

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Parent-reported concerns can be a first step toward further screening and intervention for children at risk for ASD. However, little is known about how parental well-being may contribute to parental concerns, especially in families who already have one child with ASD. This study included 54 parents and their 18-month-old high-risk toddlers to examine the extent to which parents' well-being and children's expressive language and social communication contribute to concerns about their toddlers. Results revealed that parental concerns were predicted by both their own well-being and their toddler's expressive language. These results suggest that elicitation of parental concerns may provide important information about both toddlers and parents, and highlight the importance of considering parental well-being in developing support plans for families.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterized by deficits in two core domains: Social communication and restricted interests and repetitive behaviors (American Psychiatric Association, 2013). The Center for Disease Control (CDC) currently estimates that 1 in 68 children in the United States has ASD (CDC, 2016), which is a 30% increase from prevalence estimates released in 2012 (CDC, 2012). Although many children are not diagnosed until after their third birthday, a number of parents of children with ASD report concerns about their child's behavior or development long before they receive a formal diagnosis of ASD (Chakrabarti, & Fombonne, 2005; Wetherby, Brosnan-Maddox, Peace, & Newton, 2008). Children and families benefit from earlier identification and diagnosis as the identification of children who are at risk leads directly to their referral for further diagnostic evaluations and, if warranted, early intervention. Children as young as 18-months have shown improvement in IQ and adaptive behavior after completing comprehensive, intensive early intervention programs that provide 20 hours per week of clinician delivered intervention services. (Dawson et al., 2009), and children as young as 21 months have shown improvements in social-emotional and engagement functioning after targeted intervention (Ingersoll, 2012; Kasari, Gulsrud, Wong, Kwon, & Locke, 2010). Without referral for early intervention, children cannot make gains in these pivotal areas.

The elicitation of parental concerns is often the earliest way to detect toddlers who may benefit from further screening and evaluation (Glascoe, 1994). The American Academy of Pediatrics recommends that pediatricians assess for parental concern about developmental problems using a validated measure beginning at the 9-month visit, and continuing at well-child visits at 18 months and either 24 or 30 months (American Academy of Pediatrics, 2007). Parent report is valuable for substantial reasons. Parents of toddlers spend a great deal of time with their

children and, as such, have observed them in multiple contexts over time. This comprehensive view provides parents and primary caregivers a fine-grained, multifaceted perspective of a child's strengths and weaknesses.

Conversely, primary care providers spend limited time with children and may not observe all of a child's varied skills. If they do not see a behavior in the office, they may assume that it is not occurring (Stone, Hoffman, Lewis, & Ousley, 1994). This may lead to cognitive errors that make a diagnosis of a developmental delay more challenging. These errors can stem from not having complete knowledge of the child and his or her development, likely due to the time-limited nature of doctor's visits and not gathering information from multiple respondents. Without discussing a child's behavior with multiple sources, pediatricians run the risk of making cognitive errors due to faulty reasoning or basing opinions and diagnoses on behaviors seen in the office alone (Graber, Gordon, & Franklin, 2002). If a parent complains about significant behavioral challenges, but none are observed during a well-child visit, it could be easy to assume that no challenging behaviors exist; however, it is more likely that a child was simply not exhibiting this behavior in the pediatrician's office, especially since children tend to behave differently in unfamiliar situations (Glascoe, MacLean, & Stone, 1991).

Furthermore, in order to use time efficiently, pediatricians often rely on their own heuristics when making a diagnosis. The danger in relying on an availability heuristic, for example, is that while it may save time, pediatricians may not consider that the child in front of them may not "grow out of" some of his or her behaviors even though this pediatrician may have observed this phenomenon in other children (Graber et al., 2002). The reliance on these heuristics and the cognitive errors that stem from this reliance are particularly important to consider when assessing for ASD, as a delay in diagnosis could result in delays for early

intervention services. In fact, Zuckerman, Lindly, and Sinche (2015) found that parents of children with ASD express concerns earlier than parents of children with either intellectual disabilities (ID) or developmental disabilities (DD), and, importantly, that these parents are more likely to receive reassurance from pediatricians rather than the proactive responses received by parents of children with ID or DD. One way to combat these cognitive errors and tendencies towards reassurance is to use multiple informants to assess a child's behavior, beginning with children's parents.

A strong body of literature exists regarding the accuracy of parent report of children with developmental delays or behavioral challenges (Glascoe, 1999a, 1999b, 2000; Malhi & Singhi, 2002; Pulsifer, Hoon, Palmer, Gopalan, & Capute, 1994). In other clinical populations, parents correctly identified 76% of children with conduct problems and 70% of children with typical behavior (Malhi & Singhi, 2002), suggesting the importance of parent report not only in detecting challenges where they exist, but also in detecting typical development. Including parents' perspectives in the screening process is particularly valuable when attempting to detect developmental delays. Two commonly used parent-report screening tools are the Ages and Stages Questionnaire (ASQ; Bricker & Squires, 1999) and the Parents' Evaluation of Developmental Status (PEDS; Glascoe, 2006). Both the PEDS and ASQ are brief screening measures that ask either about parents' concerns in different developmental areas (PEDS) or whether a child has certain skills in a variety of domains (ASQ). When parents were asked to complete the ASQ and the PEDS either in a pediatrician's office or at home, both measures demonstrated moderate to high sensitivity with regard to screening for developmental delay and the ASQ demonstrated high specificity in screening for delay (Limbos & Joyce, 2011). When parents were asked to complete the PEDS, they accurately identified approximately 70% of

children with developmental delays (Glascoe, 1997). In addition, when mothers of preschool children were asked to estimate their child's developmental age, their estimations were highly correlated with their child's developmental age as determined using standardized measures completed by an objective observer (Pulsifer et al., 1994). Parental concerns are a valuable tool to be used in the screening process for children who would benefit from further developmental or behavioral screening (Glascoe, 1994).

Historically, research on parental concerns about young children with ASD has been used in retrospective studies to identify the early behaviors associated with ASD (Baghdadli, Picot, Pascal, Pry, & Aussilloux, 2003; Chawarska et al., 2007; Coonrod & Stone, 2004; De Giacomo & Fombonne, 1998; Young, Brewer, & Pattison, 2003). Retrospective studies from the late 1990s to early 2000s revealed that parents of children with ASD became concerned about their toddler's development at an average age of 17-19 months (Chawarska et al., 2007; Coonrod & Stone, 2004; De Giacomo & Fombonne, 1998; Siegel, Pliner, Eschler, & Elliot, 1988; Young et al., 2003). In these studies, parents of children already diagnosed with ASD were asked to reflect upon their child's development early in life through the use of open-ended questions in an interview format or through the use of self-report questionnaires. Results have revealed that parents of children with ASD most often reported first concerns related to language (Chawarska et al., 2007; Coonrod & Stone, 2004; Young et al., 2003), and additional concerns related to the social development of their child (Chawarska et al., 2007).

More recently, parental concerns have been assessed prospectively in samples of infant siblings of children with ASD (i.e., high risk [HR] siblings), who are at elevated genetic risk for ASD as well as language and cognitive delays (Grønborg, Schendel, & Parner, 2013; Messinger et al., 2013; Ozonoff et al., 2011). In addition to formal screening measures, prospective research

studies have used site-specific screening tools including surveys or semi-structured interviews. Results from these studies have revealed that parental concerns about their HR toddlers are valid (McMahon, Malesa, Yoder, & Stone, 2007) as well as predictive of later developmental challenges (Hess & Landa, 2011; Ozonoff et al., 2009; Sacrey et al., 2015). In two separate studies, the number of parents' developmental concerns (Sacrey et al., 2015) and the presence of autism-specific concerns at 12 months (Ozonoff et al., 2009) were associated with HR infants' 36-month ASD diagnosis. Sacrey and colleagues (2015) asked that parents complete a semi-structured interview to assess their current concerns in three broad areas: communication concerns, behavioral concerns and general concerns. Parents were then coded as either "concerned" or "not concerned" in each area assessed. The number of parental concerns reported was associated with later child diagnosis. Ozonoff and colleagues (2009) interviewed parents and asked them an open-ended question about whether they had current concerns about their child's development. Responses were recorded and later coded into one of eight categories of concerns: communication, social, stereotyped behavior, unspecified autism concerns, motor, medical/regulatory, behavior/temperament, and general development. As with Sacrey and colleagues (2015), Ozonoff and colleagues (2009) followed a similar procedure and coded responses as either "concerned" or "not concerned" in each developmental area. The eight categories of concerns were then dichotomized into "ASD-concerns" and "non-ASD concerns" and ASD-specific concerns were associated with a later ASD diagnosis.

Another study found that the presence of developmental concerns at 24 months, but not 14 months, was predictive of later ASD diagnosis (Hess & Landa, 2011). Hess and Landa (2011) asked that parents complete questionnaires that asked open-ended questions about their concerns about their child's development. Parents were asked whether they were concerned about their

child's development, and if they were concerned, to list current concerns. They were also asked to complete a questionnaire that asked open-ended questions related to their child's strengths, changes in communication, developmental concerns and any additional information parents wished to share. Parents' concerns across each of these questionnaires were compiled and grouped into six categories: communication, motor, social, behavior/temperament, sensory, and any other areas. As with other prospective studies (Ozonoff et al., 2009; Sacrey et al., 2015), parents' responses in each category were dichotomized into either "concerned" or "not concerned." Even when not categorized as ASD-specific concerns, parental concerns are associated with a child's diagnosis of ASD.

Another parent-report research measure that is commonly used to assess parental concerns is the Parent Concerns Form (PCF). Parents are asked to rate their concerns in seven different developmental areas on a three-point scale. Parents can select either no concern (0), a little concern (1) or yes concern (2). When using the PCF between 12 and 24 months of age, parental concerns about their HR toddler's development were significantly correlated with concurrent, independent measures of toddlers' cognitive and language development (McMahon et al., 2007). Collectively, these studies provide support for the validity of early parental concerns about their toddler, as well as highlight the importance of considering parental concerns when making decisions about toddlers' needs for additional screening or evaluation. Eliciting parental concerns about HR toddlers can serve the purpose of learning about early symptoms or risk factors for ASD that may warrant initiation of preventative interventions at young ages.

At the same time, research with other child populations has suggested that parental reporting of their child's behavior may be influenced by their own mental health. For example, parents with high levels of depressive symptoms have reported that their children also have high

levels of depressive symptoms, suggesting a potential reporting bias (Boyle & Pickles, 1997; Fergusson, Lynskey, & Horwood, 1993; Richters, 1992). It is important to note, however, that it is also possible that mothers with higher levels of depressive symptoms report higher levels of challenging child behavior as compared to mothers with lower levels of depressive symptoms because their children are, in fact, more challenging. Additionally, it is also difficult to discern the temporal relation between maternal depressive symptoms and child behavior. That is, it is possible that maternal depressive symptoms were high before children began displaying challenging behavior. Conversely, it is also possible that maternal depressive symptoms increase as a result of a child's challenging behavior. Both the influence of a child's challenging behavior and the temporal relation between child behavior and maternal depression remain difficult to disentangle despite efforts to include objective reports from teachers and reports from children themselves (e.g., Fergusson et al., 1993). Boyle and Pickles (1997) did find, however, that the association between maternal depressive symptoms and their ratings of their child's behavior changed over time. When children were 8-12 years old, there was an association between maternal depressive symptoms, child behavior, and maternal reporting errors of their child's behavior. However, when these same children were 12-16 years of age, maternal depressive symptoms were only associated with child behavior, not with maternal reporting error. There may be a bidirectional relation between maternal depressive symptoms and child behavior (Boyle & Pickles, 1997), which remains important to consider, especially in parents of children with ASD.

The mental health of parents of children with ASD warrants consideration, as several studies have found that these parents experience elevated levels of stress and depression relative to parents of children with typical development as well as children with other developmental

disabilities (Baker-Ericzn, Brookman-Frazee, & Stahmer, 2005; Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001; Ingersoll & Hambrick, 2011). When examining cortisol levels in parents of children with ASD, the pattern of results was similar to that of combat soldiers, parents who have a child with cancer, and individuals who suffer from PTSD (Seltzer et al., 2010). These results may stem from chronic levels of stress that parents of children with ASD experience, due to their child's behavioral challenges or social impairments (Hastings, 2003; Baker-Ericzn et al., 2005; Seltzer et al., 2010), and the strain placed on caregivers' time and resources (Zuckerman et al., 2014). In fact, recent studies have found an association between parental depressive symptomatology and increased behavioral concerns for their children with ASD (Bennett et al., 2012; Bitsika & Sharpley, 2016) as well as for their later-born toddlers (Talbott, Nelson, & Tager-Flusberg, 2015). Bennett and colleagues (2012) asked mothers to rate both their own depressive symptoms and the behavioral challenges that they experience with their young child with ASD. Child behavior was examined through both maternal report and objective measures. Interestingly, maternal depressive symptoms were associated with maternal-reported ASD symptoms, but not with clinician reported severity of ASD symptoms. This relation points to the importance of considering the effect of maternal well-being on their reporting of child behavior.

It is possible that other child factors contribute to maternal well-being above and beyond the effects of ASD symptoms. In another study, Bitsika and Sharpley (2016) examined the relation between self-rated maternal depressive symptoms and ratings of their son's depressive symptoms when he also had ASD. Results revealed an interesting outcome: mothers with more severe self-reported depression reported that their son had more severe depressive symptoms as compared to mothers with less severe depressive symptoms. A third party also rated child depressive symptoms in order to provide an unbiased assessment of depression. Though this

study examined the severity of depressive symptoms, Bitsika and Sharpley (2016) did not include child autism severity in their model, which could address some of the questions raised by Bennett and colleagues (2012) in order to examine whether over-reporting exists when both child depressive symptoms and ASD severity are included in the same statistical model.

More recently, Talbott and colleagues (2015) examined depression in mothers of HR toddlers. Mothers completed weekly open-ended measures of their concerns about their HR toddler's development. Mothers were asked if they were concerned about their toddler's development and, if so, to describe their concerns. The methodology used by Talbott and colleagues (2015) is unique; however, the way in which they categorized concerns is similar to the techniques used by other prospective studies (i.e., Hess & Landa 2011; Ozonoff et al., 2009; Sacrey et al., 2015). Maternal responses were coded into four categories: language, social communication, restricted or repetitive behaviors and general/medical concerns. They then created a group of "autism concerns," which included all categories besides general/medical concerns. Maternal depressive symptoms were associated with maternal concerns about their HR toddlers, such that mothers with at least one concern about their toddler's development reported more depressive symptoms than mothers who did not express any concerns. Interestingly, the presence of at least one concern was associated with maternal depressive symptoms, not the type of concern that parents expressed. Additionally, there was no association found between maternal depressive symptoms and child behavior. As Talbott and colleagues (2015) identify, it is challenging to discern whether maternal depressive symptoms lead to an over-reporting of concerns or whether parents who are concerned about their child's development leads to an increase in maternal depressive symptoms. The potentially bi-directional relation between maternal depressive symptoms, child behavior and maternal concerns warrants further

examination. Collectively, these studies suggest that maternal well-being plays a role in maternal reporting of their child's symptoms. Identifying the relative contributions of toddler behavior and parental well-being to parental concerns about their HR toddlers may have implications for promoting a more holistic approach to care plans that focuses on improving parental well-being in addition to toddlers' learning and development.

The purpose of the present study was to examine the relative contributions of parental well-being and child behavior on parents' expression of concerns about their 18 month-old HR toddler. This age was selected because 18 months is the average age at which parents first report concerns about their toddler's behavior or development (De Giacomo & Fombonne, 1998) and also the age at which the American Academy of Pediatrics recommends that pediatricians begin to probe for ASD-specific parental concerns during well-child visits (American Academy of Pediatrics, 2007). Parental well-being was conceptualized in terms of parenting-related stress and parenting self-efficacy. Two types of toddler behaviors were selected – expressive language and social communication – because these areas are the most commonly reported early concerns of parents of toddlers with or at risk for ASD (Chawarska et al., 2007; Coonrod & Stone, 2004; Hess & Landa, 2011; Young et al., 2003). Understanding the relative influence of parental well-being and toddler behavior on parental concerns may provide a window into parents' experiences and offer opportunities for screening and supportive services for both the parent and child.

Method

Participants

The sample comprised 54 parents (53 mothers) with a child with ASD and a younger toddler who participated in a longitudinal multi-site study examining the social and emotional development of HR toddlers. Participants were recruited from two sites: the University of

Washington and Vanderbilt University. Recruitment methods included the use of statewide databases of birth records as well as flyers posted at research centers and clinics. Before beginning research procedures, informed consent was obtained from all participants. Participants enrolled in the longitudinal study between the ages of 6 and 12 months of age, and completed study visits at up to 7 time-points: at 6, 9, 12, 15, 18, 24 and 36 months of age. All participants had an older sibling with ASD as validated via the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000), the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur & Lord 2003) and a clinical diagnosis based on DSM-IV criteria (APA, 2000). Other inclusion criteria were: (1) toddler's gestational age $\geq$ 37 weeks, birth weight $\geq$ 2,500g, and absence of severe motor or sensory impairments, or genetic, neurological, or metabolic disorders; and (2) English as the parent's primary language. The current study includes data from the 18-month visit only. The current study includes 47.8% of the main sample. Participants were excluded (n = 59) from the current study because enrollment in the current study was limited to families with complete data for the relevant measures of parental concerns, parental well-being, and toddler behavior at the 18-month research visit. The majority of parents in the sample were highly educated and identified their race as Caucasian. See Table 1 for demographic characteristics.

Measures

Parental concerns about their toddler were measured using the Parent Concerns Form (PCF; McMahon et al., 2007), a self-report questionnaire examining concerns in seven areas of development: language understanding, language use, fine motor skills, gross motor skills, behavior, social interactions, and adaptive behavior. Parents rate their concern in each area using response options of "no," "a little," or "yes." For this study, responses indicating any concern at

all (i.e., "a little" or "yes") were coded as 1, and responses of "no" were coded as 0. Scores could range from 0-7, with higher scores indicating more concerns. McMahon and colleagues (2007) examined parental concerns on a 0-14 scale and found an internal consistency of .73. The current study was concerned with highlighting any level of concern, which prompted the collapsing of the "a little" and "yes" responses. Cronbach's α for the current sample was .76.

Parental well-being was assessed using two commonly-used parent-report instruments: the Parenting Stress Index-Short Form (PSI-SF; Abidin, 1990) and the Maternal Efficacy Scale (MES; Teti & Gelfand, 1991). Both measures were selected due to their parenting-specific nature and their previous use with parents of children with ASD (e.g., Carter, Martínez-Pedraza, & Gray, 2009; Davis & Carter, 2008; Kuhn & Carter, 2006). The PSI-SF comprises 3 domains (Parent-Child Dysfunction, Difficult Child, and Parental Distress) that are used to derive a Total score ranging from 36 to 180, with higher scores indicating higher levels of parenting stress. The PSI-SF has strong internal consistency and moderate reliability and Cronbach's α for the entire scale in this sample was .95.

The MES is a 10-item questionnaire that assesses a parent's sense of competence regarding his or her ability to parent his or her child. Scores range from 10-40, with higher scores indicating higher levels of self-efficacy. The MES has strong psychometric properties with a reliability of $\alpha = .79$ and concurrent validity with a related measure, $r = -.75$ (Teti & Gelfand, 1991). In the current sample, Cronbach's α was .83.

A composite score was created from the parenting stress and self-efficacy measures in light of previous findings that the two constructs are correlated (Kuhn & Carter, 2006) and to create a more robust measure of parental well-being (Stone & Yoder, 2001). The correlation between the PSI-SF and the MES was -.65, $p < .01$. Because the two measures employ different

scales, the composite score was computed using Percent of Maximum Possible Score (Cohen, Cohen, Aiken, & West, 1999), and the PSI-SF was reverse scored so that higher scores on the composite reflect higher levels of well-being.

Two domains of toddler behavior were measured: expressive language and social-communicative behavior. The MacArthur Communicative Development Inventories (MCDI; Fenson et al., 2007) was used to measure toddler expressive language. Parents review a checklist of 396 words and indicate which words the toddler "understands and says." The MCDI has a concurrent validity of .74 when compared with other measures of child language and strong internal consistency, $\alpha = .97$ (Boucher, 2007). The Screening Tool for Autism in Toddlers (STAT; Stone et al., 2004, 2008) was used to measure toddler social-communication skills. The STAT is a 12-item, 20 minute play-based assessment that has proven useful as a continuous measure of toddlers' social-communicative skills (Malesa et al., 2013; Stone, McMahon, Yoder, & Walden, 2007). Scores in four domains –Requesting, Directing Attention, Play, and Motor Imitation –are summed to obtain a Total score that ranges from 0-4, with higher scores indicating weaker skills. The STAT has a test-retest reliability of $\kappa = .90$ and an inter-rater reliability of $\kappa = 1.00$ (Stone et al., 2004).

Results

Preliminary analyses

Preliminary analyses revealed that 18 of the 54 parents (33%) reported no concerns about their toddler's development at 18 months on the PCF. Due to this zero-inflation, parental concerns were dichotomized into "no concerns (0)" and "one or more concerns (1)." In addition, because scores on the MCDI demonstrated a non-normal distribution (skewness = 2.10, kurtosis = 5.38), quartile scores derived from this variable were used.

Main analyses

Means and standard deviations for all study variables are presented in Table 2. Point-biserial correlations revealed that the presence of parental concerns was associated with lower levels of toddler expressive language and parental well-being, $r = -.28$, $p < .05$ and $r = -.55$, $p < .01$, respectively. Parental well-being was not associated with either toddler expressive language, $r = .12$, $p = .37$, or social communication, $r = -.05$, $p = .72$. Additional correlations are presented in Table 3.

Logistic regression was then used to examine the relative contributions of expressive language and parental well-being to parental concerns. Results revealed that both toddler expressive language, $OR = .58$, $\beta = -.55$, $p < .05$, Nagelkerke pseudo $R^2 = .10$, and parental well-being, $OR = .84$, $\beta = -.17$ $p < .01$, Nagelkerke pseudo $R^2 = .47$, independently predicted parental concerns. Toddler expressive language and parental well-being were then entered in a model together to identify their individual contributions. When controlling for each other, both toddler expressive language, $OR = .47$, $\beta = -.76$, $p < .05$, and parental well-being, $OR = .82$, $\beta = -.20$, $p < .05$, predicted the probability of parental concerns. The Nagelkerke pseudo R^2 for the model was .56. Predicted probabilities were plotted to illustrate the contribution of each predictor to parental concerns, while controlling for the other predictor (see Figure 1). Different patterns emerged for the two predictor variables. For parental well-being, those with lower levels of well-being (i.e., scores below the sample mean) were highly likely to report concern. However, the likelihood of concern decreased precipitously as well-being scores approached and surpassed the mean. In contrast, predicted probabilities for toddler expressive language demonstrated a more consistent likelihood of parental concern across the range of toddler expressive language levels.

Discussion

The purpose of this study was to examine the extent to which parents' well-being and their toddler's behavior contribute to parental concerns about their high-risk toddler's development. Results reveal that both parental well-being and a specific aspect of their toddler's development (i.e., expressive language) contribute independently to parent-reported concerns. These data suggest that eliciting concerns about their later-born toddler may capture important information about both the parent and the child, and may be helpful not only for identifying toddlers who may benefit from further developmental screening and evaluation, but also for identifying parents who may benefit from additional supports.

It was somewhat surprising that toddlers' social-communication skills were not predictive of parental concerns, while expressive language was. This result may reflect common-method variance, in that both concerns and language were elicited through parental self-report, whereas social communication was based on an examiner-administered measure. However, it should be noted that the parent was present during the social-communication assessment, and as such was able to observe his or her child's performance during this measure. An alternative explanation is that social-communication skills tend to have a more subtle presentation and less well-known milestones of development than does expressive language (Caronna, Augustyn, & Zuckerman, 2007). In addition, the parents in this study may not have had experience parenting a neurotypical child, which might provide a set of social-communication norms or expectations against which they might measure their toddler's social-communication development. The nuanced nature of social communication, combined with possible decreased hands-on experience in this area, could contribute to reduced parental understanding regarding expected milestones.

Examining the relative contributions of parents' well-being and toddlers' expressive language to parental report of concerns revealed some interesting findings. Although both

parental well-being and toddler expressive language independently predicted the probability of parental concerns, there were subtle differences in the patterns that emerged. When controlling for parental well-being, parents of toddlers with higher levels of expressive language were less likely to express concern about their development, compared to parents of toddlers with lower levels of expressive language. This pattern was similar across all levels of expressive language (see Figure 1), and is consistent with previous literature suggesting that expressive language is an area of development to which parents are particularly sensitive (Coonrod & Stone, 2004).

On the other hand, when controlling for expressive language, parental well-being demonstrated a different pattern. For parents with well-being below the sample mean, there was a high likelihood that they would express concern about their child's development. However, as their well-being increased, the likelihood that they would report concerns about their toddler's development declined sharply. This finding suggests the possibility of a potential threshold effect for parental well-being, in that parents who experience well-being (in terms of parenting stress and/or efficacy) above a certain point may be less likely to either perceive or report concerns. Although this idea is highly speculative in light of our available data, it may be of heuristic value for future research in this area.

It is noteworthy that parents' well-being was not associated directly with toddler expressive language or social communication. This is important because, although impairments in these areas are common in HR toddlers, they do not appear to be related to parental well-being in this sample. The well-being of parents in the current study may be related to other toddler and/or parent characteristics. One possible explanation is that parents' well-being may be affected more by their child's challenging behaviors than to developmental milestones, as suggested by previous research (Hastings et al., 2005; Meirsschaut, Roeyers, & Warreyn, 2010).

The current study has several limitations. First, our measure of expressive language was based only on parental report; no objective measure of language was administered at the 18-month visit. Second, the zero-inflated nature of our parental concerns data limited our options for statistical analyses. The original intent of this project was to treat parental concerns as a count variable. However, due to the zero-inflated nature of the variable as well as the small sample size, these statistical analyses, such as a zero-inflated negative binomial regression, were not possible. Treating parental concerns as a count variable would allow for more detailed information related to the extent to which parental well-being influences the number of concerns that parents report. Third, the use of a composite variable of parental well-being prevented comparison of results from this sample to those of published norms. The use of this composite variable also prohibited the examination of the extent to which each component (i.e. stress and self-efficacy)—or perhaps even another latent parenting factor—contributed to their concerns. Future studies might examine additional aspects of parental well-being (e.g., depression) in order to determine which factor or factors have the strongest effect on parents' concerns.

This study was completed using a pre-existing dataset and, as such, there were certain inherent constraints. Future studies could collect data at multiple time points over the child's first 2-3 years of development to examine potential changes in the relation between parental well-being and parental concerns over time. If child behavior and parental concerns were measured repeatedly, more information could be gleaned about the extent to which different child behaviors may contribute to parental concerns over time. For example, it may be that a parents' concerns at 18 months are mostly centered around language as children may miss well-known milestones at this age; however, as children grow, their deficits in the social development may become more apparent and concerning to parents.

In addition to examining the relation between child behavior and parental concerns over time, longitudinal studies could also examine the relation between child behavior and parental well-being throughout a child's early years of life. The current study did not find a relation between child behavior and parental well-being; however, it may be that the child behaviors included in this study did not address additional child characteristics (e.g., challenging behavior) that may be most associated with parental well-being. Future studies could examine whether changes in child behaviors, both those related to social-communication as well as additional behaviors of interest are related to changes in parental well-being. Furthermore, longitudinal studies would allow for the examination of the extent to which improvements in parental well-being predict their reports of their child's behavior, or whether improvements in child behavior lead to improvements in parental well-being. It is also possible that other areas of a parent's life are influencing their own well-being at different ages. As such, it may also be of interest to include a measure of stressful life events that a parent is experiencing in order to address additional factors that may influence their concerns about their child.

The longitudinal examination of each of these variables could also lead to the examination of the relative contributions of child behavior and parental well-being in predicting parental concerns over time. These data would lend themselves well to conducting a mediational analysis that could address the question of whether parental well-being mediates the relation between child behavior and parental concerns. The examination of well-being as a mechanism of parental concerns would be important to address, as results might suggests areas where parents may benefit from additional support and services.

Another area that future studies could address is the measures used to collect data on parental concerns, parental well-being and child behavior. In order to gather more nuanced

information about parental concerns, future studies could consider conducting semi-structured interviews to address parental concerns. The inclusion of semi-structured interviews would allow for more detailed aspects of parental concerns to be addressed, which could address the question of whether different aspects of child behavior influence distinct areas of parental concerns. To gain more information about the relation between each of these variables, child behavior could also be measured differently. In addition to collecting data on children's social-communication, future studies could also collect data on their challenging behaviors. This is of particular importance in parents of children with ASD, and as such should be examined as it relates to both parental concerns and parental well-being. Different methodologies could also be used to collect child behavior. The inclusion of both parent report on a child's behavior as well as the report of a third party would provide support for the verification of parental concerns and of their reporting of their child's behavior. Collecting both parental report of child behavior as well as objective measures could also allow for the examination of the ways in which parental report of a behavior may correlate with a third party's report. It would be interesting to consider, whether, if parents reported on their child's social-communication skills, a relation would have been found between parental concerns and child social-communication skills.

In sum, the results of this study provide new information about factors that contribute to parental concerns about their toddlers who are at elevated familial risk for ASD. Results revealed that both child behaviors and parents' own sense of well-being contribute to their expressions of concern. Elicitation of parental concerns in clinical contexts may provide important information about parents themselves, as well as their toddler, that can be considered in developing treatment plans. These results do not detract from the validity of parent concerns about high-risk toddlers as described in previous studies (Ozonoff et al., 2009; Hess and Landa,

2011); rather, they provide further evidence about the rich information that can be gleaned through the elicitation of parental concerns about their toddlers.

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Table 1

Demographic Characteristics of the Sample

Toddler Characteristics (n=54)	
Age, mos.	
Mean (SD)	18.0 (.4)
Range	17.1 – 18.8
% Female	50
Race	
% Caucasian	79.6
% Asian	3.7
% Black	1.8
% Multiracial	14.8
Parental Characteristics	
Age, yrs.	
Mean (SD)	35.7 (4.2)
Range	25.7 – 43.6
% 4-Year College or Beyond	61.1

Table 2

Descriptives for Study Variables

Variable	M (SD)	Range
Parental Well-Being	64.0 (13.1)	28.6-83.3
Toddler Social Communication	1.6 (.8)	.25 - 3.75
Toddler Expressive Language (# words said)	35.1 (43.0)	0 - 220
Toddler Expressive Language (# of words said Per Quartile)		
1st Quartile	3.7 (2.2)	0 - 8
2nd Quartile	11.4 (1.9)	9 - 15
3rd Quartile	28.1 (8.4)	16 – 43
4th Quartile	94.8 (44.3)	44 - 220

Table 3

Correlations Among Study Variables

	2	3	4
1. Parental Concerns	-.28*	-.23	-.55**
2. Toddler Expressive Language (Quartile)	--	.47**	.12
3. Toddler Social Communication	--	--	-.05
4. Parent Well-Being	--	--	--

* $p < .05$. ** $p < .01$.

Figure 1. Predicted probabilities of parental concerns at 18 months.

Note: Shaded regions represent the 95% confidence interval.