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A Transdiagnostic Comparison of Mindfulness and Parenting Stress in Mothers of Children with Autism, Developmental Delay, and Fragile X Syndrome

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Abstract

This study compared mindfulness and parenting daily hassles (PDH) among mothers of children with autism spectrum disorder (ASD), developmental delay (DD), and fragile X syndrome (FXS), and explored diagnostic group as a moderator of the relationship between mindfulness and PDH. Mothers of children with ASD (n = 166), DD (n = 113), and FXS (n = 74) completed measures of PDH, trait mindfulness, and mindful parenting. Mothers reported comparable levels of trait mindfulness and PDH, but the FXS group (versus ASD and DD) reported higher levels of mindful parenting. The mindful parenting—PDH relationship was negative for all groups but weaker for mothers of children with ASD (versus DD and FXS). Implications for research and practice are discussed.

Keywords: Mindfulness, Parenting Daily Hassles, Fragile X Syndrome, Autism, Developmental Delay

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Mothers of children with intellectual and developmental disabilities (IDD)—including autism spectrum disorder (ASD; a neurodevelopmental condition characterized by difficulties with social communication and the presence of restricted interests and repetitive behaviors), developmental delay (DD; exhibiting performance equal or greater than two standard deviations below the mean on age-appropriate standard norm-referenced testing on physical, cognitive, communication, social, or emotional skill domains, but not yet having a diagnosis to explain these delays), and fragile X syndrome (FXS; an X-linked neurodevelopmental disorder resulting from an expansion of more than 200 cytosine-guanine-guanine (CGG) repeats on the *FMR1* gene)—tend to report higher levels of parenting stress compared to mothers of children with neurotypical development (Hayes & Watson, 2013; Potter et al., 2022). Mothers of children with FXS may be especially vulnerable to parenting stress due to additional diagnostic, psychological, and medical risks faced by this population (Wheeler et al., 2017). Mindfulness has been associated with reductions in parenting stress among mothers of children with and without IDD, and mindfulness-based intervention approaches have been rigorously tested among caregivers of children with ASD and DD but not FXS (e.g., Bazzano et al., 2015; Neece et al., 2023). Despite transdiagnostic variation in stress susceptibility across mothers of children with IDD and notable benefits of mindfulness to ASD and DD sub-populations, no study has examined how the relationship between mindfulness and parenting stress may differ among mothers of children with ASD, DD, or FXS.

Parenting Stress in Mothers of Children with ASD, DD, and FXS

Parenting stress is conceptualized as a negative psychological response to the demands of

parenthood (Bornstein, 2002). Routine tasks, such as feeding, bathing, and transporting one's child can leave parents tired and frustrated across a wide range of parent populations (Crnic & Greenberg, 1990). The bulk of existing research on parenting stress in mothers of children with IDD has relied on broad assessment tools (e.g., the Parenting Stress Index; Abidin, 2006) that measure stress in the parenting role in terms of overall life stressors. The field, however, has developed an increasing appreciation for measures that capture the day-to-day challenges and ongoing routine stressors that many parents may encounter regardless of child age and diagnostic status. Examining parenting stress in a more granular, day-to-day context is particularly relevant for families of children with IDD, who tend to experience more daily hassles compared to neurotypical counterparts and whose daily parenting stress levels closely relate to child behavioral functioning (Crnic et al., 2009; Iwamoto et al., 2023). As such, the current study evaluates parenting stress using Crnic and Greenberg's Parenting Daily Hassles scale, which assesses the intensity of routine parenting hassles and may be a stronger predictor of familial outcomes (e.g., parenting satisfaction, child behavior problems, maternal depression, anxiety) compared to other broader stress measures (e.g., measures of major life stress; Crnic & Greenberg, 1990). Below, we provide an overview of the literature on parenting stress in caregivers of children with IDD but acknowledge that there is significant variability in parenting stress and daily hassles experienced by caregivers in all groups. This variability is shaped by a range of factors, including individual coping mechanisms, social support, and the unique needs and behaviors of their children, underscoring the importance of personalized approaches in research, support, and intervention.

Autism spectrum disorder. Mothers of children with ASD tend to report higher stress levels compared to parents of children with neurotypical development, genetic disorders (e.g.,

FXS, Down Syndrome), chronic illnesses, and other IDDs (for a review, see Hayes & Watson, 2013). Elevated levels of maternal parenting stress are bidirectionally associated with externalizing behavior problems and ASD symptom severity in children with ASD (e.g., Rodriguez et al., 2019). Additional sources of parenting stress in this population include internal factors (e.g., coping styles, mental health problems, adjustment to the diagnosis), as well as external factors (e.g., financial demands, resource needs, and service navigation), with service disparities and disability-related stigma further compounding strain for underserved communities (Wallace-Watkin et al., 2023).

Existing studies have predominantly compared mothers of preschool/school-age children with ASD versus DD, finding parenting stress to be greater in the ASD group but more predictive of child behavior problems in the DD group (e.g., Estes et al., 2009; see Hayes & Watson, 2013, for a review). Only a couple of studies have compared mothers of children with ASD versus FXS, finding group differences in maternal well-being (FXS > ASD) and parenting stress (ASD > FXS) among parents of adolescents/young adults (ages 10-26; Abbeduto et al., 2004) and younger children (Richardson, 2010). To date, no study has specifically compared these groups concerning the intensity of daily parenting hassles.

Developmental delay. Parenting stress is also highly prevalent among mothers of children with DD. While maternal parenting stress is generally highest among mothers of children with ASD (Hayes & Watson, 2013), mothers of children with DD report significantly higher levels of parenting stress compared to mothers of children with neurotypical development (for a review, see Barroso et al., 2018). In mothers of children with DD, longitudinal research has shown a bidirectional relationship between maternal parenting stress and both internalizing and externalizing child behavior problems in early childhood (ages 3–9 years, Neece et al., 2012)

through late adolescence (ages 3–18 years; Woodman et al., 2015). Additional sources of maternal parenting stress include additional caregiving demands, financial strain, and having to navigate school and service systems, with service disparities further compounding strain for families from underserved communities. No research, to date, has explored how the intensity of hassles may differ among mothers of children with DD compared to FXS and ASD counterparts.

Fragile X syndrome. Mothers of children with FXS also report high levels of parenting stress. Research suggests that these mothers may experience lower levels of parenting stress than mothers of children with ASD (e.g., Richardson, 2010) but *higher* levels of depression relative to mothers of children with neurotypical development and other genetic disorders (Fitzgerald & Gallagher, 2022). FXS is characterized by mild to severe intellectual disabilities, developmental delays, self-injury, and social/behavioral challenges. FXS also highly co-occurs with ASD; children with FXS *and* ASD tend to exhibit fewer social communication difficulties and less severe restricted and repetitive behaviors, but comparable levels of behavior problem severity, nonverbal cognition, and adaptive behavior compared to children with idiopathic ASD (Wolff et al., 2012). Predictors of parenting stress in FXS populations include child behavioral problems (positive predictor; Bullard et al., 2021) and adaptive behavior (negative predictor; Potter et al., 2022).

While mothers of children with FXS may appear phenotypically similar to mothers of children with ASD and DD due to shared challenges (e.g., child behavior challenges and often co-occurring autism symptoms), these mothers face a host of unique FXS-specific stressors. For FXS populations, the diagnostic odyssey is often long, financially and emotionally taxing, and frequently involves multiple physicians, misdiagnoses, and medical/genetic involvement of multiple family members (Wheeler, 2024). The rarity of FXS also makes it difficult for families

to access support, leaving social-emotional and psychoeducational needs unmet (Wheeler, 2024). Additionally, biological mothers of children with FXS are almost always carriers of *FMR1* premutations (i.e., 55-200 CGG repeats), which increases the risk of physical health problems (e.g., Fragile X-Associated Tremor/Ataxia Syndrome), as well as emotional, cognitive, and reproductive challenges (e.g., Fragile X-Associated Primary Ovarian Insufficiency), which may collectively confer elevated stress levels in this population (Wheeler et al., 2017). Women with a premutation are also at greater risk of suffering stress-related illnesses (e.g., migraines, hypertension), mood and anxiety disorders, elevated rates of stress, and may experience greater effects of stress on mental health symptoms, making them especially vulnerable to the effects of increased childcare demands (Seltzer et al., 2012; for a review, see Wheeler et al., 2017). While emerging literature suggests initial distinctions between mothers of children with FXS versus ASD on facets of maternal well-being and parenting stress, additional research is necessary to validate these findings in the context of daily parenting hassles. Given potential differences in stress vulnerability across IDD populations—with particular risk for FXS—a transdiagnostic examination of parenting daily hassles is timely.

Mindfulness in Mothers of Children with ASD, DD, and FXS

Given the high prevalence of parenting stress among mothers of youth with IDD, factors that may attenuate maternal parenting stress are of increased research interest. Mindfulness, defined as the ability to pay attention to the present moment in a nonjudgmental way (Kabat-Zinn, 2013), has been found to buffer the effects of stress on mental and physical health outcomes across a wide range of populations, and increasing research has examined its ability to address parent mental health needs.

Trait mindfulness. *Trait mindfulness*—defined as one's general predisposition to be

mindful in daily life—is associated with a wide range of outcomes among mothers of children with ASD, DD, or FXS, including lower stress among mothers of children with ASD (Conner & White, 2014); lower levels of parenting stress, depression, and anxiety and greater family satisfaction in mothers of children with developmental disabilities (Griffith et al., 2023); and lower stress, anxiety, depression, and daily health symptoms in mothers of children with FXS (Wheeler et al., 2018). Given these benefits, mindfulness-based intervention approaches, including Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013), have gained increased popularity for use with these populations and have been found to decrease parenting stress in parents of children with ASD (Neece et al., 2023) and DD (Bazzano et al., 2015), with some studies showing effects on child functioning including improved adaptive functioning (Weitlauf et al., 2022). To date, only one study has investigated a mindfulness-based intervention—via a self-directed smartphone app—among mothers of children with FXS, finding the intervention to be both feasible and acceptable (Hunter et al., 2019). Despite the unique stressors faced by mothers of children with FXS, these mothers remain extremely underrepresented in the mindfulness literature.

Mindful parenting. Mindful parenting—the practice of extending moment-to-moment awareness into the social context of parent-child relationships—is also associated with positive parenting outcomes including lower stress and depressive symptoms among mothers of children with ASD (Beer et al., 2013), and lower stress, anxiety, and depression in mothers of children with FXS (Wheeler et al., 2018). Mindful parenting has been found to mediate the relationship between child behavior problems and stress in parents of children with ASD (Jones et al., 2014), and moderate the effects of MBSR on child internalizing problems in parents (primarily mothers) of children with DD, such that children of parents with greater post-treatment increases in acting

with awareness and nonjudgment had a greater reduction in internalizing problems (McGregor et al., 2020). Mindful parenting-based interventions have been shown to decrease parenting stress and increase parenting satisfaction in mothers of children and adolescents with DD and ASD (deBruin et al., 2014), with collateral improvements to child aggressive behavior, social skills, and compliance (Singh et al., 2006). To date, mothers of children with FXS remain absent from the mindful parenting intervention literature.

The Current Study

Given the links between mindfulness and parenting stress in mothers of children with ASD, DD, and FXS, the current study sought to explore whether these links differed by diagnostic group, with a particular focus on the intensity of parenting daily hassles (PDH), and an interest in highlighting the experience of mothers of children with FXS, who, despite facing unique syndrome-specific stressors, remain vastly underrepresented in the literature. Comparing mothers of children with ASD, DD, and FXS could reveal transdiagnostic differences in mindfulness and parenting stress processes, which has the potential to guide more individualized intervention approaches for each group. The current study had three aims: (1) to compare parent-reported levels of trait mindfulness, mindful parenting, and PDH across mothers of children with ASD, DD, and FXS; (2) to examine trait mindfulness and mindful parenting as predictors of PDH; and (3) to explore diagnostic group (ASD vs DD vs FXS) as a moderator of the relations of trait mindfulness and mindful parenting to PDH. We hypothesized that both trait mindfulness and mindful parenting would be negatively associated with PDH. Given the paucity of research *concurrently* examining levels of mindfulness and parenting stress across the three groups, we did not have *a priori* hypotheses regarding the groups' relative levels of mindfulness and PDH nor how the associations between mindfulness and PDH would differ by group.

Method

Participants and Procedure

Procedures were approved by the Institutional Review Board at participating institutions.

Developmental Delay Sample

The DD sample included baseline data for $n = 113$ mothers of children with DD participating in a randomized controlled trial (RCT) based in (REGION MASKED) and (REGION MASKED) investigating the effects of behavioral parent training enhanced with MBSR or psychoeducational support on parenting stress and child behavior problems in preschoolers with DD (MASKED). Most families ($n = 91$) were recruited through state agencies that contract services for individuals with developmental disabilities; other families ($n = 22$) were recruited through community-based providers and referral programs.

Criteria for inclusion were: (a) having a child ages 3 to 5 years with a DD who was receiving early intervention or early childhood/preschool special education through an individualized family service plan (IFSP) or individualized education plan (IEP) (note: there were no required educational classifications for children with an IEP); (b) having parent-reported concerns about their child's behavior (reporting some or many concerns about the frequency or intensity of child challenging behavior), (c) reporting clinical levels of stress on the Parenting Stress Index-Short Form 4th Edition (note: this criteria was removed for Spanish-speaking participants as lower clinical cut-off scores are recommended for this population; Barroso et al., 2016), (d) parent ability to complete study procedures in English or Spanish. Parents were excluded from study participation if (a) they screened positive for active psychosis, substance abuse, or suicidality according to the associated modules of the Structured Clinical Interview for DSM Disorders, Research Version Non-Patient Edition (First et al., 2002); (b) they were

currently receiving any form of psychological or behavioral treatment at the time of referral, given potential confounds with the interventions in the larger clinical trial; or (c) their child had significant sensory impairments (e.g., deafness, blindness) or nonambulatory conditions that would necessitate significant modifications to the protocol of the larger study. In the current study, children with an ASD diagnosis (n = 56) were excluded from the DD sample and instead included in the ASD sample (see *Autism Spectrum Disorder Sample* below). Participating children with a diagnosis of FXS were excluded from analyses entirely because our research team was unable to verify parent-reported FXS diagnoses (unlike ASD diagnoses, which were confirmed by clinical best estimates involving administration of the ADOS-2 by research-reliable assessors). Only biological mothers were included in the current study sample. See Table 1 for DD sample details.

Autism Spectrum Disorder Sample

The ASD sample included data from n = 166 mothers of children with a confirmed diagnosis of ASD. Of these, n = 56 were drawn from the RCT described previously, and n = 110 participants were drawn from the baseline timepoint of another RCT based in (MASKED). Seven primary caregivers from the original RCT were excluded from the ASD sample as only mothers were included in the current study. (MASKED) examined the efficacy of MBSR compared to psychoeducational support for reducing parenting stress in families of preschoolers with ASD. Similar to the aforementioned RCT's recruitment procedures, participants were primarily recruited through state agencies that provide services to individuals with developmental disabilities in the (REGION MASKED).

Inclusion criteria for the (MASKED) clinical trial were: (a) child community ASD diagnosis or on a waitlist for an ASD assessment with ASD symptoms verified by study-

administered assessments (Autism Diagnostic Observation Schedule-2; Lord et al., 2012); (b) child age 3 to 5 years, and (c) parent ability to complete study procedures in English. Exclusionary criteria included: (a) positive screen for active parental psychosis, substance abuse, or suicidality according to the associated modules of the Structured Clinical Interview for DSM Disorders, Research Version Non-Patient Edition (First et al., 2002); (b) parent participation in an auxiliary mental health treatment or support group at time of randomization to avoid confounds with planned interventions; and (c) child motor impairment that would prevent participation in the parent-child interaction tasks that were part of the larger assessment protocol (e.g., difficulty sitting independently). Only biological mothers were included in the current study sample. No children in this sample had a co-occurring diagnosis of FXS, as reported by parents. See Table 1 for ASD sample details.

Fragile X Syndrome Sample

The FXS sample included $n = 74$ mothers of children with FXS who participated in a larger survey project exploring stress, coping, and mindfulness among women with an *FMR1* premutation, based out of (MASKED) in the United States. Participants were recruited through *Our Fragile X World*, a national registry focused on the experiences of individuals with FXS and their families. Parents were eligible if they had at least one child with FXS. Although 163 mothers completed the larger survey study, our analyses excluded mothers whose youngest child with FXS (i.e., the target child for the current study) was 18 years or older ($n = 89$) given our study's focus on children. See Table 1 for FXS sample details.

Measures

Demographics. Child and parent ages, races, ethnicities, family income, child diagnoses, and services received were collected via parent interview for the ASD and DD groups and online

questionnaire for the FXS group.

Parenting Daily Hassles (PDH). Parenting daily hassles (our study's operationalization of parenting stress) were assessed using Crnic and Greenberg's (1990) Parenting Daily Hassles questionnaire, a 20-item measure of child behaviors and parenting tasks that can be challenging for parents (e.g., being complained to, having to change plans because of unplanned child need). Parents are asked to rate both how often the hassle occurred on a 4-point scale from "rarely" to "constantly" and the intensity with which the parent perceives the event as a hassle on a 5-point scale from "no hassle" to "big hassle." The total score on the intensity subscale of the PDH was used in the current study as is recommended by the authors of the PDH (Crnic & Greenberg, 1990). Cronbach's alpha in the current study was .92 (.93 for FXS; .91 for ASD; .92 for DD).

Trait mindfulness. Trait mindfulness was assessed using the Five Factor Mindfulness Questionnaire–Short Form (FFMQ-SF; Bohlmeijer et al., 2011), a validated short version of the frequently used, 39-item FFMQ. The FFMQ-SF assesses general mindfulness in everyday life. It measures five constructs of dispositional mindfulness (observing, describing, acting with awareness, nonreactivity, and accepting without judgment). These constructs can be combined into a total mindfulness score, which was used in the present study. Cronbach's alpha in the current study was .83 (.86 for FXS; .85 for ASD; .79 for DD).

Mindful parenting. Mindful parenting was assessed using the 15-item Bangor Mindful Parenting Scale (BMPS; Jones et al., 2014). The BMPS was developed based on the FFMQ, with the same five facets measured in the context of parenting. Cronbach's alpha in the current study was .75 (.80 for FXS; .74 for ASD; .70 for DD).

Data Analytic Plan

Bivariate correlations were run to determine if any of the variables in Table 1 were

significantly correlated with the dependent variable (PDH). We report Pearson's correlations below, but note that Spearman's and Kendall's tau-b tests yielded the same pattern of findings. Child age (r = –.18), parent education (r = .22), and household income (r = .15) were significantly related to PDH (ps < .05), and were included in our models as covariates. We computed partial correlations between the primary study variables, adjusted for child age, household income, and parent education, in the combined sample and each sub-group (Table 2). We computed one-way ANCOVAs, controlling for child age, parent education, and household income, to identify group differences on trait mindfulness, mindful parenting, and PDH.

We conducted tests to detect outliers and multicollinearity and to check the assumptions of regression. A multiple linear regression was run and DFBetas, DFFITS, Leverage, and Studentized Deleted Residuals were obtained to test for the leverage, discrepancy, and both global and specific influence of outliers. Cases were considered outliers if values for DFBetas or DFFITS, Leverage, and Studentized Deleted Residuals were all outside the following ranges: DFBetas ± 1 or DFFITS > |1|, Leverage < .17, and Studentized Deleted Residuals ± 2 (Cohen et al., 2003). Multicollinearity was considered a concern if VIF values were greater than 10 and Tolerance values were less than .1. Residual plots and normality tests were used to check the assumptions of regression. There were no multicollinearity concerns nor significant outliers and our data did not violate any of the assumptions of regression.

To test the relationships between trait mindfulness and PDH and between mindful parenting and PDH, we ran hierarchical linear regression analyses, controlling for child age, parent education, and household income. To determine whether diagnostic group moderated these two relationships, diagnostic groups were coded into two dummy codes: DD and FXS (coded as 1s) with ASD coded as the reference group (0). ASD was selected as the reference

group as it is the most widely represented group in both the literature and the current study. We computed hierarchical linear regressions with covariates (child age, parent education, household income) included in the first step of the regression, the independent variable (trait mindfulness or mindful parenting) in the second step, the two dummy codes in the third step, and the interactions of the independent variable with each dummy code in the fourth step. The dependent variable for each model was PDH. Simple slopes and post-hoc subgroup regression analyses were conducted to visualize and interpret significant moderation.

Results

One-way ANCOVAs (controlling for child age, parent education, and household income) found group differences on mindful parenting, such that mothers of children with FXS reported significantly higher levels of mindful parenting compared to mothers of children with DD or ASD, $p < .001$, $\eta^2_{partial} = .05$ (small-to-medium effect). No group differences were found on trait mindfulness or PDH; however, in the PDH model, education was a significant predictor of PDH, $F(1, 351) = 10.24$, $p = .002$, $\eta^2_{partial} = .03$. No other covariates were significant predictors of any dependent variables. Demographic characteristics and group differences are displayed in Table 1.

Partial correlations for the full sample and each sample between primary study variables are displayed in Table 2. Within all three samples, mindful parenting was negatively correlated with PDH, and positively correlated with trait mindfulness, ps < .05; trait mindfulness and PDH were not significantly correlated, although all three primary study variables were correlated in the combined sample, ps < .05.

Hierarchical linear regression analyses (Table 3) found a significant negative effect of mindful parenting on PDH. Diagnostic group moderated this association, with significant interaction terms for FXS and DD. The final model accounted for approximately 18% of the

variation in PDH, although the interaction terms only accounted for an additional 1%. Figure 1 plots the simple slopes for these significant interactions. Simple slopes analyses found significant negative associations between mindful parenting and PDH for all three groups, $ß_{ASD}$ = -.67, $ß_{DD}$ = -1.54, $ß_{FXS}$ = -1.66, *p*s < .01. The slope for families of children with ASD was significantly less steep compared to the slopes for families of children with DD (t = -1.99, p = .048) and FXS (t = -2.01, p = .045), ΔR^2= .01.

Hierarchical linear regression analyses (Table 4) also found a significant negative main effect of trait mindfulness on PDH ($ß$ = -.22, p = .008, R^2 = .12). Diagnostic group did not moderate this association, *p*s > .05.

Discussion

The present study investigated the relations of two forms of mindfulness—trait mindfulness and mindful parenting—with parenting daily hassles (PDH) among mothers of children with ASD, DD, or FXS. We compared levels of trait mindfulness, mindful parenting, and PDH as reported by mothers in each diagnostic group (ASD, DD, or FXS). Additionally, we explored whether diagnostic group moderated the relations of trait mindfulness or mindful parenting to PDH. Across all three groups, mothers reported comparable levels of trait mindfulness and PDH, but mothers of children with FXS reported significantly higher levels of mindful parenting compared to mothers of children with ASD or DD. Consistent with our hypotheses, trait mindfulness and mindful parenting were negatively associated with PDH. The association between mindful parenting and PDH was moderated by diagnostic group; the effect of mindful parenting on PDH was significantly less pronounced for mothers of children with ASD compared to DD or FXS counterparts.

Interestingly, even after accounting for child age, levels of PDH were similar across the three diagnostic groups. This finding is particularly striking as much of the DD sample and a subset of the ASD sample were subject to an additional inclusion criterion of clinically elevated parenting stress, suggesting a high level of clinical need across all three groups, particularly for the FXS sample, who were not held to this criterion but still reported comparable levels of PDH. Our study, the first to use the Parenting Daily Hassles scale for comparative analysis, suggests that routine parenting stressors, such as cleaning up messes and managing child needs appear to impact mothers of children with FXS similarly to *highly stressed* mothers of children with DD or ASD. Additionally, the study's broad age range (i.e., children with FXS being older than DD and ASD peers) suggests that these stressors may be age-indiscriminate; given high rates of intellectual disability and age-related declines in cognitive and adaptive development over time experienced by youth with FXS, the hassles experienced by parents of *older* children with FXS may be similar to those of *younger* children with ASD or DD. These findings, therefore, may signal an area of additional clinical need for FXS populations—whose stress levels may be even higher than this study suggests—underscoring the necessity for further research to confirm these findings among entirely age-matched samples with equivalent inclusion criteria.

Transdiagnostic differences in the association between mindful parenting and PDH underscore the distinct mental health and behavioral dynamics within each group, highlighting the need to investigate these groups separately. Notably, the association between mindful parenting and PDH was attenuated for mothers of children with ASD (versus DD and FXS). While we note that the effect size was small, this finding does align with recent literature suggesting that parents of young children with ASD may be better able to "set aside" or compartmentalize their distress when engaged in parent-child interaction (Baker et al., 2023).

Among a subset of our ASD sample, Baker et al. found that parental distress had less impact on positive parenting behaviors in parents of young children with ASD (versus neurotypical development), perhaps owing to increased intentionality in parenting and more active monitoring of relations between one's own distress and parenting behavior among parents of children with a recognized disability. Similarly, our preliminary findings seem to suggest that mothers of children with ASD may compartmentalize stress, allowing them to parent mindfully with less of the hindrance reported among their FXS or DD counterparts.

Conversely, a more pronounced association between PDH and mindful parenting was observed in mothers of children with FXS or DD (versus ASD), albeit with small effect sizes. Assuming these findings replicate among age- and stress-matched samples, this heightened interrelation may signal that these groups are particularly suitable candidates for mindfulness-based intervention. Strategic targeting of mindfulness, specifically emphasizing mindful parenting, within these groups could yield cascading benefits to parental well-being, and perhaps in turn, child outcomes. This finding bears particular significance for mothers of children with FXS, who, despite their additional vulnerability to stress, remain virtually absent from the mindfulness-based intervention literature, relative to ASD and DD counterparts. The parallel associations found between mindful parenting and PDH in the DD and FXS samples offer promise, indicating that previous positive outcomes observed with mindfulness-based interventions in mothers of children with DD may extend to those with FXS. While particularly promising for DD and FXS populations, the inverse correlation found between mindful parenting and parenting stress across all three groups highlights potential transdiagnostic benefits of mindfulness and underscores the importance of considering individual differences within groups.

With a small-to-medium effect size, we also observed that mothers of children with FXS

(versus DD and ASD) reported higher levels of mindful parenting. Higher baseline levels of mindful parenting among mothers of children with FXS may suggest that these mothers are naturally more mindful in their parenting, reflecting an inherent strength that future researchers and interventionists may leverage in mindfulness-based interventions. Conversely, this finding could also imply that these mothers have less room for improvement and may be less apt to show intervention-dependent gains. Exploration of the efficacy of mindfulness intervention in this population is imperative to ascertain how this apparent predisposition for mindful parenting impacts mindfulness-based intervention uptake and impact.

The current study exhibited several strengths. Notably, the inclusion of a diagnostically diverse sample enabled the examination of previously unexplored distinctions in mindfulness and PDH across three groups with potentially different experiences with stress, permitting us to identify specific diagnostic groups that may be especially likely to derive benefits from mindfulness-based intervention. Our sample was also ethnically diverse (e.g., over half were Hispanic/Latinx) and spanned a wide range of socioeconomic and educational backgrounds. Additionally, our investigation employed a unique measure of parenting stress, capturing the intensity of daily stressors often experienced by these populations and thus providing a more precise assessment of the routine stressors encountered by families across a spectrum of diagnostic groups.

This study had certain limitations. First, although child age was systematically controlled for in all analyses, the expansive age range of the children in our study imposes constraints on our capacity to directly compare the diagnostic groups. The challenges facing the mothers in our sample may vary at different stages of the family life cycle and the chronicity of parenting stress also likely varies, as mothers of older children have experienced stress and sources of stress for

longer compared to counterparts with younger children. Further research should confirm these findings among entirely age-matched samples. Our samples may have also differed in cognitive functioning. While our ASD and DD samples had similar IQs and intellectual disability rates, cognitive functioning was not evaluated in the same way for the FXS sample. As cognitive functioning is related to parenting stress in IDD populations, future studies should control for cognitive differences when comparing parenting stress across diverse diagnostic groups. Our three samples also differed demographically in terms of their geographic region, primary language, and SES, all of which may contribute to further variation in parenting stress. We also recognize the potential effects of selection bias in our sample; mothers in the FXS sample voluntarily opted to participate in a survey about mindfulness, and parents in the DD and ASD samples were all treatment-seeking and aware that one of the possible study conditions involved mindfulness with a broader study focus on stress-reduction, potentially influencing their decision to participate in the study. Moreover, some of the DD sample and ASD sample were subject to a unique inclusion criterion of clinically elevated parenting stress, reflecting the larger RCT's focus on stress reduction. Hence, the PDH scores of the current sample may not represent the general DD or ASD population, although we also note that estimates of clinically-elevated parenting stress prevalence in both populations have increased substantially in recent years, suggesting that a large proportion of caregivers do naturally meet this clinical cutoff (e.g., Bradley et al., 2024*;* Dennis et al., 2018; Schwartzman et al., 2021). Finally, as our study drew from cross-sectional data, we cannot infer causality or temporal ordering of variables. Subsequent iterations of this study should investigate the relationships among these variables over time or through experimental manipulation (e.g., RCT) to ascertain causal links.

Our findings highlight significant differences, albeit the same negative direction, in the

link between mindful parenting and PDH, suggesting a need for mindfulness interventions that are individualized to each diagnostic group. For example, mindfulness-based interventions for mothers of children with ASD could emphasize strategies for compartmentalizing distress to maintain engagement in positive parenting practices, whereas interventions for mothers of children with DD or FXS may focus on building foundational mindfulness skills to enhance mindful parenting and reduce daily stress impacts, given the stronger association between mindful parenting and PDH in these groups. Moreover, for mothers of children with FXS, mindfulness-based interventions that recognize and build upon their apparent proclivity for mindful parenting may attenuate the high levels of parenting stress experienced by this vulnerable and empirically underexamined group.

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Figure

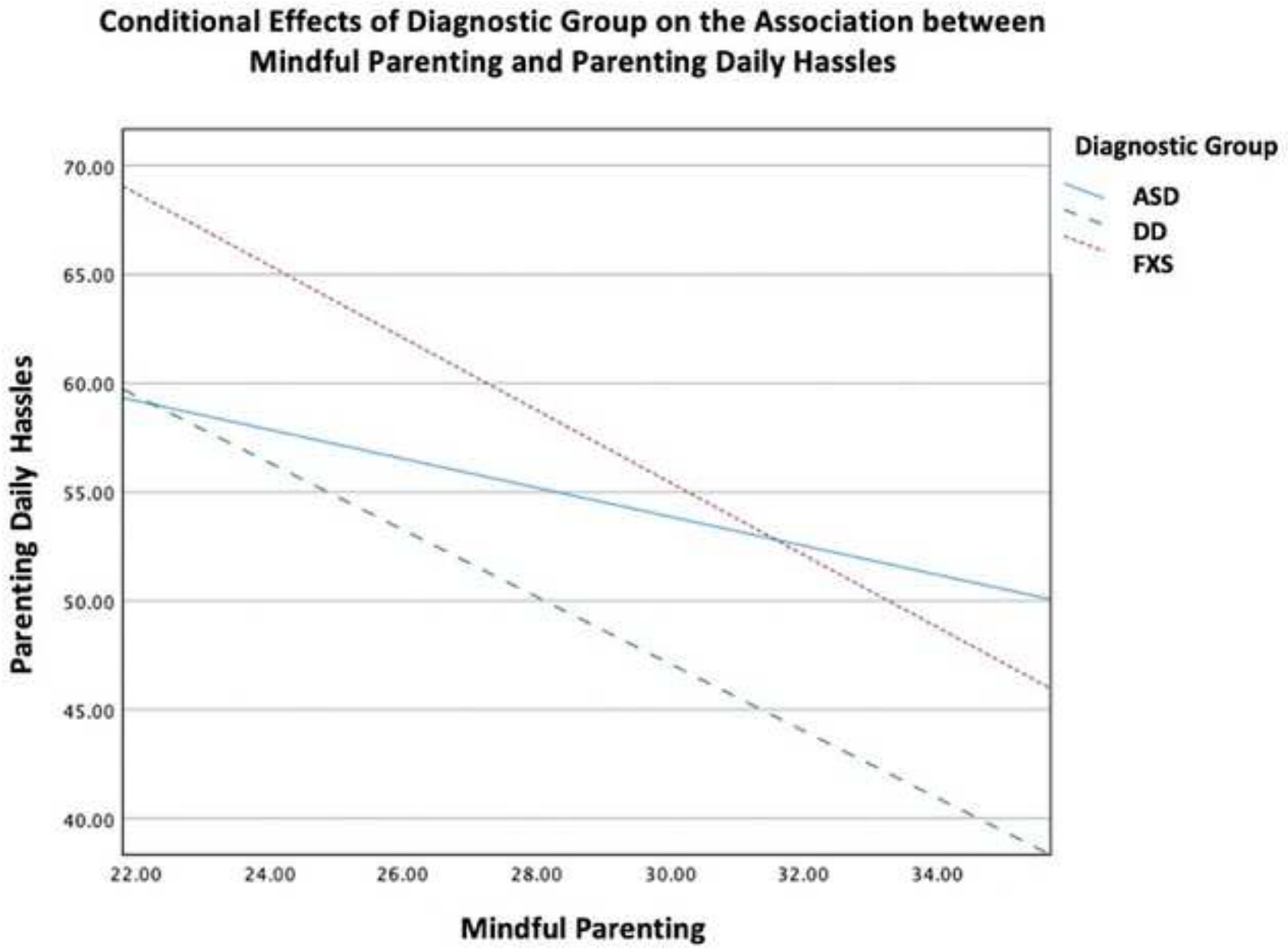

Table 1 *Demographic Characteristics of Participants and Group Differences on Self-Report Variables*

	ASD (n = 166)	DD (n = 113)	FXS (n = 74)	Significance Test	Effect Size[d]	Post-Hoc: ASD (A) vs DD (D) vs FXS (F)
Child Characteristics						
Male (%)	79.5	51.3	81.1	$\chi^2(2) = 31.95, p < .001$	$v = .30$	D < A; D < F
Mean Age in months (*SD*)	52.64 (10.6)	49.04 (11.1)	164.58 (39.9)	$F(2, 351) = 933.69, p < .001$	$\eta^2 = .85$	D < F; A < F
ASD and DD Sub-sample Only						
Mean IQ (SD)[a]	67.75 (20.0)	71.12 (22.0)	--	$t(193) = -1.08, p = .28$		
Intellectual disability (%)[a]	52.9	46.7	--	$z = .938, p = .348$		
FXS Sub-sample Only						
Thinking, Reasoning, and Learning Abilities (parent-report), %						
Poor	--	--	25.7			
Fair	--	--	33.8			
Good	--	--	28.4			
Very Good	--	--	8.1			
ASD Diagnosis (parent-report), %	--	--	50			
Mother Characteristics						
Mean Age in years (SD)	34.56 (6.1)	35.98 (6.1)	49.7 (7.0)	$F(2, 351) = 435.53, p < .001$	$\eta^2 = .01$	D < F; A < F
Latinx Ethnicity (%)[b]	74.8	61.9	10.8	$\chi^2(2) = 87.42, p < .001$	$v = .50$	F < D; F < A
Mother Education (%)				$\chi^2(12) = 68.27, p < .001$	$v = .31$	
Have not finished high school	14.5	20.4	0			F < D; F < A
High school or GED	16.9	22.1	6.8			F < D
Trade or technical school	9.6	6.2	2.7			
Some college	21.1	12.4	9.5			
2-year college	9.0	9.7	13.5			
4-year college	18.7	23.0	33.8			A < F
Graduate or professional degree	9.6	6.2	33.8			A < F; D < F
Mother Marital Status (%)				$\chi^2(10) = 130.56, p < .001$	$v = .43$	
Married	25.3	67.3	78.4			A < D; A < F
Living Together	47.6	18.6	0			F < D; F < A; D < A
Separated	9.0	1.8	2.7			D < A
Divorced	3.6	0.9	14.9			D < A; D < F
Widowed	0.6	1.8	1.4			
Single	13.8	9.7	2.7			F < A
Annual Household Income (%)				$\chi^2(4) = 13.103, p = .011$	$v = .13$	
<$25k	21.7	25.9	11.1			
$25k to $50k	25.9	25.9	13.9			
>$50k	49.4	48.2	75.0			A < F; D < F
Maternal Parenting Stress						
Mean Parenting Daily Hassles Intensity (*SD*)	56.93 (19.8)	53.24 (21.5)	46.66 (18.2)	$F(2, 351) = .824, p = .440$		
Adjusted Mean (*SD*)[c]	55.36 (2.0)	55.27 (2.4)	52.08 (5.5)			
Maternal Mindfulness						
Mean Trait Mindfulness FFMQ Total (*SD*)[c]	78.48 (13.6)	76.90 (13.5)	78.84 (14.1)	$F(2, 351) = .444, p = .642$		
Adjusted Mean (*SD*)[c]	78.96 (1.5)	77.77 (1.8)	75.48 (3.5)			
Mean Mindful Parenting BMPS Total (*SD*)[c]	28.88 (5.7)	26.47 (5.1)	32.19 (5.5)	$F(2, 351) = 7.49, p < .001$	$\eta^2_{partial} = .05$	D < A; D < F; A < F
Adjusted Mean (*SD*)[c]	28.56 (0.6)	26.28 (0.7)	32.63 (1.5)			

[a] IQ and ID status assessed using the Stanford-Binet Intelligence Scales 5th Edition ABIQ (Roid, 2003) and Differential Ability Scales 2nd edition (Elliot, 2007).
[b] 19.9% of the mothers in the ASD sample and 43% of mothers in the DD sub-sample were monolingual Spanish speakers.
[c] Covariates appearing in the model are evaluated at the following values: Child age in months = 73.13, Education = 0.63, Annual household income = 0.55. Education was coded as: 0 = No college; 1 = Some college or higher. Household Income was coded as: 0 = $50,000 or less; 1 = greater than $50,000.
[d] For chi-square tests, the effect size index used was *Cramer's V;* in general, .10 indicates a small effect, .30 indicates a medium effect, and .50 indicates a large effect. For ANOVA and ANCOVA, η^2 and $\eta^2_{partial}$ were used, respectively; in general, .01 indicates a small effect, .06 indicates a medium effect, and .14 indicates a large effect.

Table 2 *Partial Correlations between Main Study Variables*

	1	2	3	4	5	6	7	8	9	10	11	12
1. PDH (Combined Sample)	--											
2. Trait Mindfulness (Combined Sample)	-.20**	--										
3. Mindful Parenting (Combined Sample)	-.31**	.55**	--									
4. *ASD sub-sample* PDH				--								
5. *ASD sub-sample* Trait Mindfulness				-.16	--							
6. *ASD sub-sample* Mindful Parenting				-.21*	.52**	--						
7. *DD sub-sample* PDH							--					
8. *DD sub-sample* Trait Mindfulness							-.20	--				
9. *DD sub-sample* Mindful Parenting							-.38**	.67**	--			
10. *FXS sub-sample* PDH										--		
11. *FXS sub-sample* Trait Mindfulness										-.18	--	
12. *FXS sub-sample* Mindful Parenting										-.45**	.53**	--

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

Note: Values are adjusted for child age, mother education, and household income.

PDH = Parenting Daily Hassles - Total Intensity Subscale.

ASD sub-sample (n = 166), DD sub-sample (n = 113), FXS sub-sample (n = 74)

Table 3. *Hierarchical linear regression to Examine Interactions of Mindful Parenting and Diagnostic Group on Parenting Daily Hassles*

	Coefficients					
Variable	B	SE	β	*t*	*p*	ΔR^2
Step 1						
Child age	-0.11	0.02	-0.27	-4.6	<.001**	0.09
Mother Education	8.20	2.63	0.20	3.12	.002**	
Household Income	3.36	2.48	0.08	1.4	.176	
Step 2						
Child age	-0.09	0.02	-0.22	-3.58	<.001**	0.08
Mother Education	8.44	2.52	0.20	3.34	<.001**	
Household Income	2.54	2.38	0.06	1.07	.287	
Mindful Parenting	-0.99	0.18	-0.29	-5.51	<.001**	
Step 3						
Child age	-0.12	0.05	-0.25	-1.99	.019*	0.01
Mother Education	7.71	2.52	0.19	3.06	.002**	
Household Income	2.14	2.38	0.05	0.90	.369	
Mindful Parenting	-1.06	0.18	-0.31	-5.79	<.001**	
Developmental Delay	-4.76	2.42	-0.11	-1.96	.051†	
Fragile X Syndrome	1.60	6.25	0.03	0.26	.798	
Step 4						
Child age	-0.11	0.05	-0.29	-2.22	.027*	0.01
Mother Education	7.79	2.52	0.19	3.09	.002**	
Household Income	2.54	2.38	0.06	1.07	.287	
Mindful Parenting	-0.67	0.24	-0.20	-2.79	.006**	
Developmental Delay	19.45	12.24	0.44	1.59	.211	
Fragile X Syndrome	31.45	16.03	0.63	1.96	.051†	
Developmental Delay x Mindful Parenting	-0.87	0.44	-0.55	-1.99	.048*	
Fragile X Syndrome x Mindful Parenting	-1.00	0.50	-0.64	-2.01	.045*	

Note. Mother Education is coded as: 0 = No college (including have not finished high school, high school or GED, and trade or technical school); 1 = Some college or higher (including 2-year college, 4-year college, and Graduate or professional degree). Household Income is coded as: 0 = $50,000 or less; 1 = greater than $50,000.

† p < .10; * p < .05; ** p < .01

Table 4. *Hierarchical linear regression to Examine Interactions of* ***Trait Mindfulness*** *and Diagnostic Group on Parenting Daily Hassles*

	Coefficients					
Variable	B	SE	β	*t*	*p*	ΔR^2
Step 1						
Child age	-0.11	0.02	-0.27	-4.7	<.001**	0.090
Parent Education	1.93	0.62	0.20	3.11	.002**	
Household Income	2.06	1.48	0.08	1.39	0.166	
Step 2						
Child age	-0.11	0.02	-0.26	-4.52	<.001**	0.021
Parent Education	1.81	0.62	0.19	2.94	.004**	
Household Income	1.84	1.47	0.08	1.25	.211	
Trait Mindfulness	-0.22	0.08	-0.15	-2.70	.008**	
Step 3						
Child age	-0.09	0.05	-0.23	-1.78	.076†	0.005
Parent Education	1.80	0.62	0.19	2.92	.004**	
Household Income	1.83	1.47	0.08	1.24	.215	
Trait Mindfulness	-0.22	0.08	-0.15	-2.76	.006**	
Developmental Delay	-3.25	2.46	-0.08	-1.32	.187	
Fragile X Syndrome	-2.86	6.46	-0.06	-0.44	.659	
Step 4						
Child age	-0.09	0.05	-0.23	-1.74	.083†	0.000
Parent Education	1.80	0.62	0.19	2.91	.004**	
Household Income	1.87	1.49	0.08	1.26	.209	
Trait Mindfulness	-0.22	0.11	-0.15	-1.96	.051†	
Developmental Delay	-5.08	15.10	-0.12	-0.34	.737	
Fragile X Syndrome	-0.69	16.52	-0.01	-0.04	.967	
Developmental Delay x Trait Mindfulness	-0.03	0.20	-0.05	-0.15	.884	
Fragile X Syndrome x Trait Mindfulness	0.02	0.19	0.04	0.12	.901	

Note. Mother Education is coded as: 0 = No college (including have not finished high school, high school or GED, and trade or technical school); 1 = Some college or higher (including 2-year college, 4-year college, and Graduate or professional degree). Household Income is coded as: 0 = $50,000 or less; 1 = greater than $50,000.

† p < .10; * p < .05; ** p < .01