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Longitudinal Psychometric Evaluation of the Developmental Disorder Parenting Stressor Index with Japanese Parents of Children with Autism

Abstract

Assessing parenting stress in parents of children with autism has crucial clinical implications because increased parental stress is associated with psychological disorders and personal distress, which can result in worse child-parent relationships. We examined the psychometric properties of a new index for assessing parenting stressors—the Developmental Disorder Parenting Stressor Index (DDPSI) and the temporal variability of parenting stressors using longitudinal data of 212 Japanese parents of children with autism aged 2-18years. The findings indicated that the DDPSI has appropriate cross-validity, structural validity, construct validity, and reliability. Moreover, the psychometric properties and the brevity of the DDPSI increases the clinical utility of the scale. The implications of the findings of this study are discussed.

Keywords: Autism, Parenting, Stressor, Stress, Psychological assessment

Several studies have reported that parents of children with developmental disabilities experience higher levels of stress than parents of children without such disabilities (Baker et al., 2005; Emerson, 2003; Estes et al., 2009; Weiss 2002). Specifically, parents of children with autism face higher parenting stress than parents of children without autism (Estes et al., 2013; Griffith et al., 2010; Mugno et al., 2007). A meta-analysis has supported this contention (Hayes & Watson, 2013). Moreover, an integrated review has provided evidence that Japanese mothers of children with autism experience high parenting stress, similar to mothers in western countries (Porter & Loveland, 2018). In addition, prior research has indicated that parents of children with autism are at a higher risk for depression (Bitsika & Sharpley, 2017; Nomura et al., 2007; Olson & Hwang, 2001), anxiety (Bitsika & Sharpley, 2017), and other mental health problems (Griffith et al., 2010; Montes & Halterman, 2007) compared to parents of children with other disabilities.

Increased parenting stress is known to increase parents' risk of developing depression and other mental health problems (Zablotsky et al., 2012). Therefore, it is essential to clinically assess parenting stress in parents of autism children to facilitate early therapeutic interventions for the parents when necessary. Moreover, a prior empirical study has suggested that parents' mental health problems elevated the risk of psychopathology and abnormal development in children (Goodman & Gotlib, 1999; Goodman et al., 2011). Therefore, it is crucial to develop assessment tools for assessing parenting stress.

Only a few studies have developed tools to assess parenting stress among parents of children with developmental disabilities. Hayes & Watson (2013) reported that most studies used distinct versions or interpretations of the two most commonly used parenting stress measures: the Questionnaire on Resources and Stress (QRS; Holroyd, 1987) and the Parenting Stress Index (PSI; Abidin, 1983). Sexton et al. (1992) found that these two measures had confirmed

concurrent validity and were strongly correlated with parents' overall stress scores. However, the most-commonly used scales in many prior studies on parenting stress in parents of autism children have several limitations.

The Parenting Stress Index Short Form (PSI-SF) has been used in many publications that targeted parents of children with autism; however, these studies have two main limitations. First, psychometric analysis of the PSI-SF has been primarily conducted with samples of typically developing children (Dardas & Ahmad, 2014; Heys & Watson, 2013). A recent analysis of the psychometric properties of the PSI-SF suggests that both the "parent-child dysfunctional interaction" and the "difficult child" subscales should be used with caution when examining children with autism, because both subscales are structurally unstable, and several items showed poor functioning (Dardas & Ahmad, 2014; Zaidman-Zait et al., 2010). In addition, Zaidman-Zait et al. (2011) indicated that the original three-factor structure was unacceptable when applied to a large sample of parents of young children with autism using data collected shortly after diagnosis. Second, all PSI versions capture the stress of parents of children aged between 1 month and 12 years (Loyd & Abidin, 1985); however, the PSI has frequently been used with parents of children of any age with disabilities or chronic illness (e.g., Hastings, 2003; 2005), because there has not as yet been any other useful or validating parenting stress scale for parents with children of any age. Considering parental stress will change over time as children develop, it is essential to develop tools that assess parenting stress among parents of children at any age who have disabilities.

The QRS has several limitations: for assessing psychiatric populations, the instrument is too long and too inclusive for these populations because it includes items not exclusively relevant to parents of children with autism (Konstantareas et al., 1992). The QRS has a true-false, binary

choice format, although parents might have difficulties in making binary forced-choice (Konstantareas et al., 1992). In addition, it lacks validation among specific populations (Honey et al., 2005). Specifically, the length and binary choice format have practical disadvantages, with the former placing enormous burdens on the responders, and the latter making it more difficult to assess substantial changes in parenting stress. To address these limitations, Honey et al. (2005) confirmed the applicability of the QRS short-form (Friedrich et al., 1983) in research with parents of young children with autism and proposed using a total stress score based on 31 items, because the exploratory factor analyses failed to support the expected two- or three- factor solution for the scale items. However, the problem of binary forced-choice remained.

Yamane (2013) developed the Developmental Disorder Parenting Stressor Index (DDPSI) to address the limitations of previous scales. The DDPSI was designed to assess both experiences and cognitive appraisal related to parenting stressors, and experienced parents having children with developmental disabilities in Japan. Cognitive mediation plays a significant role in stress responses (Holroyd & Lazarus, 1982). However, research has suggested that previous scales assessing parenting stressors in parents of children with disabilities are not designed to assess their unique experiences, or the cognitive appraisal related to parenting stressors adequately; because these scales merely measure the outcomes of parental stress as stress responses. Moreover, previous scales have not considered parenting events and experiences that caused the stress response (Gildden, 1993; Sakaguchi & Beppu, 2007; Yamane, 2013). Furthermore, a persons' cognitive appraisal might determine whether a situation or encounter is personally stressful (Lazarus & Alfret, 1964). Therefore, interventions might aim at cognitive appraisal to reduce stressor. The DDPSI has the advantage of assessing both stressful experiences and cognitive appraisal. Yamane (2013) conducted a questionnaire and interviews survey with 53

Japanese mothers (aged 33 to 53 years) of children with autism and developmental disabilities (aged 4 to 23 years). The results yielded 308 episodes of stress related to parenting and disability. These episodes were organized into 25 items concerning parenting stressors. The content validity of the items was examined by two psychologists and one postgraduate student majoring in psychology. The items were rated on a four-point Likert scale ranging from 0 (*not at all experienced*) to 3 (*almost always experienced*), and 0 (*not at all averse*) to 3 (*very averse*). The former rating assessed the extent to which parents experienced parenting stressors (EPS) as stressful experiences, and the latter assessed the aversion of parenting stressors (APS) as a broader cognitive appraisal that included primary and secondary appraisal based on Lazarus' stress theory (Lazarus, 1966; Lazarus & Folkman, 1984). The primary appraisal involves determining whether the stressors poses a threat, and the secondary appraisal involves the individual's evaluation of resources and coping strategies for addressing any perceived threats (Lazarus & Folkman, 1984). Lazarus (1999) argued that primary and secondary appraisal often tend to merge and that it is difficult to distinguish appraisal and coping, which should only be distinguished when it is convenient to do for analysis.

Yamane (2013) conducted exploratory and confirmatory factor analysis (CFA) on the DDPSI items completed by 255 Japanese mothers of children with autism and developmental disabilities in parents associations of them. The Findings of these analyses suggested that the DDPSI adopts 18-items and has the following four-factor structure: Difficulty Understanding/ Coping, Pessimistic Thoughts on Independence and Future, Inadequate Understanding of Child's Disability, and Conflicts Caused by Child's Disability. Also, the DDPSI has high internal consistency (α = .81-.92), adequate concurrent validity and convergent validity assessed by Handicapped Child Parenting Stress Scale (r = .33 ~ .51) and Stress Response Scale-18 (r

= .40~ .65; Yamane, 2013). Further, the hypothetical model according to Lazarus' stress theory (Lazarus & Folkman, 1984; Cohen & Wills, 1985) that social support reduces the stress response via DDPSI was tested by a structural equation modeling analysis. The results supported the model and supported the construct validity of the DDPSI.

The DDPSI was dsigned to assess significant parenting stressors, including child-related and parent-related stressors that have been identified by prior research in western countries. The DDPSI also assesses several aspects of parenting stressors that are specifically influenced by Japanese culture because it was developed based on data of Japanese parents. An integrated review has suggested that parenting stress in Japanese mothers of autism children is likely to be related to Japanese parenting styles, gender ideology, and cultural beliefs (Porter et al., 2019). Moreover, Jimenez et al. (2013) reported that Asian-Americans are more likely to experience stigma about mental illnesses and express more shame and embarrassment about having a mental illness than Caucasian-Americans. In addition, Porter et al. (2018) indicated that Japanese mothers of children with autism are sensitive to other people's evaluation and gaze, and are likely to experience more stress about the difference between their children and typically developing children. The DDPSI is designed to be sensitive to these parenting stressors (e.g., item 12: "People around me think I have failed to discipline or educate my child when they see inexplicable behavior from my child").

The DDPSI has several advantages over prior parenting stress scales. First, it is shorter; therefore, it is easier to complete. Second, it distinguishes between and measures experiences in and cognitive appraisal of parenting stressors; thus, the DDPSI can measure the effects of parental support or intervention in terms of both changes in cognitive appraisal and a decrease in stressful parental experiences (e.g., children's behavioral problems). The fact that the DDPSI can

measure both EPS and APS gives it an advantage in assessment. For example, if the parents' EPS is high, it suggests the need for parenting support and intervention for the autism children, and if the parents' APS is high, it suggests the need for support using the cognitive restructuring method.

Despite these strengths, the DDPSI has several limitations. First, the scale was developed based on a sample of only mothers who attended a parent support group. Cross-validity of the factor structure of the DDPSI has not been clarified among non-support group mothers or fathers. Second, the DDPSI was created using cross-sectional data. The test-retest reliability and predictive validity of the scale have not been documented. Consequently, additional research is needed to investigate whether DDPSI has acceptable validity and reliability.

This study was designed to utilize longitudinal data of parents having autism children and investigated the validity and reliability of the DDPSI for assessing their stressors. Specifically, we expected to cross-validate the factor structure of the DDPSI with data of fathers and parents that do not attend parent support groups. We planned to examine the measurement invariance of the DDPSI across fathers, mothers, and parents who are not attending parent support groups to assess the test-retest reliability and construct validity of the DDPSI. We also investigated the temporal variabilities of parenting stressors. To evaluate the construct validity of the DDPSI, we posited five hypotheses described below regarding the longitudinal relationships between parenting stressors, parental stress response, and autism traits based on Yamane (2013) findings and other research on autism and parenting stress.

Based on previous research, we firstly hypothesized that mothers would have more parenting stressors than fathers (Baker-Ericzén et al., 2005; Davis & Carter, 2008; Hastings, 2003; Hastings et al., 2005; Konstantareas et al., 1992; Moes et al., 1992; McStay et al., 2014).

In particular, we expected that Japanese mothers would experience more parenting stressors than fathers, because the Japanese parenting style emphasizes a close relationship between mothers and children (Rothbaum et al., 2000), and less involvement of fathers in parenting because of strong, traditional, gender stereotypes (Holloway & Nagase, 2014). Secondly, we hypothesized there would be a positive correlation between parenting stressors and the severity of autism symptoms, because meta-analysis results indicate that the stress among parents of children with autism is higher than that among parents of typically developing children (Hayes & Watson, 2013). In addition, parenting stress reported by families with children with autism is related to autism severity (Benson, 2006; Ingersoll & Hambrick, 2011; Zablotsky et al., 2013). Thirdly, we hypothesized that changes in parenting stressors would be positively related to parental stress response changes because elevated stressors predicted elevated stress responses, as noted in Lazarus' stress theory (Lazarus, 1966; Lazarus & Folkman, 1984). Fourthly, we hypothesized that the interaction between EPS and APS would predict parents' stress responses, because a situation must be perceived as stressful via perceptual processes to be considered stressful (Lazarus, 1966; Lazarus & Folkman, 1984). We can theoretically assume that a combination of stressors and cognitive assessments can produce a stress response.

Methods

Participants and Procedure

A total of 292 parents with children with autism aged between 2 and 18 years of age (mean age = 9.93 (*SD* = 4.34) years), participated in the initial survey (Time: T1). In January 2015, participants were recruited by online questionnaire pilot survey through a research company. Participants were residents in 44 prefectures out of 47 prefectures of Japan, and 51.03% of participants from the three metropolitan areas, Tokyo, Osaka, and Nagoya, which is

nearly identical to the population ratio of Japan (Statistics Bureau of Japan, 2019). Among these, 94.18% (*n* = 275) completed the second survey (Time 2; T2), and 72.60% (*n* = 212) completed the third survey (Time 3; T3). There was one month between T1 and T2, and six months between T1 and T3.

Approximately one-third of the participants (35.27%; *n* = 103; T2: *n*=97; T3: *n*=78) were fathers, and the remaining (64.73%; *n* = 189; T2: *n*=178; T3: *n*=134) were mothers. Parents' ages ranged from 21 to 60 years (mean = 41.61 (*SD* = 7.06) years). Most participants were married (*n* = 271, 92.81%). Parents' reported annual household incomes ranged from < ¥2,000,000 to >¥12,000,000: 37.31%, 21.92%, and 16.54% had incomes of ¥4,000,000–¥6,000,000; ¥2,000,000–¥4,000,000; and ¥6,000,000–¥8,000,000, respectively. Participants' household income tended to be significantly lower than the average household income of Japan, according to statistics from the Comprehensive Survey of Living Conditions report (Ministry of Health, Labour, and Welfare, Japan, 2017). Most parents (60.62%, *n* = 177) had never attended a parent support group; however, 24.32% (*n* = 71) currently belonging to a parent support group, 9.25% (*n* = 27) had belonged to a group in the past, and 5.82% (*n* = 17) did not respond.

Regarding children's demographics, 78.08% (*n* = 228) were boys. All children had been diagnosed with autism by a psychiatrist. The Japanese version of the Autism Spectrum Screening Questionnaire (ASSQ-J-SF) was used to determine whether the children had the characteristics of autism. Among all children, 94.86% (*n* = 277) scored over the cut-off points of ASSQ-J-SF (mean = 12.19 (*SD* = 4.23) points). At T1, 39.00%, 26.71%, 14.38%, and 13.01% of the participating children were diagnosed with pervasive developmental disorders, autism, autism spectrum disorder, and Asperger's syndrome, respectively. Children's diagnosis age at T1 ranged from 1 to 17 years (mean = 5.03 (*SD* = 3.00) years).

Measures

Parenting stressors were measured at T1, T2, and T3, and the global change rating (GCR) was measured at T2. Autism traits were measured at T1, and stress response was measured at T1 and T3.

Parenting stressors All 18 items from DDPSI (Yamane, 2013) was used. It includes items across four subscales: (a) Difficulty Understanding/Coping, which means parents have difficulty understanding their child and coping with their needs (6 items); (b) Pessimistic Thoughts on Independence and Future, which refers to anxiety about their child's future and independence (5 items); (c) Inadequate Understanding of Child's Disability, which refers to an inadequate understanding of the child's disorder (4 items); and (d) Conflicts Caused by Child's Disability, which refers to conflicting emotions regarding their child's disorder (3 items). The DDPSI measures parenting stressors parents of children with a disability including the EPS and the APS felt during the previous month. Participants rate how well each item describes their feelings on a four-point scale ranging from 0 (*not at all experienced*) to 3 (*almost always experienced*), and their feelings on a four-point scale ranging from 0 (*not at all averse*) to 3 (*very averse*) for each of the four subscales. The former rating was summed as the EPS scores, and the latter was summed as the APS scores.

GCR of parenting stressors Participants were required to answer the following at T2: "During the last month, did your parenting stressors change?" Participants responded using a 7-point Likert scale (1 = *very much worsened*; 4 = *unchanged*; 7 = *very much improved*).

Autism traits The ASSQ-J-SF (Ito et al., 2014) was used to measured autism traits, which includes 11 items to measure symptoms that are characteristic of autism. Participants rated whether their child stood out as different from other same-aged children: 0 (*no*), 1 (*somewhat*),

and 2 (*yes*). The ASSQ-J-SF has high internal consistency and high discrimination power for autism diagnosis. It has adequate sensitivity and specificity for identifying children as being diagnosed with autism; with a cutoff score ≥ 5, sensitivity = .94 and specificity = .82 and score ≥ 12, sensitivity = .47 and specificity = .97 (Ito et al., 2014).

Stress response The Stress Response Scale-18 (SRS-18; Suzuki et al., 1997) was used to measure parents' stress response. It includes 18 items across three subscales: (a) depression and anxiety (6 items), (b) displeasure and anger (6 items), and (c) apathy (6 items). It measures stress responses that one has experienced in general, during the last 2 or 3 days. Parents rated how much each item described their experiences on a scale from 0 (*not true*) to 3 (*certainly true*) for the three subscales. The SRS has high reliability and validity (Suzuki et al., 1997).

Ethical Considerations

Ethics approval was obtained from the research ethics committee at Nara Women's University. All parents were informed of the following on the web site before they participated: (1) this research contains questions about your child' developmental disability and parenting stress. Please answer the questions if you agree with our research intent. (2) Study participation is voluntary. Rest assured, your responses will remain completely confidential. We had the participants click the link to answer the survey if they agreed with these points.

Data Analyses

Statistical analyses were conducted using SPSS 22.0 for Windows (IBM Japan, Tokyo, Japan) and M-plus (Version 7.4; 2015). Descriptive statistics were used to describe the sample. Psychometric qualities of the DDPSI were expressed by structural validity, cross-validity, internal consistency, test-retest reliability, and construct and predictive validity.

Because the four composites of the DDPSI were assembled from a factor analysis, we

needed to cross-validate the four-factor structure with a new sample of gender group and non-support group parents. CFA was conducted to investigate the accuracy of the four-factor structure of the EPS' and the APS' four-factor structure using full sample, fathers, mothers, never belonged support sample, and belonging support group sample. Next, we similarly conducted a CFA on measurement invariance among gender group and non-support group parents. Tests of measurement invariance involve the comparison of multiple nested models (Sass, 2011) to measuring configural invariance (whether factor structure is equal across groups), metric invariance (whether item loading on each factor is equal across groups), and scalar invariance (whether item intercepts are equal across groups). Model fit was interpreted as "acceptable" if the Comparative Fit Index (CFI) > .90, the Tucker-Lewis Index (TLI) > .90, and Root Mean Square Error of Approximation (RMSEA) < .08 (Hancock and Freeman 2001; Kline 2006). Moreover, Standardized Root Mean Square Residual (SRMR) < .08 was considered a good fit (Hu and Bentler 1999). The recommendation of Cheung and Rensvold (2002) was followed when comparing the nested model's fit in the analysis of invariance, such that ΔCFI and ΔTLI under .01 and ΔRMSEA less than .015 suggested no relevant changes in the model fit with respect to the previous, less restrictive model. In the case of nested models, decision-making was supported by the Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) estimates. The model with the lowest value was preferred for the two indices and for BIC in particular.

Internal consistency was assessed with Cronbach's alpha and 95% confidence intervals (95% CI). Internal consistency is considered good when Cronbach's alpha lies between .7 and .9.

Reliability concerns the degree to which the results are consistent across repeated measurements (de Vet et al. 2006). Test-retest reliability of the DDPSI was determined by means

of intraclass correlation coefficients (ICC) (two-way random effects model absolute agreement). An ICC > .7 indicates good reliability (de Vet et al. 2006).

Construct validity reflects the extent to which a measure consistently relates to other measures with theoretically derived hypotheses for the construct that is being measured. To evaluate the construct validity of the DDPSI, our five hypotheses were analyzed as follows: (1) a mixed analysis of variance (ANOVA) was performed between gender (between-group variable) and time (within-group variable) on the EPS and APS; (2) Pearson's correlation analysis was performed to confirm whether there was a positive correlation between the DDPSI and ASSQ-J-SF; We used hierarchical regression analyses to examine hypotheses three and four: (3) changes in parenting stressors from T1 to T3 would be positively related to changes in parental stress response, and (4) the interaction between EPS and APS would predict parental stress responses at T3. As the first step in the regression analyses, the dependent variable (T3 stress response) was regressed on the control variable and the T1 dependent variable, as well as the predictors. In subsequent regressions, T3 predictors were entered sequentially in the following order: EPS and APS. By controlling for the effects of relevant T1 variables in the regression equation, the regression coefficient associated with the T3 predictor can be interpreted as affecting changes in the dependent variable, controlling for the effects of all other predictors included in the equation (Cohen et al. 2003).

Community Involvement

There was no community involved in this study.

Results

Structural and Cross validity

Confirmatory factor analysis (CFA) model was specified based on the priori four-factor structure of the scale. Both of the EPS and the APS for the entire sample indicated acceptable model fit: CFI = .94, RMSEA = .07, SRMR = .06; CFI = .94, RMSEA = .07, and SRMR = .05. Standardized factor loadings for the four-factor models are presented in Table 1. In CFA, all of the factor loadings were over .45.

INSERT TABLE 1 ABOUT HERE

Based on prior research, we developed a model to test for configural invariance of the EPS in which all 18 items loaded on the four-factor model. Table 3 shows the fit indices of the models. The four-factor model showed acceptable fit indices for fathers and mothers (CFI = .93, RMSEA = .07, SRMR = .07; CFI = 91, RMSEA = .07, SRMR = .06). Measurement invariance was found for latent construct patterns, item loadings, and intercepts between fathers and mothers (Table 3). Model fit was close to or within acceptable limits for all models. We adopted the scalar invariance model with the lowest BIC (CFI = .91, RMSEA = .07, SRMR = .08, BIC = 12425.31). It was concluded that EPS demonstrated scalar invariance between fathers and mothers. The EPS among parents who never belonged and belonging to a support group also fitted the model (CFI = .92, RMSEA = .07, and SRMR = .06; CFI = .93, RMSEA = .07, and SRMR = .07). Measurement invariance was identical for the same between parents who never belonged and belonging to a support group. Model fit was close to or within acceptable limits for all models. We adopted the scalar invariance model with the lowest BIC (CFI = .92, RMSEA = .07, SRMR = .08, BIC = 11806.42). It was concluded that EPS demonstrated scalar invariance between non-support and support groups.

The results of testing the configural invariance of the APS also indicated acceptable fit indices for gender and support group invariances (Table 4). The four-factor model showed

acceptable fit indices for fathers and mothers (CFI = .95. RMSEA = .07, SRMR = .04; CFI = 94, RMSEA = .07, SRMR = .06). The results of testing the APS for measurement invariance of the common four-factor model of gender did not indicated scalar invariance because of higher BIC (Table 3). The results indicated that a model of metric invariance had an acceptable fit than a model of scalar invariance (CFI = .93, RMSEA = .07, SRMR = .07, BIC = 11316.35). The APS among parents that never belonged and belonging to a support group fitted the model (CFI = .94, RMSEA = .07, SRMR = .06; CFI = .90, RMSEA = .08, SRMR = .06). Measurement invariance was identical between parents that never belonged and belonging to a support group. Model fit was close to or within acceptable limits for all models. We adopted the scalar invariance model with the lowest BIC (CFI = .92, RMSEA = .08, SRMR = .09, BIC = 10817.75). It was concluded that APS demonstrated scalar invariance between non-support and support groups.

INSERT TABLE 2 ABOUT HERE

INSERT TABLE 3 ABOUT HERE

INSERT TABLE 4 ABOUT HERE

Internal Consistency

The internal consistency of the resulting EPS was α = .93 (95% CI: .92–.94) at T1. The factors that emerged also showed adequate to good internal consistency (α = .75–.90). In addition, the internal consistency of the resulting APS was α = .96 (95% CI: .95–.96). The factors also showed adequate to good internal consistency (α = .83–93). Overall, the internal consistency of the EPS and the APS were good.

Reliability

The T2 sample was obtained after one month, similar to the T1 sample, for determining the test-retest reliability of the scale (i.e., from T1 to T2). The test-retest reliability of the DDPSI was

determined by the intraclass correlation coefficients (ICC). The results indicated that one month after the T1 questionnaire, 3 participants *very much improved* (1.10%; GCR = 7), 11 *much improved* (4.03%; GCR = 6), 29 *slightly improved* (10.62%; GCR = 5), 41 *slightly worsened* (15.02%; GCR = 3), 22 *much worsened* (8.06%; GCR = 2), 2 *very much worsened* (0.73%; GCR = 1), and most remained stable (60.44%, GCR = 4). The ICC for the EPS scores was .74 (95CI: .63-79), the factors that emerged also showed adequate to good test-retest reliability (ICC=.70–.80). In addition, the ICC of the resulting APS was .79 (CI: .74-.84), the factors that also showed adequate to good test-retest reliability (ICC=.75-79). Overall, the EPS and APS of test-retest reliability were good.

Construct Validity

Construct validity reflects the extent to which a measure is consistently related to other measures with theoretically derived hypotheses for the construct that is being measured. The study hypotheses were analyzed as follows to evaluate the construct validity of the DDPSI.

Gender differences: hypothesis one

Before testing gender differences between fathers and mothers, we confirmed no differences in child characteristics. T-test indicated no significant differences between fathers and mothers about child's age and autism severity. A gender of parent (between-group variable) × time of research (within-group variable) two-way factorial ANOVA with the total score and four factors of EPS or APS as dependent variables demonstrated that mothers reported higher EPS scores than did fathers ($F(1, 204) = 5.23$, $p<.05$; $F(1, 204)=7.01$). This included the "Pessimistic Thoughts on Independence and Future" and "Conflicts Caused by Your Child's Disability" subscales ($F(1, 204) = 9.59$, $p<.001$; $F(1, 204) = 7.25$, $p<.01$). The interaction between gender and time was significant for the "Inadequate Understanding of Child's Disability"

subscale ($F(2, 203) = 3.38$, $p<.05$), and an analysis of simple main effects confirmed that a simple main effect of times was significant for fathers, but not mothers ($F(2, 408)=7.92$, $p<.001$). However, the main effect of gender was not significant for the EPS "Conflicts Caused by Your Child's Disability" subscale. On the other hand, mothers reported higher APS scores across all four subscales than did fathers; ($F(1, 222) = 24.20$, $p<.001$; $F(1, 222) = 18.21$, $p<.001$; $F(1, 222) = 19.96$, $p<.001$; $F(1, 222) = 14.81$, $p<.001$; $F(1, 222) = 29.40$, $p<.001$). Therefore, hypothesis one was supported (see Table 4).

INSERT TABLE 4 ABOUT HERE

Autism *traits: hypothesis two*

Pearson's correlation analysis was performed to confirm whether there was a positive correlation between the DDPSI and ASSQ-J-SF. Total EPS scores were positively correlated with the ASSQ-J-SF ($r = .28$, $p < .001$). All subscales were also positively correlated with the ASSQ-J-SF ($r = .19–.31$, $p < .001$). The ASSQ-J-SF was positively correlated with the APS ($r = .30$, $p < .001$) and all its subscales ($r = .26–.27$, $p < .001$); thus, hypothesis two was supported. However, there were some weak relationships.

Stress response

Pearson's correlation analysis was performed to confirm whether there was a positive correlation between the DDPSI and the SRS-18. Total SRS-18 scores at T1 were positively correlated with total EPS scores ($r = .51$, $p < .001$) and the subscale scores ($r = .32–.52$, $p < .001$). The SRS-18 was positively correlated with total APS scores ($r = .59$, $p < .001$) and its subscales ($r = .36–.51$, $p < .001$).

Correlations Between Parenting Stressors and Demographic Variables

Pearson's correlations were used to explore the bivariate associations between DDPSI

and parents' characteristics, children's characteristics, and parents' stress responses (Table 5). The data revealed that parents' gender (1 = women) was positively associated with APS and parents' stress response. Parents' age was negatively associated with APS. ASSQ-J-SF score was positively associated with both EPS and APS at T1, and T1 and T3 stress response. "Conflicts Caused by Your child's Disability" in both EPS or APS was positively correlated with parents' age (r = -.16, p < .01; r = -.18, p < .01, respectively).

INSERT TABLE 5 ABOUT HERE

Multivariate Analyses: Hhypotheses 3 and 4

As shown in Table 6, our third hypothesis, which posited that changes in parenting stressors from T1 to T3 would be positively related to changes in the parental stress response, was tested by estimating a series of hierarchical regression analyses utilizing T3 parental stress response as the dependent variable. The first step shows the influence of the control variables on the T3 stress response. It can be seen that parents' gender and autism traits positively predicted their stress response at T3. The next step shows the influence of parents' baseline stress response and other T1 controls on their T3 stress response. By controlling for the effects of relevant T1 variables in the regression equation, the regression coefficient associated with the T3 predictor can be interpreted as affecting changes in the dependent variable, after controlling for the effects of all the other predictors that are included in the equation (Cohen et al. 2003).

As expected, the most powerful predictor in this model was parents' T1 stress response, uniquely accounting for over one-third of the variance in the dependent variable. When the T3 EPS was added to the equation, it was a highly significant and positive predictor of parents' T3 stress response, uniquely accounting for 7.32% of the explained variance—beyond that explained by the prior model. Further, when the APS was added to the equation at T3, it was a

significant and positive predictor of parents' T3 stress response, uniquely accounting for 3.17% of the explained variance—beyond that explained by the prior step. These results supported hypothesis three.

INSERT TABLE 6 ABOUT HERE

Finally, the last hypothesis, which posited that interactions between the EPS and the APS would be related to increased parental stress response, was examined. In a fifth step, interaction variables were added to the equation: T3 EPS × T3 APS (as suggested by Cohen et al., 2003, all predictors were "centered" over their means to control for multicollinearity). As shown, when interaction terms were added, the interaction between the EPS and the APS was non-significant; therefore, hypothesis four was rejected.

Discussion

The primary purpose of this study was to examine the validity and reliability of the DDPSI further for use with Japanese parents of children with autism. We examined five hypotheses to evaluate the construct validity of the DDPSI. The results supported all the hypotheses except Hypothesis 4. We considered this to be indicative of the good construct validity of the DDPSI. The results revealed that the experiences and the aversion of parenting stressors had moderate one-month test-retest reliability. These findings suggest that the DDPSI has acceptable construct validity and reliability.

We conducted CFA of the entire sample and parents who had never attended a parent support group to confirm the cross-validity of the DDPSI. The experiences of parenting stressors in both samples indicated an acceptable model fit. Moreover, the aversions of parenting stressors in the entire sample also indicated an acceptable model fit. However, the aversions of parenting stressors among non-support group parents had only a slight model fit. Nevertheless, we

considered that the DDPSI has acceptable cross-validity because the size of the non-support group parent sample was small, and several indices had an acceptable model fit. We also examined the equivalence of the four-factor DDPSI model across fathers, mothers, the now belonging support group, and the never belonged support group. The results supported the scalar invariance of the four-factor experiences of parenting stressors model. The results also data supported scalar invariance of the support group model of the aversions of parenting stressors, and the metric invariance of the gender invariance model. Based on these results, it was assumed that the four-factor model of the experiences of parenting stressors has equivalency, indicating that the constructs of experiences of parenting stressors has a similar meanings, the same structure, and the same measurement model in fathers and mothers of now belonging and not belonged parent support groups, which supported the general validity and the interpretations of the experiences of parenting stressors. A suitable and strong DDPSI structure that is common to both genders and all parents suggest useful in a wide range of clinical settings, and gender comparison.

The aversions of parenting stressors assessed by the DDPSI allows it to be used in research on parenting stressors among fathers and mothers. However, our data indicated that the aversions of parenting stressors is unsuitable for comparing parenting stressors between the genders, because the results indicated the possibility of slight gender differences in the scores of items assessing cognitive appraisal of parenting stressors and not supporting scalar invariance of gender group model.

The results of this study indicated that mothers of children with autism experience higher parenting stress than fathers, which supported Hypothesis 1. These results are congruent with past findings (e.g., Baker-Ericzén et al., 2005; Davis & Carter, 2008; Hastings, 2003; Hastings et

al., 2005; Konstantareas et al., 1992; Moes et al., 1992; McStay et al., 2014), indicating that the response of Japanese parents are similar to parents from other cultures. The gender differences in the experience of stress could be caused by the effects of children's characteristics on parenting stress. More time spent on caring for a child with autism might increase the exposure to child-related stressors and associated demands (Jones et al., 2014; McStay et al., 2014). Specifically, mothers may have higher parenting stress than fathers because mothers are typically the primary caregivers of children with disabilities in Japan. Japanese mothers spend more time on child-care in general than mothers in Europe and the United States, while the reverse is true for Japanese fathers (Gender Equality Bureau Cabinet Office, 2017). The same might be true for parents of children with autism. In addition, there is a strong societal gender stereotype in Japan that considers mothers to be fully responsible for housekeeping and childrearing (Porter & Loveland, 2019) and Japanese mothers are often blamed for their children' s problem behavior (Kazui, 1997). Higher parenting stress among Japanese mothers seems to have been caused by mothers' inability to control their children's behavior caused by autism traits as much as mothers want. However, we assumed that it was inappropriate to strictly compare mean values between the genders, because the metric invariance of aversions of parenting stressors was not supported. It is suggested that future studies develop standard score norms for comparing stressors between fathers and mothers.

The present results also support hypothesis two—that increased severity of autism symptoms will increase parenting stressors, which is consistent with past findings (Benson, 2006; Benson & Karlof, 2009; Ingersoll & Hambrick, 2011; Zablotsky et al., 2013). Results indicated weak relationships between autism traits and parenting stressors, and the regression analysis showed that severity of autism symptoms was not a significant predictor of parents'

stress response at T3, after adding stress response at T1 to the model. A possible contributor to this finding might have been that "behavior problems" had a greater effect than did autism symptom severity. In fact, prior studies showed an association between the presence of behavior problems and increased parental stress (Davis & Carter, 2008; Hastings, 2003). Another possible reason may be the presence of a mediator. Benson (2006) and Benson & Karlof (2009) demonstrated that while some of the impact of severity of autism symptoms on parent depression was direct, some was indirect. There may be other mediator variables between the severity of autism symptoms and parenting stress; for example, stress proliferation (Benson, 2006; Benson & Karlof, 2009) or social support (Benson, 2006; Ingersoll & Hambrick, 2011).

Moreover, hypotheses three and four was supported. Specifically, parenting stressors and parents' stress responses had a covariant relationship, and the experiences and the aversions of parenting stressors were covariant with parents' stress responses. In other words, the results suggest that it is vital to assess and treat the experiences and the aversions of parenting stressors separately. These findings were consistent with the theory of Lazarus & Folkman (1984), which suggests not only the importance of stressor quantity, but also individuals' cognitive appraisal of stressors. These findings suggest that improving the cognitive appraisal of stressors decreases parenting stress, and it is important to facilitate interventions for parents' cognitive appraisal of parenting stressors. The findings suggest that the DDPSI has the methodological significance of research on parenting stressors and stress. Prior parenting stress scales have not considered parenting events and experiences that caused the stress response and have measured the experiences and cognitive appraisal without distinguishing (Gildden, 1993; Sakaguchi & Beppu, 2007; Yamane, 2013). It is assumed that the DDPSI has an advantage methodologically in distinguish the experiences and cognitive appraisal on parenting stressors. However, there was a

correlation between the experiences and the aversions of parenting stressors. A possible contributor to this results could be the methodology we used when asking for two different grades for the same item. Future studies should examine the extent to which the distinction between experiences and aversions of parenting stressors is reliable and valid.

On the other hand, although we hypothesized that the interaction between experiences and aversions of parenting stressors would be related to parents' stress responses, we did not find support for this hypothesis. The experiences and aversions of parenting stressors were individually associated with parents' stress responses; therefore, it is critical to assess them separately. Clinicians might be able to assess experiences and aversions of parenting stressors to guiding interventions. High experiences of parenting stressors of parents might suggest the need for parenting support and interventions for the autism children. However, the stressors of parents of children with autism are often chronic (Twoy et al., 2007). The Autism children's behavior is difficult to change based on their characteristics such as autism traits. Therefore, the frequency of experiencing stressors caused by children's behavior might be difficult to change. Parents high aversions of parenting stressors suggested the need for support using the cognitive restructuring, stress management, mindfulness-based intervention and methods. Cognitive interventions for parenting stressors might be also effective in these cases, and aversions of parenting stressors might be useful for examining the interventions' efficacy.

The present results revealed that the experiences and the aversions of parenting stressors had moderate one-month test-retest reliability. In addition, the experiences and aversions of parenting stressors at T1 were significantly higher than both of them at T2. A possible contributor to this finding might have been that the research was conducted in January and February, when school ends in Japan; therefore, parenting stressors (e.g., anxiety over the next

school year) are high and automatically decrease over time. We identified the stable group with the GCR that identified changes in the experiences and the aversions of parenting stressors together. Considering that the experiences and the aversions of parenting stressors might well change separately, it is assumed that the GCR of parenting stressors could not assess whole parenting stressors change, because the experiences and the aversions of parenting stressors changes cancel each other out. For example, the stable group probably included parents that increased the experiences of parenting stressors and decreased the aversions of parenting stressors during a month, or parents that decreased the experiences of parenting stressors and increased the aversions of parenting stressors. The present study suggests that the reliability of the DDPSI is acceptable; however, future researchers should examine the reliability and interval stability of the DDPSI. Moreover, future research should measures changes in the aversions and experiences of parenting stressors separately, because parenting stressors are likely changed over time.

The DDPSI is a particularly effective measure for assessing parenting stressors of parents with an East Asian culture background, such as Japan. The items of the DDPSI are sensitive to several parenting stressors experienced by parents who are sensitive to the evaluation of people surroundings them as well as to differences between their autism children and typically developing children, which others blamed on parents as lack of discipline. Socially inappropriate behaviors despite the normal appearance of children with autism might make this disorder especially stigmatizing for parents (Farrugia, 2009; Gray, 1993). For example, parents of children with autism have been evaluated as a bad parents, and blamed for lack of parenting ability because their children's inappropriate public behavior is attributed to the lack of parental discipline (Farrugia, 2009). Moreover, Asian-Americans are more likely to experience stigma

about mental illness (Jimenez et al., 2013), and Japanese mothers of autism children are sensitive to other people's evaluation and gaze and are likely to have more stress about the difference between their children and typically developing children (Porter & Loveland, 2019). The DDPSI is sensitive to these factors, and therefore, it is considered a sensitive scale for evaluating parenting stressors among Japanese and East Asian parents of autism children. Further studies are needed to identify if DDPSI has such advantages because this study did not directly make any cross-cultural comparisons.

Limitations

This study had some limitations. First, the population recruited online may have high online literacy and motivation to participate in online studies; therefore, they may not represent all Japanese parents of children with autism. Consequently, sampling bias may have affected the present findings. In addition, our group sizes (concerning attending support groups) were not proportionate and the sample size of these sub group was not large enough; further studies are needed to clarify this. Second, study measures were based solely on parents' self-reports. Study findings may inflate the level of some associations between variables due to shared-method variance. Future research should include varied measurements. Third, we utilized data from only two periods. Future research should utilize additional longer-term longitudinal data, which would improve estimation accuracy. Despite these limitations, the current findings have key implications for future researchers who examine stress in families of children with autism and for familial therapeutic interventions.

Conclusion

Despite several limitations, the findings indicated that the DDPSI had appropriate cross and construct validity, and reliability. In addition, the present study suggested that it is important to

measure both experience and cognitive appraisal of parenting stressors in evaluating the stress of parents of children with autism using assessment tools. Therefore, the DDPSI has several advantages and is a valuable measurement tool to be able to evaluate them in clinical settings; the DDPSI is shorter, easier to complete, applicable to parents with children of any ages, and can evaluate both viewpoints of parenting stressors. This study suggests that the DDPSI is useful for early detection of psychological disorder in parents of children with autism and for assessment to examine treatment and intervention goals and methods.

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TABLE 1

Confirmative factor analysis of Developmental Disability Parenting Stressor Index (N = 292)

DDPSI facotrs and items	EPS	APS
Difficult Understanding and Coping		
1 I do not understand what my child is feeling or thinking.	.85	.87
2 There are times when I cannot understand my child's behaviors.	.85	.90
3 There are times when I cannot keep pace with my child's rapid mood changes.	.79	.86
4 It is difficult for me to understand what my child wants and needs.	.76	.88
5 I do not know how to manage when my child causes problems.	.72	.80
6 There are times when I find it difficult to cope when my child is overexcited.	.65	.68
Pessimistic Thought on Independence and Future		
7 I think my child might be unable to live independently as an adult.	.84	.89
8 I cannot imagine how my child will manage adulthood in the future.	.80	.82
9 I am concerned about the effect on my child when their parents pass away.	.75	.86
10 I am concerned whether there will be people who will understand my child in the future.	.75	.88
11 I think my child might be unable to adapt to the surroundings and society in general.	.69	.78
Inadequate Understanding of Child's Disability		
12 People around me think I have failed to discipline or educate my child when they see inexplicable behavior from my child.	.89	.83
13 When I am trying to explain my child's disability, people around me think that I am making excuses for my child and do not understand me.	.72	.83
14 I feel that my child's kindergarten school and the teachers there lack an adequate understanding of my child's disability.	.55	.64
15 It is difficult for my child's grandparents to accept the disability of my child.	.49	.65
Conflicts Caused by Your Child's Disability		
16 I cannot help noticing the weaknesses of my child, but I want to focus on their strengths.	.80	.85
17 I become frustrated with my child despite knowing that my child's inability to do certain things is because of their disability.	.79	.78
18 I think about why my child cannot even do easy things, although they could previously do things just like other children.	.73	.76

Note. EPS = Experience of parenting stressor; APS = Aversion of parenting stressor

TABLE 2

Coefficients Between subscales of Experiences and Aversion of Parenting stressor (N = 292)

	1	2	3	4	5	6	7	8
1 EPS1	—							
2 EPS2	.61 ***	—						
3 EPS3	.58 ***	.43 ***	—					
4 EPS4	.74 ***	.60 ***	.47 ***	—				
5 APS1	.66 ***	.45 ***	.35 ***	.60 ***	—			
6 APS2	.51 ***	.63 ***	.28 ***	.56 ***	.75 ***	—		
7 APS3	.45 ***	.41 ***	.52 ***	.42 ***	.66 ***	.58 ***	—	
8 APS4	.56 ***	.49 ***	.31 ***	.72 ***	.80 ***	.73 ***	.61 ***	—

*** $p < .001$

Note. EPS1 = Difficult Understanding and Coping, EPS2 = Pessimistic Thought on Independence and Future, EPS3 = Inadequate Understanding of Child's Disability, EPS4 = Conflicts Caused by Your Child's Disability, APS1 =Difficult Understanding and Coping, APS2 = Pessimistic Thought on Independence and Future, APS3 = Inadequate Understanding of Child's Disability, APS4 = Conflicts Caused by Your Child's Disability

TABLE 3

Tests of Measurement Invariance of the EPS across Model of Gender and Support Group

Invariance test	*n*	*df*	$\chi 2$	CFI	TLI	RMSEA	SRMR	ΔCFI	ΔTLI	ΔRMSEA	AIC	BIC
Full sample	292	129	290.62	.94	.92	.07	.06					
Gender												
Father	189	129	187.85	.93	.92	.07	.07					
Mother	103	129	272.70	.91	.90	.08	.06					
Gender invariance												
Configural invariance	292	272	478.68	.92	.91	.07	.07	—	—	—	12125.98	12515.72
Metric invariance[a]	292	290	503.71	.92	.91	.07	.08	.00	.00	.00	12110.66	12434.22
Scalar invariance[b]	**292**	**294**	**516.86**	**.91**	**.91**	**.07**	**.08**	**.00**	**.00**	**.00**	**12116.46**	**12425.31**
Support group												
Never belonged	177	129	255.59	.92	.90	.07	.06					
Belonging	98	129	181.98	.93	.92	.07	.07					
Support group invariance												
Configural invariance	275	272	448.46	.92	.91	.07	.07	—	—	—	11525.86	11909.24
Metric invariance[a]	275	290	463.65	.93	.92	.07	.07	.00	-.01	.00	11501.35	11819.63
Scalar invariance[b]	**275**	**294**	**472.54**	**.92**	**.92**	**.07**	**.08**	**.00**	**.00**	**.00**	**11502.61**	**11806.42**

[a] Equal factor loadings and thresholds across group. [b] Equal factor loadings and means across groups.
Bolded model represents the final optimal model.

TABLE 4

Tests of Measurement Invariance of the APS across Model of Gender and Support Group

Invariance test	*n*	*df*	χ2	CFI	TLI	RMSEA	SRMR	ΔCFI	ΔTLI	ΔRMSEA	AIC	BIC
Full sample	292	129	297.63	.94	.93	.07	.05					
Gender												
Father	189	129	192.80	.95	.94	.07	.04					
Mother	103	129	246.16	.94	.93	.07	.06					
Gender invariance												
Configural invariance	292	272	467.47	.94	.93	.07	.06	—	—	—	10984.70	11374.43
Metric invariance[a]	**292**	**290**	**511.95**	**.93**	**.93**	**.07**	**.07**	**.01**	**.00**	**.00**	**10992.79**	**11316.35**
Scalar invariance[b]	292	294	540.60	.92	.92	.08	.10	.01	.01	.00	11017.19	11326.04
Support group												
Never belonged	177	129	252.33	.94	.93	.07	.06					
Belonging	98	129	227.92	.90	.88	.08	.06					
Support group invariance												
Configural invariance	275	272	498.20	.92	.92	.08	.06	—	—	—	10540.97	10924.35
Metric invariance[a]	275	290	516.59	.92	.92	.08	.07	.00	-.01	.00	10513.08	10831.36
Scalar invariance[b]	**275**	**294**	**525.24**	**.92**	**.92**	**.08**	**.09**	**.00**	**.00**	**.00**	**10513.94**	**10817.75**

[a] Equal factor loadings and thresholds across group. [b] Equal factor loadings and means across groups.
Bolded model represents the final optimal model.

TABLE 5

Mean Parenting Stressors Scores (T1 to T3) (N= 212)

	T1		T2		T3		*F*		
	Father	Mother	Father	Mother	Father	Mother	Time	Gender	Interaction
EPS	27.55 (12.08)	30.29 (12.50)	22.26 (11.85)	27.35 (13.41)	23.44 (13.86)	26.71 (13.44)	14.91 ***	5.23 *	1.25
EPS1	8.62 (4.56)	9.73 (5.23)	7.21 (4.47)	8.62 (5.43)	7.58 (5.15)	8.57 (5.31)	8.48 ***	3.31	.29
EPS2	9.70 (3.82)	10.97 (3.68)	8.05 (4.03)	9.81 (4.07)	7.97 (4.17)	9.49 (4.33)	19.82 ***	9.59 ***	.45
EPS3	4.51 (3.12)	4.23 (3.26)	3.12 (2.62)	3.85 (3.69)	3.86 (3.22)	3.68 (3.50)	7.68 ** *	0.05	3.38 *
EPS4	4.71 (2.50)	5.36 (2.77)	3.88 (2.43)	5.07 (2.85)	4.03 (2.70)	4.97 (2.77)	7.54 ***	7.25 **	1.25
APS	23.56 (13.78)	30.37 (13.13)	20.61 (12.68)	30.04 (13.35)	20.06 (13.96)	28.88 (15.01)	3.91 *	24.20 ***	1.42
APS1	7.30 (4.61)	9.41 (5.25)	6.51 (4.46)	9.64 (5.22)	6.25 (4.79)	9.40 (5.53)	1.19	19.96 ***	1.74
APS2	7.25 (4.44)	9.20 (4.16)	6.44 (4.07)	9.10 (4.15)	6.44 (4.40)	8.59 (4.70)	3.12 *	18.21 ***	.80
APS3	4.97 (3.33)	6.29 (3.42)	4.19 (2.97)	5.83 (3.71)	4.13 (3.31)	5.88 (3.73)	4.04 *	14.81 ***	.41
APS4	4.04 (2.46)	5.47 (2.51)	3.47 (2.44)	5.47 (2.68)	3.25 (2.55)	5.01 (2.89)	5.70 **	29.40 ***	1.53

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. EPS1 = Difficult Understanding and Coping, EPS2 = Pessimistic Thought on Independence and Future, EPS3 = Inadequate Understanding of Child's Disability, EPS4 = Conflicts Caused by Your Child's Disability, APS1 =Difficult Understanding and Coping, APS2 = Pessimistic Thought on Independence and Future, APS3 = Inadequate Understanding of Child's Disability, APS4 = Conflicts Caused by Your Child's Disability

TABLE 6

	Parent's gender	Parent's age	Child's gender	Child's age	T1 AT	T1 SR
T1 EPS	.10	-.09	-.01	-.07	.29 ***	.51 ***
T1 APS	.28 ***	-.10	-.07	-.02	.29 ***	.60 ***
T1 SR	.21 ***	-.16 **	-.03	-.18 **	.23 ***	—
T3 SR	.24 ***	-.14 *	.00	-.08	.20 **	.68 ***

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. EPS = Experience of parenting stressor; APS = Aversion of parenting stressor; Gender: 1 = female, 0 = male; AT = Autism trait; SR = Stress response.

TABLE 7

Hierarchical Regression Analysis Results Predicting Parents' Stress Responses at T3 (N = 212)

Predictor	Step 1 β	Step 2 β	Step 3 β	Step 4 β	Step 5 β
Parent's gender	.19 **	.12 *	.12 *	.08	.08 *
Parent's age	-.08	-.04	-.03	-.04	-.04
Child's gender	.00	.01	.02	.00	.00
Child's age	-.03	.08	.09	.09	.08
AT	.20 **	-.05	-.06	-.08	-.08
T1 stress response		.59 ***	.50 ***	.50 ***	.49 ***
T1 EPS		.25 ***	.09	.12	.12
T1 APS		-.06	-.05	-.16 *	-.16 *
T3 EPS			.36 ***	.23 ***	.23 ***
T3 APS				.26 ***	.26 ***
T3 EPS × T3 APS					.03
R^2	.10 **	.52 ***	.60 ***	.63 ***	.63 ***
ΔR^2		.42 ***	.07 ***	.03 ***	.00

* $p < .05$, ** $p < .01$, *** $p < .001$; VIF = 1.06 ~ 2.75

Note. EPS = Experience of parenting stressor; APS = Aversion of parenting stressor; Gender: 1 = female, 0 = male; AT = Autism trait.