**The quality of life of children with neurodevelopmental disorders and their parents during the Coronavirus disease 19 emergency in Japan**

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**Abstract**

**Aim:** This study performed to reveal how the COVID-19 pandemic has affected the quality of life (QOL) of children with neurodevelopmental disorders and their parents and to identify possible factors that enabled them to maintain their QOL.

**Methods:** We enrolled 136 school-aged children and their parents and administered QOL questionnaires to assess the maladaptive behavior of the children; depression, anxiety, and stress of the parents; and activities of their daily lives. The relationship between their QOL and clinical features were examined.

**Results:** The QOL of children and parents was worsened if the mother had limited job flexibility; changes in the sleep rhythms of children also worsened the QOL. Maladaptive behaviors in children were strongly associated with parental stress. However, some families who faced these same conditions of job stress and sleep disorders were able to maintain a higher QOL and less parental stress, less parental depression and anxiety, and milder maladaptive behavior in children.

**Conclusions:** During the COVID-19 stay-at-home-period, both mothers with limited job flexibility and changes in the sleep rhythm of children worsened the QOL of children and their parents. Whereas, low parental stress decreased maladaptive behavior in children, and simultaneously the family’s QOL was maintained.

***Introduction***

People around the world have experienced profound changes in their lifestyles and relationships due to the coronavirus disease 2019 (COVID-19) pandemic and the requirements that individuals stay at home and practice social distancing. The disease spread rapidly throughout Japan, and an emergency declaration was issued by the prime minister on April 7, 2020. Citizens were mandated to stay at home and refrain from outside activities until May 25. School-aged children had been sent home even earlier, on March 2. Parents faced increased stressors if they had limited job flexibility, suffered job loss and reduced income, or had greatly increased responsibilities within the home.

Compared to typically developing children (TDC), children with neurodevelopmental disorders (NDDs) are more likely to suffer mental and physical difficulties during a disaster because of the unpredictable changes around them and alterations to their routines1-3. In recent studies, caregivers in Italy observed that children with autism spectrum disorder (ASD) engaged in more intense and frequent disruptive behavior during the COVID-19 quarantine.2 Their parents were prone to depression and anxiety4 as they confronted difficulties in structuring their ASD children’s daily activities, especially free time2.

Quality of life (QOL) describes an individual’s subjective perception of their position in life, as evidenced by their physical, psychological, and social functioning5. The QOL of parents was greatly reduced by stress and the lack of coping skills in the face of increasingly aggressive behavior in their NDD children5,6.

As COVID-19 persists worldwide, it presents a different set of challenges compared to other natural disasters. The outside relationships an NDD child might have with schools and people in the community are weakened, and the child is exposed to more time with the family and social media.

Two primary lifestyle factors change the QOL of most children with NDD: The first is difficulties with their sleep cycles, which are associated with not only children’s mental problem but also poorer parent mental health and higher parenting stress7. The second is the parents’ work patterns and concerns about financial stability8,9.The stress that parents carry from their jobs impairs their childcare skills and affects the well-being of the children9. It is noticed that decreased flexible work patterns for the mothers, because many mothers mainly care for children and do household chores.

This study evaluates how family QOL during the COVID-19 pandemic has been affected by changes in the sleep cycles of children with NDDs and stresses caused by the mothers’ work patterns. We also explore possible factors that have enabled some of these families to maintain their QOL.

***Results***

*Participant backgrounds*

The clinical backgrounds of the children and their parents are shown in Table 1. We recruited 152 parents and their school-aged children with NDDs from the Hachioji area during the COVID-19 emergency. Questionnaires were completed by 136 of 152 parents (89.5%). We surveyed their backgrounds and daily life patterns and assessed the QOL and mental health of the parents and children. The range of participants included 132 mothers (97.0%), two fathers (1.5%), one grandmother (0.7%), and one adult sister (0.7%).

Table 2 shows the results of the questionnaires. Forty-nine children (36.0%) scored above the CBCL internalizing score cut-off of ≥70 points for clinical range, and 38 children (27.9%) scored above the CBCL externalizing score cut-off of ≥ 70 points for clinical range. Sixty-two parents (45.6%) scored above the cut off of ≥16 points (CES-D) for depression; 12 parents (8.8%) were in the top five percent of the general population for high-state anxiety according to the STAI, 13 parents (9.6%) were in the top five percent for high-trait anxiety according to the STAI, 23 parents (16.9%) were in the top five percent for high parenting stress associated with the parental domain of the PSI, and 51 parents (37.5%) were in the top five percent for high parenting stress associated with the children’s domain of the PSI. The median QOL score for children was 72.5 out of 100.0 points on the Kiddo-KINDLR questionnaire, and the median QOL score for parents was 61.0 out of 100 points on the WHOQOL-BREF questionnaire.

*QOL changes in children and parents*

Suppl. 1 compares worsening QOL for families before and during the COVID-19 pandemic: usual working pattern in mothers and worsening sleep patterns in children led to lower QOL scores for parents and children. The parents also had lower QOL scores in the absence of grandparents who might provide extra support.

*Factors that protect QOL for parents and children with NDDs*

We investigated the clinical characteristics of children and parents who were able to maintain their QOL even after the profound changes brought about by the COVID-19 pandemic. We analyzed alterations in the children's sleep rhythms and the mothers’ working patterns as factors for additional analysis (Fig. 1, Suppl. 2).

Fifty-seven children suffered from altered sleep patterns; this group was divided into the high QOL group (＞70: 27 children) and low QOL group (≤70: 30 children); parents were also divided into a high QOL group (≥57: 30 parents) and low QOL group (<57: 27 parents). The high QOL groups, both parents and children, also had lower STAI state- and trait-anxiety scores, parent- and child-domain PSI scores, and internalizing CBCL scores. On the other hand, low-QOL children had higher externalizing CBCL scores, and the high-QOL parents had lower CES-D scores.

The parental QOL was higher when the mother’s job unpredicted flexible work arrangements. For families where there was usual working pattern, children were divided into a high QOL group (>70: 21 children) or a low QOL group (≤70: 25 children); and parents were also divided into a high QOL group (≥56: 22 parents) and a low QOL group (<56: 24 parents). Both children and parents in high QOL groups had lower CES-D depressive state scores, STAI state- and trait anxiety scores, PSI parent domain scores, and CBCL internalizing scores; children in the high-QOL group had lower scores in the PSI children domain in PSI, and externalizing score in CBCL.

A simple linear regression analysis revealed a relationship between the PSI child domain and the CBCL total score: *R*2 = 0.574, F = 183.295, and *P* <0.001 (Fig. 1).

***Discussion***

We examined the QOL of children with NDDs and their parents during Japan’s COVID-19 stay-at-home period, April 7 to May 25, 2020. The QOL was diminished if the mother had little job flexibility, similar to the usual work and commute pattern, and if there was a change in the child’s sleep patterns. Social separation also meant that grandparents, who would have offered parenting support during non-COVID times, were not available; this further worsened the QOL of the parents. Internalizing and externalizing symptoms in children were strongly associated with parental stress due to the child’s maladaptive behavior.

However, some parents and children who faced bad sleep pattern and similar working pattern were able to maintain a higher QOL with parenting stress, less anxiety and depression, and only mild maladaptive behavior in children.

*Alterations of child and parent QOL*

The COVID-19 pandemic restricted daily life activities and resulted in mandated social distancing measures, which required children to stay at home and to wear masks to prevent infection when going out. Children with NDDs were presumed to be more affected by the lifestyle changes and a high level of uncertainty caused by the COVID-19 pandemic than typically developing children and to have an increased level of maladaptive behaviors1. In addition, parents faced additional parenting stress10.

A recent adult based online anonymous study showed that the COVID-19 pandemic has negatively affected mental health (i.e., stress and depression) and QOL11-13. A higher risk for increased anxiety and depression was seen in younger women (18–29), unemployed persons, individuals with a prior psychiatric history, and those reporting a greater negative impact on their QOL11,12.

As stated above, we found that three factors impaired the QOL of parents and children with NDDs. The first factor was changes in the sleep rhythms of the NDD children. This population is prone to sleep problems, which affects QOL, even when there is no outside crisis; previous studies have shown that sleep problems affected the QOL of children with ADHD and ASD14,15,16. Meanwhile, sleep problems in children with NDDs also affected parental QOL, stress levels, and physical health7,17. A Turkish study during the COVID-19 pandemic indicated that severe sleep orders led to greatly increased ASD symptoms18. In our study, the QOL of both children with NDDs and their parents worsened due to changes in the children’s sleep rhythm.

The second factor that reduced the QOL of children and parents after the COVID-19 pandemic began was when the mothers’ jobs did not offer flexibility. Although the mother was still working away from home similar to pre-COVID-19 pandemic, she had an increased burden of household chores and educational demands. It was difficult for the parent to cope with the childcare burden, which had increased due to school closures, compared to a parent who could telecommute, had decreased work hours, or stopped working8,9.

The third factor that affected the family’s QOL was the absence of grandparents, who can play an important role in helping the parents with their NDD children. One study showed how grandparents who had autistic grandchildren helped the parents understand autistic symptoms19. However, older people infected with COVID-19 were more likely to become seriously ill, which forced the grandparents to reduce contact with their extended families. Proactively using non-face-to-face support methods, such as online video conferencing platforms, was one way to cope with enforced separation during the COVID-19 pandemic.

Another study suggested that one of the factors related to reduced parental QOL of children with ASD was the lack of reciprocal social interaction with others, including friends, other family members, or others in the community6. Mutual social support might be an important QOL-increasing factor for parents during the COVID-19 pandemic. However, during the COVID-19 stay-at-home period, traditional face-to-face mutual support by the community and friends was impossible.

In this study, we showed that the QOL of parents and their children with the above three factors was reduced during COVID-19 stay-at-home period, although it was unclear whether the QOL of parents and children was lower than pre-COVID-19 among all participants.

*Synergistic effects between maladaptive behavior of children and parenting stress*

During the COVID-19 emergency, there was a high proportion of NDD children who were internalizing and externalizing symptoms and also a high proportion of parents suffering from depression and stress (Table 2). The t-scores of CBCL internalizing and externalizing symptoms in children with NDDs were associated with PSI child-domain scores in their parents. The PSI child domain reflects parental stress associated with the child’s maladaptive behavior; parental stress is increased when the severity of the child’s internalized and externalized symptoms becomes more severe.

Conversely, with lower parental resilience in the face of the increased childcare demands, the children’s internalization and externalization symptoms become worse. Previous studies detail similar relationships between the behavioral problems of children with NDDs and parental stress20,21. Socially inappropriate and disruptive behaviors evident in children with NDDs are poorly tolerated socially, leading to increased parental stress20. Children's maladaptive behaviors and parenting stress could synergistically reduce the QOL for each group.

*Factors protecting the QOL of parents and children with NDDs*

The outline of the results was shown in Fig.1. As mentioned above, two factors reduced the QOL of parents and children: children with poor sleep rhythms and mothers whose jobs were inflexible. However, as stated above, some parents and children maintained a healthy QOL during the COVID-19 stay-at-home period.

In previous studies, reduced parental and child QOL has been associated with severe child behavioral difficulties and parenting stress6,20,22. Previous studies have reported the experiences of children with NDDs after other natural disasters; the children showed an increased occurrence of mental health problems and reduced adaptive behavior23,24. In an Italian study, ASD children had more intense and frequent disruptive behavior during the COVID-19 stay-at-home period2. Almost all caregivers with children with ASD confronted increased difficulties in managing daily activities, especially free time2. Preliminary data from a study of 3,000 Chinese families during the COVID-19 period showed that parents with ASD children suffered from depression (46.01%), anxiety (44.67%), and stress (44.62%)4. Although our study showed that Japanese children with NDDs had high externalizing and internalizing symptoms, the internalizing symptoms had a stronger relationship with QOL in both children and parents. Measures to reduce children's maladaptive behavior and parents’ depression and anxiety were important issues to maintain the QOL of children and parents.

In previous studies, strong social support received after a disaster has been associated with an increased psychological resilience25. Access to social supports for children with NDDs and their families during COVID-19 pandemic has also been crucial to address vulnerability factors, guide adjustments in home environments, and apply mitigation strategies to improve coping3. There was an urgent need to shift from the conventional care system to the remote delivery of healthcare and NDDs support3. To improve the QOL of children with NDDs and their parents, it is necessary to build a dedicated system for education, welfare services, and healthcare with public support.

This study had several limitations. First, the number of patients analyzed in the study was small, and the diagnoses of the neurodevelopmental disorders varied. However, all participants were families in Hachioji and its neighboring cities; the families had relatively homogeneous life-behavior patterns and qualities and quantities of social welfare support. Second, it is unclear whether the QOL of parents and children was lower during COVID-19 than before COVID-19, because the QOL of parents and children with NDDs is always significantly lower than the general population5,6,26.

The participants agreed to answer the same questionnaires again after the COVID-19 pandemic ends, and we would like to compare the results between the COVID-19 stay-at-home period and post-COVID-19.

In conclusion, this study discussed the QOL status of children with NDDs and their parents during the COVID-19 stay-at-home period. The QOL of parents and their children was worsened if the mothers have usual working pattern and if there were changes in the sleep patterns of the children. Internalizing and externalizing symptoms in children were strongly associated with parental stress due to the child’s maladaptive behavior. Some families were able to maintain their QOL, had lower parental stress, a milder level of anxiety and depression, and milder maladaptive behavior in children, even if the mothers did not have job flexibility and the children suffered from disrupted sleep patterns.

***Method and Materials***

*Data collection*

In May 2020, during the COVID-19 pandemic and subsequent declaration of a state of emergency, we conducted a study of children with NDDs and their parents at the Shimada Ryoiku Center Hachioji: a regional core outpatient clinic where children receive medical examinations, rehabilitation, and psychotherapy. Hachioji is located in the western part of Tokyo and has a population of 580,000 (population density 3,093/km2).

The children in the study ranged in age from elementary to senior high school (6 to 18 years old). The exclusion criteria were (1) children with moderate or profound intellectual disabilities, (2) children without NDDs (attention-deficit hyperactivity disorder [ADHD], autism spectrum disorder [ASD], specific learning disorders [SLD], tic disorders, or other neurodevelopmental disorders), as classified by DSM-5, (3) non-school-aged children (under six years old or over 19 years old), or (4) parents who did not understand the questionnaires written in Japanese.

Japan’s government enforced a state of emergency from April 7 to May 25 and mandated that individuals stay at home, with no activities outside the home. School attendance had been suspended even earlier, beginning March 2 and continuing until May 30. During this period, there were 19 persons infected with COVID-19 in Hachioji City (a 6.8% rate of positivity).

*Assessment tools*

One caregiver from each family completed the following questionnaires: (1) an assessment of the parent’s clinical status: the Japanese version of the State-Trait Anxiety Inventory [STAI]27, the Center for Epidemiologic Studies Depression Scale (CES-D),28,29 the Parenting Stress Index (PSI)30,31, and the World Health Organization Quality of Life-BREF (WHOQOL-BREF)32; (2) an assessment of the children’s clinical status: the Child Behavior Checklist (CBCL)33 and the KINDLR to measure health-related QOL34,35; (3) an assessment of daily life during the COVID-19 stay-at-home period, including changes in the working hours and commuting habits of mother or father, availability of parental advisers such as grandparents, the children's education skills, children's sleep patterns, and amount of time using social media and online games; (4) The parents’ (respondents) and children’s ages and the educational histories of mother and father. The questionnaires were collected by mail. The children’s NDD diagnoses and intellectual quotient (IQ) scores were confirmed by the attending physician.

The Kiddo-KINDLR and WHOQOL-BREF were rated on a five-point Likert scale, and mean scores for each sub-scale were transformed into a 0–100 scale where higher scores reflected a better QOL. The averaged values in Kiddo-KINDLR of four sub-scales (physical well-being, emotional well-being, self-esteem, and family), excluding social contact and school sub-scales, were calculated to evaluate the children’s QOL. The averaged values of the 26 items in the WHOQOL-BREF were calculated to evaluate the parent’s QOL.

*Statistical analysis*

A one-way analysis of variances (ANOVAs) on the Kiddo-KINDLR and WHOQOL-BREF was performed to examine factors affecting the QOL of children and their parents. We used subject demographic data as grouping variables for the ANOVAs such as the presence or absence of alternative working patterns (changes in working hours and commuting) of the mother and the presence or absence of sleep changes in the children. A one-way ANOVA was also performed on the parental QOL to examine the presence or absence of grandparents who played roles as parental advisers.

The clinical characteristics of children and parents who could maintain the QOL despite having low QOL factors were examined. The two items associated with poor QOLs of parents and children were selected from the items for which significant differences were obtained by the above ANOVA (*P* <0.05). Children and parents with specific factors that reduced QOL were divided into groups with high QOL and low QOL, respectively, based on the median; one-way ANOVA was performed to examine group differences (both high- and low-QOL groups) in the t-scores of internalized and externalized indexes on CBCL, child domain scores and parent domain scores of PSI, state-anxiety scores and trait-anxiety scores of STAI, and CES-D scores.

In addition, the relationship between the PSI child domain and CBCL total scores were assessed by simple linear regression analysis.

All statistical analysis was conducted using the JMPTR software, version 10 (SAS Institute Inc., Cary, NC, USA).

*Ethical approval and informed concent*

This study followed the guidelines of the declaration of Helsinki and was approved by the institutional review board of the Shimada Ryoiku Center Hachioji (Shimahachi-2001). For all participants, dedicated staff explained the study while maintaining a social distance in a well-ventilated large room, and the parent agreed to his/her participation and provided written informed consent.

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The author played a major role in research.

Takashi Okada: The authors supervised this work.

***Author Contributions***

R.U. wrote the main manuscript text, prepared all figures, formally analyzed the data. T.O. supervised this work and assisted with the writing of the manuscript. R.U. and T.O. acquired funding. R.U., T.O., and H.O. contributed to the conception and design of the work. Y.O., H.I., M.S., Y.K., C.K., Y.N., K.A., A.I., N.S., Y.M., and H.O. jointly conducted the acquisition of data. R.U. and Y.K. analyzed and interpreted the data. All authors have approved the final article.

***Additional Information***

*Competing Interests Statement*

The authors declare no competing interests.

**Figure legends**

Figure 1. Factors affecting QOL during the COVID-19 stay-at-home period

Children with worsening sleep patterns and mothers with usual working patterns, were two factors of a reduced family QOL. In spite of these factors, some families were able to maintain a healthy quality of life with reduced parenting stress, less parental depression and anxiety, and milder internalizing and externalizing symptoms in the children with NDDs. Conversely, increased parenting stress, a severe depressive state and anxiety in parents, and severe internalizing and externalizing symptoms in children deteriorated the QOL of children with NDDs and their parents. Internalizing and externalizing symptoms in children were associated with parental stress, a depressive state, and anxiety in parents.

Table 1. Clinical background of children and their parents

|  |  |
| --- | --- |
| **Children** | **Total** |
| Male: Female | 104:32 |
| Age M±SD | 10.6 ± 2.6 |
| WISC/WAIS FSIQ M±SD | 84.9 ± 15.5 |
| ADHD N, (%) | 78 (57.4) |
| ASD N, (%) | 65 (47.8) |
| SLD N, (%) | 9 (6.6) |
| Alteration of sleep rhythm N, (%) | 57 (41.9) |
| Use of social media and games; ≥5 hours N, (%) | 27 (19.9) |
| Changes in education N, (%) |  |
| Online school classes available | 12 (8.8) |
| Learning with handouts at home and a few school days | 123 (90.4) |
| Regularly go to school | 1 (0.7) |
| **Parent** | **Total** |
| Participants; Mother: Father: Other than parents | 131: 3: 2 |
| Participants; Age M±SD | 42.4 ± 5.8 |
| Single parent family (only mother family) N, (%) | 12 (8.8) |
| Mother’s working situation N, (%) |  |
| Usual working pattern | 46 (33.8) |
| Changed working pattern1) | 59 (43.4) |
| House keeping | 31 (22.8) |
| Parenting adviser; grandparents N, (%) | 61 (44.8) |
| Parenting adviser; medical or welfare support organizations available N, (%) | 104 (76.5) |

(%) Data indicate proportion of each characteristic in every group.

†Changed working pattern suggested short working hours, stopped working, tele-work, etc.

N, number; M, mean; SD, standard deviation; FSIQ, full scale intellectual quotient; ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; SLD, specific learning disorder

Table 2. Questionnaires administered children and their parents

|  |  |  |  |
| --- | --- | --- | --- |
| **Questionnaire: Children** | Median, Range | N (≥Cut-off) (%) | Cut-off |
| Averaged sub-scale values of Kiddo-KINDL | 72.5, 41.3–95 |  | ― |
| CBCL, internalized index | 65.5, 40–93 | 49 (36.0) | ≥70 |
| CBCL, externalized index | 65.0, 39–91 | 38 (27.9) | ≥70 |
| **Questionnaire: Parents** |  |  |  |
| Averaged sub-scale values of WHO-QOL-BREF | 61.0, 35.6–86.8 |  | ― |
| CES-D | 14.5, 0–56 | 62 (45.6) | ≥16 |
| STAI, state | 49.0, 22–80 | 12 (8.8) | Woman: ≥64‡ |
| Man: ≥66‡ |
| STAI, trait | 49.0, 23–78 | 13 (9.6) | Woman: ≥65‡ |
| Man: ≥66‡ |
| PSI, parent domain | 115.5, 66–169 | 23 (16.9) | ≥137‡ |
| PSI, children domain | 104.0, 54–152 | 51 (37.5) | ≥111‡ |

‡ Score was above the 95 percentiles.

N, number; CBCL, Child behavior checklist; WISC-IV, Wechsler Intelligence Scale for Children－Fourth Edition; WHO, world health organization; QOL; quality of life; CES-D, Center for Epidemiologic Studies Depression Scale; STAI, state trait anxiety inventory; STI, parenting stress index

Suppl.1 Causes of worsening children and parent QOL

|  |  |  |  |
| --- | --- | --- | --- |
| **QOL of Children** | **Presence (**M ± SD**)** | **Absence**  **(**M ± SD**)** | ***P* value** |
| Mother with usual working pattern | 69.5 ± 7.6 | 73.7 ± 11.6 | \*0.028 |
| Changes in sleep rhythm of children | 69.0 ± 12.6 | 74.6 ± 8.0 | \*0.002 |
| **QOL of Parent** | **Presence** (M ± SD) | **Absence**  (M ± SD) | **P value** |
|  |
| Mother with usual working pattern | 57.3 ± 7.7 | 62.2 ± 8.8 | \*0.002 |  |
| Changes in sleep rhythm of children | 57.2 ± 8.5 | 62.9 ± 8.2 | \*<0.001 |  |
| Parenting adviser; grandparents | 62.7 ± 8.1 | 58.7 ± 8.9 | \*0.008 |  |

\* *p* value < 0.05

QOL; quality of life; N, number; M, mean; SD, standard deviation; ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; SLD, specific learning disorder; FSIQ, full scale intellectual quotient

Suppl 2. Results of related factors for maintaining QOL

1. Alteration of children’s sleep rhythm

|  |  |  |  |
| --- | --- | --- | --- |
| **QOL of Children** | **Preservation**  (M ± SD) | **Aggravation** (M ± SD) | ***P* value** |
| CES-D | 18.5 ± 12.2 | 20.9 ± 9.6 | 0.422 |
| STAI, state | 49.4 ± 12.7 | 56.4 ± 10.3 | \*0.026 |
| STAI, trait | 49.3 ± 12.6 | 55.6 ± 10.9 | \*0.049 |
| PSI, parent domain | 108.8 ± 20.9 | 128.4 ± 20.1 | \*0.016 |
| PSI, children domain | 99.2 ± 16.5 | 120.0 ± 18.0 | \*<0.001 |
| CBCL, internalizing index | 63.5 ± 11.6 | 73.5 ± 7.9 | \*<0.001 |
| CBCL, externalizing index | 62.6 ± 9.6 | 71.7 ± 9.4 | \*<0.001 |
| **QOL of Parent** | **Preservation**  (M ± SD) | **Aggravation** (M ± SD) | ***P* value** |
| CES-D | 15.1 ± 7.3 | 24.9 ± 12.0 | \*<0.001 |
| STAI, trait | 49.3 ± 11.0 | 57.3 ± 11.7 | \*0.010 |
| STAI, state | 47.2 ± 10.9 | 58.7 ± 10.4 | \*<0.001 |
| PSI, parent domain | 106.9 ± 21.0 | 132.7 ± 15.5 | \*<0.001 |
| PSI, children domain | 103.5 ± 20.4 | 117.5 ± 17.2 | \*0.007 |
| CBCL, internalizing index | 65.6 ± 11.6 | 72.3 ± 9.3 | \*0.021 |
| CBCL, externalizing index | 66.2 ± 9.9 | 68.6 ± 11.1 | 0.4 |

1. Mother with usual working pattern

|  |  |  |  |
| --- | --- | --- | --- |
| **QOL of Children** | **Preservation** (M ± SD) | **Aggravation** (M ± SD) | ***P* value** |
| CES-D | 13.7 ± 10.8 | 20.0 ± 10.0 | \*0.040 |
| STAI, state | 47.7 ± 11.2 | 54.5 ± 9.7 | \*0.033 |
| STAI, trait | 57.3 ± 9.5 | 47.3 ± 9.0 | \*<0.001 |
| PSI, parent domain | 104.9 ± 19.3 | 132.3 ± 18.6 | \*<0.001 |
| PSI, children domain | 98.8 ± 16.3 | 118.6 ± 16.2 | \*<0.001 |
| CBCL, internalizing index | 61.0 ± 7.7 | 72.1 ± 5.9 | \*<0.001 |
| CBCL, externalizing index | 63.4 ± 5.6 | 70.9 ± 7.7 | \*<0.001 |
| **QOL of Parent** | **Preservation** (M ± SD) | **Aggravation** (M ± SD) | ***P* value** |
| CES-D | 11.2 ± 6.5 | 22.5 ± 11.1 | \*<0.001 |
| STAI, state | 46.9 ± 7.5 | 55.6 ± 11.9 | \*0.005 |
| STAI, trait | 46.2 ± 7.6 | 58.8 ± 9.1 | \*<0.001 |
| PSI, parent domain | 109.7 ± 22.2 | 129.0 ± 20.5 | \*0.004 |
| PSI, children domain | 104.9 ± 21.8 | 113.8 ± 15.0 | 0.112 |
| CBCL, internalizing index | 64.0 ± 9.3 | 69.8 ± 7.3 | \*0.023 |
| CBCL, externalizing index | 66.3 ± 7.3 | 68.6 ± 8.0 | 0.313 |

\* *p* value <0.05

QOL; quality of life; N, number; M, mean; SD, standard deviation; ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; SLD, specific learning disorder; FSIQ, full scale intellectual quotient; CES-D, Center for Epidemiologic Studies Depression Scale; STAI, state trait anxiety inventory; STI, parenting stress index; CBCL, child behavior checklist