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Factors associated with self-rated mental health in mothers of children and adolescents with autism spectrum disorders

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Abstract: The rising demand for child care is putting a strain on parents of children with autism spectrum disorder (ASD), particularly mothers. This study investigated Chinese mothers of children with ASD and examined the factors associated with maternal mental health. An online national survey was completed by the parents of 5,077 ASD children and adolescents aged 0 to 17 years (4892 dyads, 185 single mothers and 150 single fathers). A total of 28.0% of the mothers reported poor mental health. Mothers with children aged 10-13 years had a lower chance of having poor mental health than mothers with children aged 0-2 years (OR 0.63, 95% CI 0.43–0.91). Mothers with high-functioning ASD children were less likely to have poor mental health than those with low-functioning ASD children (OR 0.76, 95% CI 0.62–0.94). Having children with comorbidities was related with a higher risk of poor mental status (OR 1.56, 95% CI 1.35–1.81), as was having conflicts with other family members (OR 1.44, 95% CI 1.22–1.70) and providing full-time care (OR 1.22, CI 1.06–1.41). Having a higher-than-average family income was associated with lower risk of having poor mental health (OR 0.70, 95% CI 0.58–0.82). Factors related to the children and family, and providing full-time care, have a significant effect on mothers' mental health states. Reducing obstacles to work and social interaction, as well as tackling the financial burden of raising an ASD child, may help improve the well-being of mothers.

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Key words: Autism spectrum disorder; Mother; Mental health status; Influencing factors

1 Introduction

Autism spectrum disorder (ASD) is a range of neurodevelopmental disorders that are characterized by the following core deficits: impairments in social interaction and communication and restricted, repetitive behaviors (APA, 2013). It has been reported that parents of children with ASD have poor mental health and wellbeing (Estes et al., 2009; Whitmore, 2016; Hall & Graf, 2020). These families have higher stress levels (Hayes & Watson 2013). According to Miller et al. (2015) and Andrew et al. (2016), these families were more likely to experience financial difficulties, social isolation, unmet health-care needs, poor work results, and increased time commitments for providing healthcare. A change in career status and financial burdens could also trigger negative psychological states (Falk et al., 2014).

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Mothers in these families were found to be more stressed and to have more negative mental health outcomes than fathers due to their disproportionate duty to care for their disabled child (Hastings, 2003; McStay et al., 2014). Several factors have been recognized as important for maternal mental health, including a child's age, gender, diagnostic severity, and family socioeconomic status (SES). Compared to parents with older children, parents of younger children with ASD have reported higher levels of stress (Schieve et al., 2011). Severe symptoms in the child increase the likelihood of anxiety and depression in the parents (Barroso et al., 2018; Yorke et al., 2018). Mothers of boys with ASD report poorer mental health and higher stress compared to mothers of girls with ASD (Zablotsky et al., 2013). Mothers with a lower SES were found to have considerably worse mental health (Zhou et al., 2019; Nahar et al., 2022). In addition, a mother's employment status and social support can affect her mental health. Working mothers may experience increased stress as a result of juggling competing work and family responsibilities (Zhou et al., 2018; Limbers et al.,2020), and are more likely to choose full-time child care than fathers (Gau et al., 2011). Mothers of children with ASD usually report poorer levels of family cohesion (Higgins et al., 2005). Improved outcomes for families with children with ASD are also linked to social support from friends and family (Zablotsky et al., 2013; Andrew et al., 2016). Involvement of grandparents can provide various forms of support including instrumental and emotional assistance, which are positively associated with general family functioning and quality of life for caregivers (Lee & Gardner 2010; Sullivan et al., 2012; Kaczmarek, 2021). Social support is an environmental variable that may serve as a protective factor for parental mental health and well-being.

Higher subjective well-being has been linked to better health and longevity, as well as improved social relationships, work performance, and creativity (Diener et al., 2018). Parental quality of life is closely related to child well-being and development (Eiser et al., 2005; Lee et al., 2009) as well as family functioning (Pisula et al., 2017). It is critical to investigate the mental health of mothers because maternal mental health issues have been linked to the rehabilitation of children of all ages. The impact of employment status, child demographics, social support, and child personality on the mental health status of mothers with ASD children should be investigated.

Research from China has special cultural implications, because Chinese women are under high social expectations to care for family members. It is the moral responsibility of family members in Chinese culture to care for people with disabilities (Chiu et al. 2015). Traditional family roles of "men outside and women inside" are deeply ingrained in Chinese culture. Mothers were traditionally the primary caregivers (Yang et al., 2016). Now that people with ASD live longer than they did before (Buescher et al., 2014) and the number of children diagnosed with ASD in China is increasing (Sun et al., 2013; Zhou et al., 2020), the number of caregivers living with ASD is increasing as well, and is expected to rise further in the coming decades. Several studies in China have examined the mental health of mothers of children with ASD and identified key influencing factors. For instance, survey results revealed that unemployed mothers had poorer mental health than part-time and full-time working mothers (Wu et al., 2023). Working mothers were more confident in dealing with stress and more likely to seek social support than non-working mothers. Risk factors for poor quality of life included older maternal age and lower family income (Wei et al., 2018). Family SES was directly related to maternal quality of life (Chen & Lian, 2022). When the marriage connection was not harmonious, the woman's mental health suffered the most; and the more children a mother had, the greater the parental pressure she experienced (Wu et al., 2023). Building upon this growing body of literature, this study aims to further contribute by examining the mental health status of mothers of children with ASD across a large sample size and a wide age range of children. The primary goal of this study was to explore maternal mental health status and the secondary goal was to determine the associated factors.

2 Methods

2.1 Participants

The data for this study came from the Survey on Family Circumstances and Demand for Support and

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Resources Among Autistic Children in China (FCDSR). This was a survey distributed to patients who engage in the AlsoLife online community. As one of China's largest online communities for parents of children with ASD, the website enables over 200,000 parents to exchange information about the disease, therapies, symptoms, and comorbidities. Online access to the survey was offered from September 15 to September 30, 2020. The details of the survey have been described elsewhere (Zhao et al., 2023). Only minor language modifications were made based on the findings of a pilot field survey (N = 20), which revealed that respondents largely comprehended the questionnaire.

2.2 Data collection

Families who satisfied the following requirements were recruited: (1) the child was between 0 and 17 years old and was diagnosed with or suspected (for children under 3 years old) of having ASD at a hospital. The existing research has found that symptoms of ASD can be detected before the age of one (Guthrie et al., 2013; Chawarska et al., 2007). This sample includes several children aged 0-1 year, with the minimum age being 10 months. In addition to using scale measurement and expert medical diagnosis, the facility was equipped with diagnostic qualifications and adhered to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) standard. Exclusion criteria were ASD individuals with severe comorbidities such as physical disability or cerebral palsy. Samples with obvious errors or omissions were also excluded from the study. There were 8014 households investigated, with 5077 (63.35%) ultimately included. The selection procedure is depicted in Figure 1. The gender ratio and distribution of family locations in this study were in line with China's general population distribution. A total of 380 cities or districts and 31 Chinese provinces were included (see Table S1-Table S2 in the Supplement for details).

2.3 Measures

2.3.1 Dependent Variable

The term "self-rated mental health status" is used in this paper to describe negative mental health status. We asked respondents to rate their subjective mental state or sense of well-being during the previous four weeks using a 5-point Likert scale with 1 = "Extremely poor", 2 = "Poor", 3= "Average", 4= "good", and 5= "very good". The answers were divided, with 2 being the cut-off score for poor mental health status. A single-item question was used in previous studies (Kim et al., 2011; Ide et al., 2022) and has been reported to be reliable and feasible (Ivarsson et al., 2011). While our approach may impact the accuracy of the evaluation, our goal was to preliminarily understand the overall mental health status of the study population, and we believe the 5-point scale allowed us to do this in an efficient manner.

2.3.2 Independent Variable

The options for workforce participation were “work” and “non-work "(for full-time housewives). We used the term "non-work" in this study to refer to mothers who were either unemployed or out of the labor force. In order to further distinguish the effects of different employment types, we constructed four employment status variables, namely “full-time”, “flexible”, “overtime”, and “a long leave of absence”. Full-time work generally refers to a person being formally employed, working a minimum of 40 hours per week, and enjoying corresponding wages, social insurance, and welfare benefits (Labor Law of the People's Republic of China). Flexible work refers to a situation in which working hours or workplaces are not fixed, and are usually less than 30 hours a week. Overtime work refers to a situation with more than 40 working hours a week. We created two variables for full-time housewives: "involuntary" and "voluntary" to distinguish the reasons for not working. "Involuntary" resignation meant resigning after finding that their child had been diagnosed with ASD and they could no longer work outside the home while taking care of the child. "Voluntary" refers to respondents who resigned before their child's diagnosis of ASD or remained unemployed for other reasons after the child's birth.

The availability of intergenerational family care (from grandparents) to give assistance and the number of information sources are both ways to measure social support, so “grandparents’ assistance” and “information channels” were added as control variables. We measured informal social support using intergenerational care because it was the primary source of support for children with disabilities, particularly Chinese children (Yang

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et al., 2016). Background information was collected on children's age, gender, ASD severity, the presence or absence of comorbidities, the number of children in the family, the mother's education level, and the family's annual income.

2.4 Statistical Analysis

The mean/standard deviation of normally distributed data is used to describe it. The factors influencing mental health status were discovered using logistic regression models. Odds ratios (ORs) and 95% confidence intervals (CIs) were used to report associations between predictors and independent variables. All anticipated expenditures were translated to US dollar (US$) values in January 2021, when one US dollar was worth around 6.49 Chinese yuan. SPSS 22.0 for Windows (SPSS Inc, Chicago, IL, USA) was used for all statistical analyses.

3 Results

3.1 Demographic characteristics

This study included 5077 households. The majority of the children (83.4%) were boys, with a mean age of 4.1 years (standard deviation (SD): 1.1), and the leading severity level was middle function (40.4%). 24.2% of the children had comorbidities such as attention deficit and hyperactivity disorder (ADHD) and epilepsy (EP). There were 34.2% working mothers and 65.8% non-working mothers, and most of the mothers had higher education degrees (66.1%). A total of 14.5% of mothers reported conflicts with other family members and 28.8% of mothers had received childcare helps from their children's grandparents. The average family income was $22,496.1 (SD: $24,961.5). Table 1 provides further details about the study population.

3.2 The influencing factors

A total of 1421 mothers (28.0%) had poor mental health status. The poorest mental health status was in the low-functioning autism (LFA) child group (31.6%) (Table 2). There were 548 working mothers (24.2%) with poor mental health status, compared to 873 non-working mothers (31.0%) ($p<0.05$). The logistic regression model results show that the unemployed mothers had higher odds of poor mental status compared to employed mothers (OR 1.22, 95% CI 1.06–1.41; Table 3). Compared to mothers with 0-2-year-old children, mothers with 10-13-year-old children had a lower risk of poor mental health status (OR 0.63, 95% CI 0.43–0.91; Table 3). Compared with mothers with LFA children, mothers with high-functioning autism (HFA) children had a lower risk of poor mental health status (OR 0.76, 95% CI 0.62–0.94; Table 3). Having children with comorbidities was associated with a greater likelihood of poor mental health status (OR 1.56, 95% CI 1.35–1.81; Table 3) and so was having conflicts with other family members (OR 1.44, 95% CI 1.22–1.70; Table 3). Above-average family income was linked with a lower likelihood of poor mental health status (OR 0.70, 95% CI 0.58–0.82; Table 3). Child gender, number of children in the household, maternal educational level, assistance from grandparents, and number of information channels were not significantly associated with maternal mental health.

3.3 Predictors of mothers' poor mental health in two groups

Regression was carried out for the working mothers and non-working mothers. Mothers who were on a long leave were 1.69 times more likely to have poor mental health status than mothers who had full-time jobs (OR 1.69, CI 1.28–2.24 for a long leave; Table 4). Those who were non-working because of the demands of caring for their ASD child were 1.42 times more likely to have poor mental status than those who had left work for other reasons (OR 1.42, 95% CI 1.07–1.86; table 4). In the working group, mothers of children aged 6-9 years and 10-13 years had better mental health compared to mothers of children aged 0–2 years (OR 0.62, 95% CI 0.41–0.84 for 6-9 years and OR 0.58, 95% CI 0.34–0.99 for 6-9 years; table 4). For working mothers, the level of the child's functioning was influential, with HFA and middle-functioning autism (MFA) children impacting maternal mental health status less than LFA children (OR 0.72, 95% CI 0.55–0.93 for the MFA and

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OR 0.68, 95% CI 0.51–0.92 for the HFA; table 4). However, for non-working mothers, we did not find that ASD severity was significantly associated with mental health. Mothers of children with comorbidities were more likely to have poor mental health than mothers of children without comorbidities (OR 1.77, 95% CI 1.42–2.22 in the work group and OR 1.42, 95% CI 1.17–1.71 in the non-work group; table 4). Mothers in a high-income family had a less odds of poor mental health status compared to mothers in a low-income family (OR 0.63, 95% CI 0.49–0.82 in the work group and OR 0.73, 95% CI 0.60–0.92 in the non-work group; table 4). Mothers having conflicts had a higher odds of poor mental health status than mothers in a family without conflicts (OR 1.34, 95% CI 1.03–1.75 in the work group and OR 1.48, 95% CI 1.19–1.85 in the non-work group; table 4). Children gender, children's number in household, maternal educational degree, grandparents' aids and information channels were not significantly associated with self-rated maternal mental state in both groups.

4 Discussion

This study examined the self-reported mental health status of mothers of children with ASD in China. It was the first study to explore the factors associated with maternal self-rated mental health in China using a large sample size and a wide age range of children.

Our findings on maternal psychological states were not encouraging. A total of 28.0% of mothers with ASD children and adolescents self-reported having a poor mental health status. This is in accord with Gatzoyia et al. (2014), who discovered that 34.2% of parents with an ASD child had clinical symptoms of depression; Davis and Carter (2008) also found that 25% of parents had depression symptoms. In their study, non-working mothers were 1.22 times more likely than working mothers to have poor mental health. The main consequence of not working is a decrease in family income (Myers et al., 2009; Fletcher et al., 2012). In this study, we discovered that 15.5% of fathers chose to overwork. Another study reported that co-parents tended to increase their working hours to alleviate financial stress (Myers et al., 2009).

Long-term-leave mothers were 1.69 times more likely to have poor mental health than full-time working mothers, demonstrating that long-term full-time home care was associated with negative maternal mental health. According to existing research, taking extended leave has a negative impact on mothers' mental health (Hauge et al., 2015). Mothers with flexible work schedules do not feel better than full-time working mothers. As previous studies have found, flexible work arrangements can be unreasonable and stressful in China (Chou et al., 2018). Paid work serves an important function for mothers who have a disabled child, and is linked to better mental health. More research is needed to verify this. Mothers who do not work involuntarily in order to take care of children are more likely to have poor mental health. This emphasizes the critical role of mothers in caregiving as well as the potential negative impact of additional caregiving responsibilities. Previous research has found that involuntarily unemployed mothers have a lower quality of life than voluntarily unemployed mothers (Chou et al., 2018), which was confirmed by this research.

Social support is associated with better maternal mental health, while conflicts with family members are associated with negative mental health. According to previous research, one of the important factors for resilience is family members cooperating with each other for the child's wellbeing (Bayat, 2007). Caregivers report feeling misunderstood by family members, which becomes a source of stress (Celia et al., 2020). In our results the information and assistance provided by grandparents has no significant impact on the mental health of mothers. However, we only tested a small portion of informal social supports in this study, and did not investigate the distinction between the quantity and quality of support, or as the difference between actual and perceived support (Haber 2007). No significant direct relationships were found, so social support might have an indirect effect on mental health through other variables. Reducing conflicts within the family and working outside the home appear to be two protective factors for mental health. Individual traits, such as psychological resilience (Cardelle-Pérez et al., 2024) and problem-focused coping strategies (Vernhet et al., 2019) could potentially buffer the impact of caregiving challenges on maternal mental health. Future research should aim to identify protective factors, as well as investigate how they interact with risk factors in shaping overall psychological outcomes.

We found that the chance of having poor mental health decreases as children grow older, which is in line with earlier studies (Rosenthal et al, 2013; Bourke-Taylor et al., 2021). One possible explanation is that

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long-term caregiving could cause a mother to accept the role and develop better coping skills, according to the adaptation model (Lazarus & Folkman 1984). More research is needed to better understand how parental stress manifests in parents of very young children with ASD, and how to best support these parents. ASD severity and comorbidities were related to maternal mental health, which is also consistent with previous studies (Zablotsky et al., 2013; Estes et al., 2013). While we evaluated the presence of ADHD and epilepsy, we did not collect information on other situations such as language and communication deficits, severe self-injurious or aggressive behaviors, or sleep problems. Adolescents and young adults with ASD, in particular, may have behavioral problems that impair caregivers' well-being (Adler et al., 2015). A more extensive investigation of comorbidity is required in the future. Understanding the unique challenges faced by this subset of caregivers can inform the development of targeted interventions and support services tailored to their specific needs.

There are a number of limitations of this study. First, all families were invited to participate in this study and completed an electronic questionnaire, which did not allow for control stratification in sampling. More rigorous sampling survey methods should be adopted in the future to improve on our research. Second, the use of a single self-report question to measure mental health status is a limitation. While pragmatic for an initial exploratory investigation, this approach lacks the psychometric rigor of validated, multi-item mental health instruments. However, different research topics have different requirements for the accuracy of the tools. If an in-depth investigation into this topic is required, it should employ comprehensive, standardized scales to more reliably and validly assess mental health. Supplementing self-reports with clinical evaluations would also strengthen subsequent studies. Despite the drawbacks, these preliminary data have great practical significance for the understanding of families with ASD children. Third, social support is commonly defined using a scale, which is more accurate and reflects several elements of social support. This study was conducted during the COVID-19 pandemic, when social support was restricted. As a result, we only measured social support in terms of grandparents' involvement and information channels. However, social support was more systematic; we only captured a portion of the picture. We did not specifically compare mental health between mothers who shared caregiving responsibilities with their spouses and those who were the primary caregivers for their children with ASD. The potential protective effects of spousal support on maternal mental health are important. Future studies should explicitly examine the presence or absence of spousal involvement in caregiving. In addition, it is crucial to emphasize that this study did not collect information on the availability or use of support services offered by government agencies or non-governmental groups. Access to such support systems may act as a buffer against mental health issues. Understanding the role of formal social support provisions may guide policies and activities targeted at improving the well-being of caregivers of children with ASD. Fourth, we did not go into detail about the roles of grandparents. Instrumental assistance is not the same as emotional support, and assistance delivered with a heavy dose of conflict can reduce the positive impact of the assistance provided. More research will be required in the future. Fifth, the cross-sectional design of the study does not allow for causal relationships to be established. Health and employment status can influence psychology, just as it in turn can influence them. Individuals with ASD are more likely to have parents with preexisting psychiatric disorders, which may further contribute to the challenges. Future research would benefit from more sophisticated modeling techniques to investigate the ways in which the variables interact.

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5 Conclusions

This study reports on self-rated negative mental health outcomes for mothers of children with ASD in China. We used national survey data that represented widely different social backgrounds and sociodemographic characteristics. Maternal mental health was associated with familial, child-related, and full-time caregiving factors. The well-being of mothers with ASD children may be enhanced by removing barriers to employment and social engagement and by addressing the financial strain of raising a child with ASD. Mothers with good mental health are more likely to have positive perceptions of their children and are more successful at reframing problems associated with their children's disabilities. Subjective wellbeing is beneficial to both an individual's and a society's effective functioning, so it is critical to track people's subjective psychological state in order to maximize their potential.

Data availability statement

The data that support our findings are available from the corresponding author upon reasonable request.

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Author contributions

Ya-nan ZHAO designed the data collection instruments, collected data, performed the data analysis, wrote and edited the manuscript. Rong ZHANG & Xiao-ying ZHENG contributed to the study design, data analysis, writing and editing of the manuscript. Hui-yun FAN coordinated data collection and reviewed the manuscript. All authors read and approved the final manuscript and, therefore, had full access to all the data in the study and take responsibility for the integrity and security of the data.

Compliance with ethics guidelines

Ya-nan ZHAO, Hui-yun FAN, Rong ZHANG, and Xiao-ying ZHENG declare that they have no conflict of interest.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013. This study approved by the ethics committee of Peking University Institutional Review Board (No. IRB00001052-20016). All families provided electronic informed consent before enrollment.

Table 1 Characteristics of the children and mothers' demographics (n=5,077)

Characteristics	*N/M*	*%/SD*
Children' demographics		
Age	4.1	1.1
Gender		
Male	4278	83.4
Female	799	16.6
ASD severity		
LFA	1196	23.6
MFA	2052	40.4
HFA	908	17.9
Undetermined	921	18.1
Comorbidity		
No	3851	75.8
Yes	1226	24.2
Only child		
No	2504	49.3
Yes	2573	50.7
Mothers' characteristics		
Employment status		
Work	1735	34.2
Full-time	821	16.2
Flexible work	628	12.4
Overtime work	52	1.0
A long leave of absence	234	4.6
Non-work	3342	65.8
Other reasons	527	10.4

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Take care child	2815	55.4
Higher education degree		
No	1720	33.9
Yes	3357	66.1
Conflicts in family		
No	4341	85.5
Yes	736	14.5
Grandparents' assistance		
No	3613	71.2
Yes	1464	28.8
Information channels [a]		
<3	3186	62.8
≥3	1891	37.2
Poor mental health		
No	3656	72.0
Yes	1421	28.0
Average income	22496.1	24961.5

Abbreviations: ASD, Autism Spectrum Disorder, LFA, Low Functioning Autism, MFA, Middle Functioning Autism, HFA, High Functioning Autism;

a. including TV programs, newspapers, books, Internet, WeChat, QQ groups and others

Table 2. Number of mothers have a poor mental health status

Characteristics	*N*	%	X^2	*P*
Overall	1421	28.0		
Children' demographics				
Age of child				
0-2 years	94	30.1	5.050	0.282
3-5 years	762	28.0		
6-9 years	476	28.6		
10-13 years	74	23.7		
14-17 years	15	22.1		
Gender of child				
Male	1195	27.9	0.041	0.830
Female	226	28.3		
ASD severity				
LFA	378	31.6	20.876	<0.001
MFA	566	27.6		
HFA	207	22.8		
Undetermined	270	29.3		
Comorbidity				
No	995	25.8	36.627	<0.001
Yes	426	34.7		
Only child				
No	456	29.6	2.725	0.102
Yes	420	27.0		

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Mothers' characteristics				
Employment status				
Work	528	24.2	28.656	<0.001
Non-work	873	31.0		
Higher education degree				
No	538	31.9	18.918	<0.001
Yes	883	26.1		
Conflicts in family				
No	1157	26.7	26.523	<0.001
Yes	264	35.9		
Grandparents' assistance				
No	1061	29.4	11.791	<0.001
Yes	360	24.6		
Information channels [a]				
<3	933	29.3	7.122	0.008
≥3	488	25.8		
House income				
Below average	454	33.9	48.780	<0.001
Around average	492	29.2		
Above average	475	23.1		

Abbreviations: ASD, Autism Spectrum Disorder, LFA, Low Functioning Autism, MFA, Middle Functioning Autism, HFA, High Functioning Autism

a. including TV programs, newspapers, books, Internet, WeChat, QQ groups and others

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Table 3. Logistic regression analysis for variables predicting poor mental status in mothers

Characteristics	Odds ratio	95%CI	
Gender of child			
Male	1.00	reference	
Female	1.02	0.86	1.21
Only child			
No	1.00	reference	
Yes	1.03	0.91	1.17
Age of child			
0-2 years	1.00	reference	
3-5 years	0.85	0.66	1.11
6-9 years	0.82	0.63	1.09
10-13 years	0.63**	0.43	0.91
14-17 years	0.58	0.31	1.10
Comorbidity			
No	1.00	reference	
Yes	1.56***	1.35	1.81
ASD severity			
LFA	1.00	reference	
MFA	0.89	0.76	1.05
HFA	0.76**	0.62	0.94

Undetermined	0.94	0.77	1.14
Employment status			
Work	1.00	reference	
Non-work	1.22**	1.06	1.41
House income			
Below average	1.00	reference	
Around average	0.87	0.74	1.02
Above average	0.70***	0.58	0.82
Higher education degree			
No	1.00	reference	
Yes	0.95	0.82	1.09
Conflicts in family			
No	1.00	reference	
Yes	1.44***	1.22	1.70
Grandparents' assistance			
No	1.00	reference	
Yes	0.94	0.81	1.10
Information channels [a]			
<3	1.00	reference	
≥3	0.90	0.79	1.03

Abbreviations: ASD, Autism Spectrum Disorder, LFA, Low Functioning Autism, MFA, Middle Functioning Autism, HFA, High Functioning Autism

a. including TV programs, newspapers, books, Internet, WeChat, QQ groups and others.

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

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Table 4. Logistic regression analysis for variables predicting poor mental status in mothers in two groups

Characteristics	Work group			Non-work group		
	Odds ratio	95%CI		Odds ratio	95%CI	
Work state						
Full-time	1.00	reference				
Flexible	1.16	0.93	1.46			
Overtime	1.28	0.70	2.32			
A long leave	1.69***	1.28	2.24			
Leave work reason						
Others				1.00	reference	
Take care				1.42**	1.07	1.87
Gender of child						
Male	1.00	reference		1.00	reference	
Female	1.08	0.82	1.41	0.98	0.78	1.22
Only child						
No	1.00	reference		1.00	reference	
Yes	0.95	0.78	1.16	1.10	0.93	1.31
Age of child						
0-2 years	1.00	reference		1.00	reference	
3-5 years	0.79	0.53	1.18	0.89	0.62	1.26

6-9 years	0.62**	0.41	0.94	0.97	0.67	1.40
10-13 years	0.58*	0.34	0.99	0.61	0.36	1.04
14-17 years	0.50	0.21	1.16	0.61	0.23	1.63
Comorbidity						
No	1.00	reference		1.00	reference	
Yes	1.77***	1.42	2.22	1.42***	1.17	1.71
ASD severity						
LFA	1.00	reference		1.00	reference	
MFA	0.72**	0.55	0.93	1.00	0.81	1.22
HFA	0.68**	0.51	0.92	0.77	0.58	1.04
Undetermined	0.74	0.53	1.03	1.11	0.87	1.41
House income						
Below average	1.00	reference		1.00	reference	
Around average	0.77	0.59	1.03	0.91	0.75	1.11
Above average	0.63***	0.49	0.82	0.74**	0.6	0.92
Higher education degree						
No	1.00	reference		1.00	reference	
Yes	1.11	0.85	1.46	0.87	0.73	1.04
Conflicts in family						
No	1.00	reference		1.00	reference	
Yes	1.34**	1.03	1.75	1.48***	1.19	1.85
Grandparents' assistance						
No	1.00	reference		1.00	reference	
Yes	1.03	0.84	1.27	0.88	0.69	1.14
Information channels [a]						
<3	1.00	reference		1.00	reference	
≥3	0.91	0.75	1.12	0.87	0.73	1.04

Abbreviations: ASD, Autism Spectrum Disorder, LFA, Low Functioning Autism, MFA, Middle Functioning Autism, HFA, High Functioning Autism a. including TV programs, newspapers, books, Internet, WeChat, QQ groups and others. *p < .05, **p < .01,***p < .00

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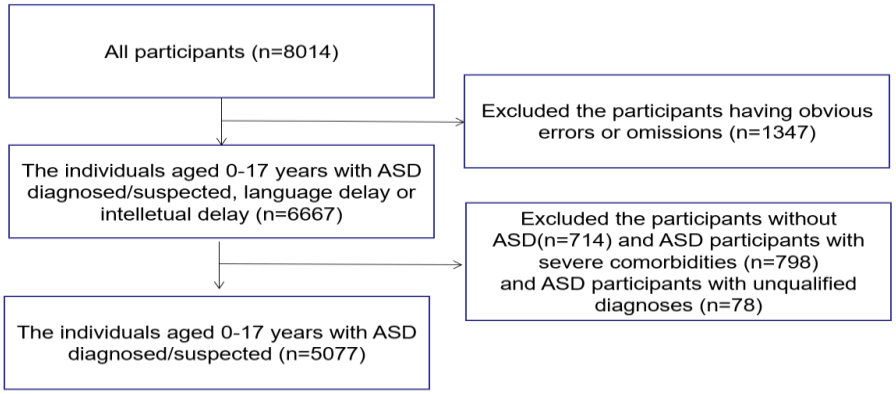

Fig. 1 Flow chart

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Supplementary information:

Tables S1 and S2

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