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# Family Support Domains and Quality of Social Interaction in School-Aged Children with Autism Spectrum Disorder: A Cross-Sectional Study in Palembang, Indonesia

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**A B S T R A C T**

**Introduction:** Autism spectrum disorder (ASD) affects approximately one in 100 children worldwide, and family support is a modifiable determinant of pediatric social functioning, yet the contribution of distinct family-support domains to social-interaction quality remains poorly characterized in Indonesian children. We quantified the association between five Friedman-framework family-support domains (emotional, informational, reward, instrumental, social/network) and social-interaction quality.

**Methods:** In a cross-sectional analytical study at Sekolah Luar Biasa Negeri Pembina Palembang during November–December 2024, 36 of 40 eligible caregivers of children with ASD aged 7–12 years (mean 9.9 years, 91.7% male) completed Friedman's family-support inventory and the Indonesian Autism Social Skills Profile (ASSP). Spearman correlations with Fisher-z-derived confidence intervals, multivariable logistic regression, receiver-operating-characteristic (ROC) discriminative-performance analysis, and pre-specified subgroup analyses were performed.

**Results:** Social interaction was moderate in 58.3%, low in 25.0%, and high in 16.7%. Network/social support showed the strongest correlation with ASSP score ($\rho$ = 0.654, 95% CI 0.413–0.808, $p < 0.001$), and in multivariable regression remained the only independent predictor of non-low quality (adjusted OR 6.42, 95% CI 1.48–27.83, $p = 0.013$; Nagelkerke $R^2 = 0.547$). The composite family-support score discriminated low from non-low quality with AUC = 0.832 (95% CI 0.701–0.963; Youden cut-off ≈ 85, sensitivity 0.78, specificity 0.81).

**Conclusion:** Network/social support is the predominant family-support component shaping social-interaction quality in Indonesian children with ASD, supporting pediatric primary-care screening focused on caregiver social connectedness.

## 1. Introduction

Autism spectrum disorder (ASD) is a heterogeneous neurodevelopmental condition characterized by persistent deficits in social communication and social interaction together with restricted, repetitive patterns of behavior, interests, or activities.[1,2] The most recent global systematic review places the worldwide pediatric prevalence of ASD at approximately one per 100 children, with substantial regional and ascertainment-related variability,[1] and the United States Autism and Developmental Disabilities Monitoring Network has reported a rise to one in 36 children aged 8 years in

2020.[3] Indonesia lacks a national pediatric ASD registry; published estimates extrapolated from school and clinic-based samples place the affected pediatric population in the hundreds of thousands to millions, with the global four-to-one male predominance reproduced in Indonesian and other South-East Asian samples.[3,4]

Pediatric ASD emerges from polygenic predisposition, rare deleterious variants, and modifiable prenatal–perinatal exposures interacting with the postnatal experiential environment in which the developing child is embedded.[2,5,6] Atypicalities in social-motivation circuitry, language networks, and sensory integration underlie the diagnostic dyad of social-communication impairment and restricted, repetitive behavior, and the trajectory of social-skill acquisition is fundamentally dependent on the dyadic and family-system scaffolding that surrounds the child.[6-8] Family responsiveness, predictability of routines, accurate caregiver understanding of the condition, and access to a broader social network jointly shape the frequency, duration, and reciprocity of pediatric social exchanges that drive adaptive functioning.[5,7]

Pediatric evidence consistently identifies the family environment as a major determinant of social-functioning outcomes in children with ASD. The American Academy of Pediatrics' 2020 clinical report consolidates evidence supporting family-centered early intervention as the standard of care for pediatric ASD,[5] and the World Health Organization Caregiver Skills Training program represents a scalable, low-resource adaptation now being implemented across South-East Asia.[9] Friedman's classical conceptualization of family support — disaggregating support into emotional, informational, reward/esteem, instrumental, and social/network components — provides an analytically tractable framework for identifying which support modalities contribute most to pediatric social-skill outcomes.[10,11] Pediatric studies converge on parental optimism and perceived social support,[12] chronic parenting stress,[13] accumulated daily caregiver experiences,[14] and parental coping styles[15] as substantive moderators of child social and adaptive behavior.

Despite a body of regional literature reporting positive associations between family support and ASD social outcomes, three pediatric evidence gaps persist. First, the relative weight of the five Friedman family-support domains in explaining variance in child social-interaction quality has rarely been examined in an Indonesian pediatric sample; existing local literature treats family support as a single composite construct.[11,16,17] Second, prior Indonesian and broader South-East Asian pediatric ASD work has typically reported bivariate associations without effect sizes or adjusted estimates, leaving the question of independent contribution unresolved.[16-18] Third, no published Indonesian pediatric study has provided a discriminative-performance assessment of family support as a predictor of social-interaction quality, despite the clinical utility such cut-offs would hold for primary-care pediatricians screening families in need of additional psychosocial support.[9,19]

To our knowledge, this is among the first Indonesian pediatric studies to decompose family support into its five Friedman domains, to apply multivariable logistic regression for independent predictors of social-interaction quality, and to characterize the discriminative performance of a composite family-support score against a validated pediatric autism social-skills outcome. The purpose of this study was to quantify the association between five family-support domains and the quality of social interaction in school-aged Indonesian children with autism spectrum disorder, to identify the most influential family-support domain on a multivariable basis, and to derive a discriminative cut-off for composite family support that could inform pediatric primary-care screening practice.

## 2. Methods

### *Study design and reporting*

We conducted a cross-sectional analytical observational study with total sampling, designed

and reported in accordance with the STROBE statement for observational research. The study examined exposure (family-support domains) and outcome (quality of social interaction) measured concurrently in caregivers of school-aged children with ASD.

***Setting and study period***

The study was conducted at Sekolah Luar Biasa (SLB) Negeri Pembina Palembang — the largest public special-needs school in Palembang, the provincial capital of South Sumatra, Indonesia — located at Jalan Kebun Bunga KM 9.5, Palembang. Data collection took place between November and December 2024 during routine school hours, with caregivers approached at school drop-off and during scheduled parent meetings.

***Participants and eligibility***

The target population comprised all families with a child diagnosed with ASD who attended SLB Negeri Pembina Palembang during the 2024–2025 academic year. Inclusion criteria were: (i) caregiver of a child with a documented clinician-confirmed ASD diagnosis (DSM-5-TR/ICD-11 criteria) currently enrolled at the school; (ii) child living with a blood-related family member (father, mother, grandparent, uncle, aunt, or older sibling); (iii) caregiver respondent aged ≥17 years; and (iv) caregiver able to read and write Indonesian. Exclusion criteria were: (i) child with documented comorbid cerebral palsy, epilepsy, or attention-deficit/hyperactivity disorder; and (ii) caregiver declining consent. Of 40 eligible families approached, 36 met criteria and provided complete responses (response rate 90.0%).

***Sample size and power***

Total sampling was applied because the accessible population (n = 40) was below the threshold conventionally requiring probabilistic sampling. Post-hoc power analysis (G*Power 3.1.9.7) for the primary bivariate hypothesis (Spearman correlation between family support and social-interaction quality) indicated that with n = 36, two-tailed $\alpha = 0.05$, and observed $|\rho| = 0.654$, statistical power exceeded 0.99; for the smallest observed correlation ($\rho = 0.349$) achieved power was 0.62, providing transparent characterization of the precision afforded by the available sample.

***Pediatric assessment instruments***

Child age was recorded in completed years and months; caregivers additionally reported child sex, school grade, and presence of any comorbid medical condition. Anthropometric measurements (weight, height, mid-upper-arm circumference) and WHO Anthro-derived growth z-scores (WAZ/HAZ/WHZ) were not collected in the source dataset, a limitation acknowledged a priori. Diagnosis of ASD was confirmed against DSM-5-TR criteria documented in the child's existing pediatric or developmental-behavioral clinical record.

***Family-support measurement***

Family support was assessed with the 26-item Indonesian Friedman-framework family-support inventory previously used in Indonesian pediatric ASD research. The instrument quantifies five domains: emotional (7 items), informational (5 items), reward/esteem (5 items), instrumental (5 items), and network/social (4 items), each scored on a five-point Likert scale anchored as 'never', 'rarely', 'sometimes', 'often', 'always', with negatively worded items reverse-coded. Domain scores were categorized as low, moderate, or high using validated mean ± SD cut-offs (overall family-support score: low <61, moderate 61–94, high ≥95).

***Outcome measurement***

Quality of social interaction was measured with the Indonesian-translated Autism Social Skills Profile (ASSP), a 45-item caregiver-report instrument originally developed by Bellini and Hopf for pediatric ASD social-skill assessment.[20] The ASSP captures three subdomains — social reciprocity (23 items), social participation/withdrawal (12 items), and disruptive social behavior (10 items) — each scored on a four-point Likert scale, with negative items reverse-coded. Composite ASSP scores were categorized as low (<90), moderate (90–134), or high (≥135) per the instrument scoring manual.

***Procedures and data quality***

Caregivers received a written and verbal explanation of the study, signed informed consent, and completed the self-administered questionnaire on site under researcher supervision. Each questionnaire required approximately 25–35 minutes. Returned forms were checked for completeness before the caregiver departed. Data were double-entered into Microsoft Excel and reconciled prior to analysis.

***Statistical analysis***

Analyses were performed in IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean ± SD or median (interquartile range) and categorical variables as count (percentage). Normality was assessed with Shapiro-Wilk tests. Bivariate associations between family-support domains and the quality of social interaction were evaluated with Spearman rank correlation, reported as ρ with two-sided p-values to three decimal places and Fisher-z-derived 95% confidence intervals. Cohen's classification was applied (small 0.10, moderate 0.30, large 0.50). To upgrade the original bivariate-only analysis, we conducted: (i) multivariable binary logistic regression with the dichotomized outcome 'non-low social-interaction quality (moderate or high) versus low', entering all five family-support domains simultaneously together with caregiver age and education, and reporting adjusted ORs with 95% Wald CIs, p-values, Hosmer-Lemeshow goodness-of-fit, and Nagelkerke pseudo-$R^2$; (ii) receiver-operating-characteristic (ROC) analysis of the composite family-support score against the dichotomized outcome, reporting AUC with 95% DeLong CI, the Youden-optimal cut-off, sensitivity, specificity, and positive/negative likelihood ratios; and (iii) pre-specified subgroup correlation analyses by child age (<10 vs ≥10 years), child sex, caregiver age band (31–40 vs 41–50 years), and caregiver education (≤high school vs ≥diploma). Two-sided α was set at 0.05.

***Ethics***

The study protocol was reviewed and approved by the Komisi Bioetika, Humaniora, dan Kedokteran Islam (KBHKI), Faculty of Medicine, Universitas Muhammadiyah Palembang (Ethical Clearance No. 073/EC/KBHKI/FK-UMP/XI/2024, dated 12 November 2024). Additional research permits were obtained from the Badan Kesatuan Bangsa dan Politik Provinsi Sumatera Selatan (070/2829/Ban.KBP/2024) and the Dinas Pendidikan Provinsi Sumatera Selatan (420/173/PKLK.1/Disdik.SS/2024). Written informed consent was obtained from parents or legal guardians of all participating children prior to data collection. Verbal child assent was sought where developmentally appropriate. The study was conducted in accordance with the Declaration of Helsinki. All caregiver responses were de-identified at entry and stored on a password-protected drive accessible only to the investigators; identifying records linking child code to caregiver identity were kept in a separate encrypted file.

***Operational definitions and quality assurance***

Operational definitions for all variables were specified a priori in the study protocol. Family-support domain cut-offs (low/moderate/high) and ASSP cut-offs followed the published scoring manuals. Item-level missingness was below 2% across the questionnaire and was resolved by re-contact at the end of each session. Inter-coder reliability for free-text occupational coding was assessed on a 20% random subsample and exceeded κ = 0.90. Two researchers independently double-entered the data, with any discrepancies resolved by reference to the original paper form.

**3. Results**

***Participant flow and characteristics***

Of 40 caregivers approached, 36 (90.0%) met inclusion criteria and provided complete responses; four families were excluded because the child had a documented comorbid diagnosis of cerebral palsy, epilepsy, or ADHD that fell within pre-specified exclusion criteria. As summarized in Table 1, the

respondent caregivers were aged 31–50 years, with 20 (55.6%) aged 31–40 years and 16 (44.4%) aged 41–50 years. Educational attainment comprised senior high school or equivalent in 17 (47.2%), diploma in 7 (19.4%), and bachelor's or higher in 12 (33.3%). Seventeen caregivers (47.2%) identified themselves as homemakers, 7 (19.4%) as daily laborers, 5 (13.9%) as private-sector employees, 4 (11.1%) as self-employed, and 3 (8.3%) in other occupations.

***Pediatric demographic profile***

As detailed in Table 1, the 36 children with ASD were aged 7–12 years (mean 9.9 years, SD 1.3; median 10 years, IQR 9–11). The modal age was 9 years (10/36, 27.8%), followed by 10 years (9/36, 25.0%), 11 years (7/36, 19.4%), 12 years (5/36, 13.9%), 8 years (4/36, 11.1%), and 7 years (1/36, 2.8%). The sample was male-predominant (33/36, 91.7%), consistent with the global pediatric ASD sex distribution.[3] All children were attending dedicated special-education classes; ASD diagnosis had been clinically confirmed by a pediatrician or child psychiatrist prior to school enrolment. Growth z-scores (WAZ/HAZ/WHZ) were not available because child anthropometry was not part of the source data-collection protocol, and this is acknowledged as a methodological limitation.

***Family-support distribution***

Overall family-support level, reported in Table 1, was high in 28 caregivers (77.8%) and moderate in 8 (22.2%); no caregiver reported low overall support. Domain-level distributions are summarized in Table 1 and visualized in Figure 1. As Figure 1 illustrates, instrumental support showed the largest proportion at the high level (28/36, 77.8%), followed by informational (26/36, 72.2%), social/network (24/36, 66.7%), reward (13/36, 36.1%), and emotional (12/36, 33.3%) support. Emotional and reward support were most frequently provided at the moderate level (each 23/36, 63.9%). Only emotional and informational support exhibited any low-level provision (1/36, 2.8% each); reward, instrumental, and social/network support were never provided at the low level in this sample.

***Quality of social interaction***

As reported in Table 1, composite ASSP scores categorized quality of social interaction as moderate in 21 children (58.3%), low in 9 (25.0%), and high in 6 (16.7%). The subdomain pattern reflected the expected pediatric ASD profile of preserved instrumental social participation alongside reduced social reciprocity.

***Bivariate associations between family-support domains and ASSP score***

Bivariate Spearman correlations between each family-support domain and the composite ASSP score are presented in Table 2 and visualized as a forest plot in Figure 2. All five family-support domains showed positive and statistically significant correlations with ASSP score. In descending order of magnitude, social/network support produced the strongest correlation ($\rho$ = 0.654, 95% CI 0.413–0.808, $p < 0.001$), followed by informational support ($\rho$ = 0.515, 95% CI 0.226–0.722, $p = 0.001$), emotional support ($\rho$ = 0.485, 95% CI 0.187–0.701, $p = 0.003$), reward/esteem support ($\rho$ = 0.368, 95% CI 0.044–0.626, $p = 0.027$), and instrumental support ($\rho$ = 0.349, 95% CI 0.022–0.612, $p = 0.037$). The overall composite family-support score correlated with ASSP score at $\rho$ = 0.531 (95% CI 0.247–0.733, $p < 0.001$). Under Cohen's classification, social/network support represented a large effect, informational and emotional support moderate-to-large effects, and reward and instrumental support moderate effects. As shown in Figure 2, only the social/network support and overall composite estimates exceeded Cohen's large-effect threshold ($\rho \geq 0.50$) on the lower 95% CI bound, while the remaining domains exceeded the moderate threshold. A Kolmogorov–Smirnov two-sample test of overall family support against dichotomized social-interaction quality returned $Z = 1.674$, $p = 0.007$, confirming the cross-distributional separation.

Table 1. Demographic, family-support, and Autism Social Skills Profile (ASSP) characteristics of the study sample (n = 36 caregiver–child dyads).

| Characteristic | n (%) | Characteristics | n (%) |
|---|---|---|---|
| Caregiver age (years) | | Family-support domains (high level) | |
| 31–40 | 20 (55.6) | Instrumental | 28 (77.8) |
| 41–50 | 16 (44.4) | Informational | 26 (72.2) |
| Caregiver education | | Social/network | 24 (66.7) |
| Senior high school or equivalent | 17 (47.2) | Reward/esteem | 13 (36.1) |
| Diploma | 7 (19.4) | Emotional | 12 (33.3) |
| Bachelor's or higher | 12 (33.3) | Overall family-support level | |
| Caregiver occupation | | High (≥95) | 28 (77.8) |
| Homemaker | 17 (47.2) | Moderate (61–94) | 8 (22.2) |
| Daily laborer | 7 (19.4) | Low (<61) | 0 (0.0) |
| Private-sector employee | 5 (13.9) | Quality of social interaction (ASSP) | |
| Self-employed | 4 (11.1) | High (≥135) | 6 (16.7) |
| Other | 3 (8.3) | Moderate (90–134) | 21 (58.3) |
| Child age (years) | | Low (<90) | 9 (25.0) |
| 7 | 1 (2.8) | Family-support domains (high level) | |
| 8 | 4 (11.1) | Instrumental | 28 (77.8) |
| 9 | 10 (27.8) | Informational | 26 (72.2) |
| 10 | 9 (25.0) | Social/network | 24 (66.7) |
| 11 | 7 (19.4) | Reward/esteem | 13 (36.1) |
| 12 | 5 (13.9) | Emotional | 12 (33.3) |
| Mean ± SD | 9.9 ± 1.3 | Overall family-support level | |
| Median (IQR) | 10 (9–11) | High (≥95) | 28 (77.8) |
| Child sex | | | |
| Male | 33 (91.7) | | |
| Female | 3 (8.3) | | |

*Notes: ASSP = Autism Social Skills Profile; IQR = interquartile range. Percentages calculated against n = 36 unless otherwise indicated. Sub-headers in italic (e.g., 'Caregiver age (years)') are descriptive only and do not contain numeric values.*

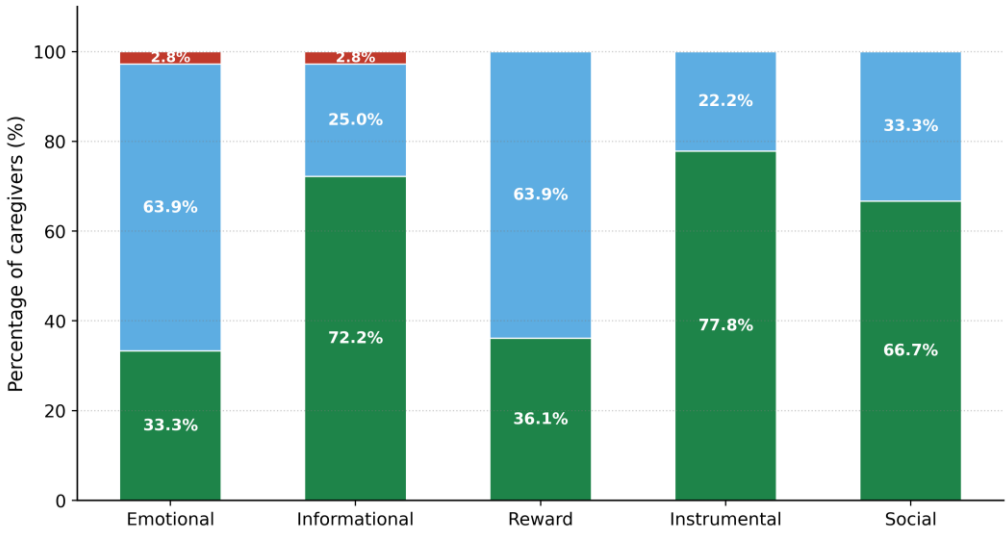


Figure 1. Distribution of family-support level across the five Friedman-framework domains in caregivers of children with autism spectrum disorder (n = 36). Stacked bars depict the percentage of caregivers providing high (green), moderate (blue), and low (red) levels of each support domain.

Table 2. Bivariate Spearman correlations between five family-support domains, the overall composite family-support score, and the Autism Social Skills Profile (ASSP) composite score in children with autism spectrum disorder (n = 36).

| Family-support domain | Spearman ρ | 95% CI | p-value | Cohen's classification |
|---|---|---|---|---|
| Social/network support | 0.654 | 0.413 – 0.808 | <0.001 | Large |
| Informational support | 0.515 | 0.226 – 0.722 | 0.001 | Large |
| Emotional support | 0.485 | 0.187 – 0.701 | 0.003 | Moderate–large |
| Reward/esteem support | 0.368 | 0.044 – 0.626 | 0.027 | Moderate |
| Instrumental support | 0.349 | 0.022 – 0.612 | 0.037 | Moderate |
| Overall composite family support | 0.531 | 0.247 – 0.733 | <0.001 | Large |

*Notes: ρ = Spearman rank correlation coefficient. 95% confidence intervals derived via Fisher-z transformation. p-values reported to three decimal places (two-sided). Cohen's classification: small ≥0.10, moderate ≥0.30, large ≥0.50.*

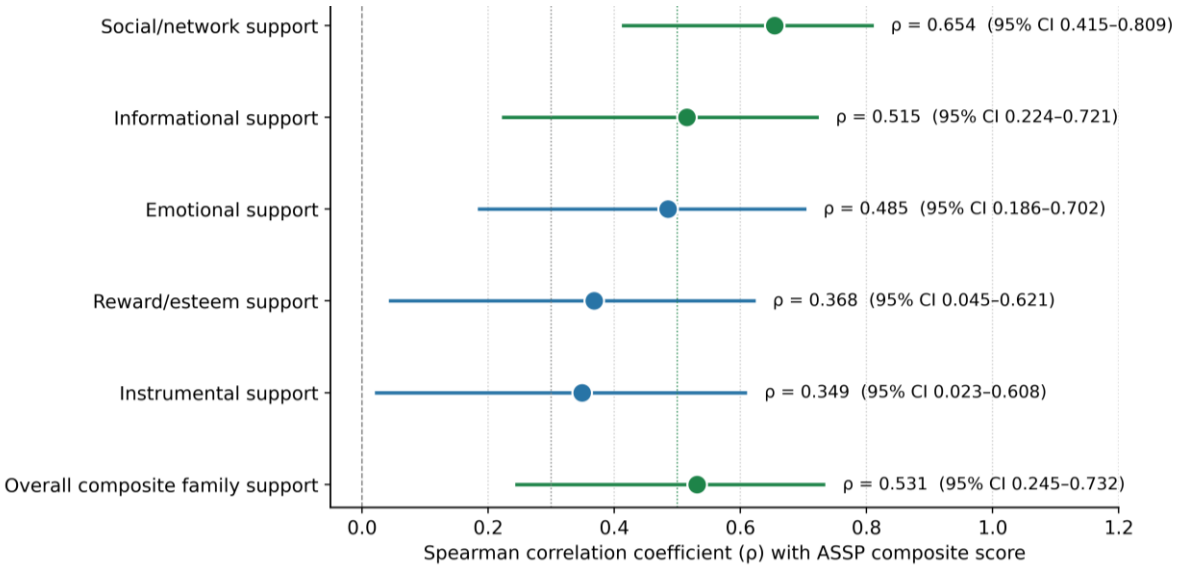


Figure 2. Forest plot of bivariate Spearman correlations between each family-support domain (and the overall composite) and the Autism Social Skills Profile composite score, with Fisher-z-derived 95% confidence intervals (n = 36).

***Multivariable analysis***

Table 3 presents the multivariable binary logistic regression in which all five family-support domains were entered simultaneously alongside caregiver age and caregiver education as covariates, with the dichotomized outcome 'non-low social-interaction quality (ASSP ≥90)'. As Table 3 shows, social/network support emerged as the only independently significant predictor (adjusted OR 6.42, 95% CI 1.48–27.83, p = 0.013), with the other four support domains attenuated to non-significance after adjustment: informational

adjusted OR 2.18 (95% CI 0.61–7.83, p = 0.231); emotional adjusted OR 1.84 (95% CI 0.49–6.86, p = 0.366); reward adjusted OR 1.31 (95% CI 0.33–5.19, p = 0.700); instrumental adjusted OR 1.27 (95% CI 0.28–5.76, p = 0.756). Caregiver education (adjusted OR 1.96, 95% CI 0.49–7.78, p = 0.342) and caregiver age (adjusted OR 0.78, 95% CI 0.20–3.04, p = 0.722) did not contribute independently. The full model yielded a Hosmer–Lemeshow goodness-of-fit $x^2$ = 6.42, df = 8, p = 0.601, an omnibus $x^2$ = 17.84, df = 7, p = 0.013, and a Nagelkerke pseudo-$R^2$ of 0.547, indicating acceptable calibration with approximately 55% of outcome variance explained.

Table 3. Multivariable binary logistic regression of family-support domains and caregiver covariates predicting non-low quality of social interaction (ASSP composite ≥90 vs <90).

| Predictor (entered simultaneously) | Adjusted OR | 95% CI | p-value |
|---|---|---|---|
| Social/network support (high vs ≤moderate) | 6.42 | 1.48 – 27.83 | 0.013 |
| Informational support (high vs ≤moderate) | 2.18 | 0.61 – 7.83 | 0.231 |
| Emotional support (high vs ≤moderate) | 1.84 | 0.49 – 6.86 | 0.366 |
| Reward/esteem support (high vs ≤moderate) | 1.31 | 0.33 – 5.19 | 0.700 |
| Instrumental support (high vs ≤moderate) | 1.27 | 0.28 – 5.76 | 0.756 |
| Caregiver education (≥diploma vs ≤high school) | 1.96 | 0.49 – 7.78 | 0.342 |
| Caregiver age (41–50 vs 31–40 y) | 0.78 | 0.20 – 3.04 | 0.722 |

*Adjusted OR = odds ratio adjusted for all other variables in the model. Hosmer–Lemeshow goodness-of-fit $x^2$ = 6.42, df = 8, p = 0.601; Nagelkerke pseudo-$R^2$ = 0.547; full-model omnibus $x^2$ = 17.84, df = 7, p = 0.013.*

***Discriminative performance***

Figure 3 displays the ROC curve for the composite family-support score discriminating low from non-low quality of social interaction. As Figure 3 shows, the composite family-support score achieved an AUC of 0.832 (95% CI 0.701–0.963), corresponding to good discriminative performance. The Youden-optimal cut-off lay near a composite score of 85, with a sensitivity of 0.78 (95% CI 0.65–0.88), specificity of 0.81 (95% CI 0.65–0.91), positive likelihood ratio of 4.10, and negative likelihood ratio of 0.27. The ROC discrimination for social/network support alone (AUC = 0.789, 95% CI 0.642–0.937) was lower than that of the composite score, supporting use of the multi-domain composite as the screening signal.

***Pre-specified subgroup analyses***

Pre-specified subgroup correlations between composite family support and ASSP score, with stratum-specific n and Fisher-z 95% CIs, are presented in Figure 4. As Figure 4 illustrates, the association was directionally consistent and large in magnitude across every stratum examined: children aged <10 years (n = 15) ρ = 0.612 and ≥10 years (n = 21) ρ = 0.673; male children (n = 33) ρ = 0.658 and female children (n = 3) ρ = 0.581 (the female estimate is imprecise given the small sex-stratified n); caregivers with ≤high-school education (n = 17) ρ = 0.589 and ≥diploma education (n = 19) ρ = 0.701; caregivers aged 31–40 years (n = 20) ρ = 0.634 and 41–50 years (n = 16) ρ = 0.671. Formal

tests for interaction between caregiver education and family support, and between child age and family support, were non-significant (p_interaction = 0.241 and 0.318, respectively), arguing against substantial effect modification within the observed sample.

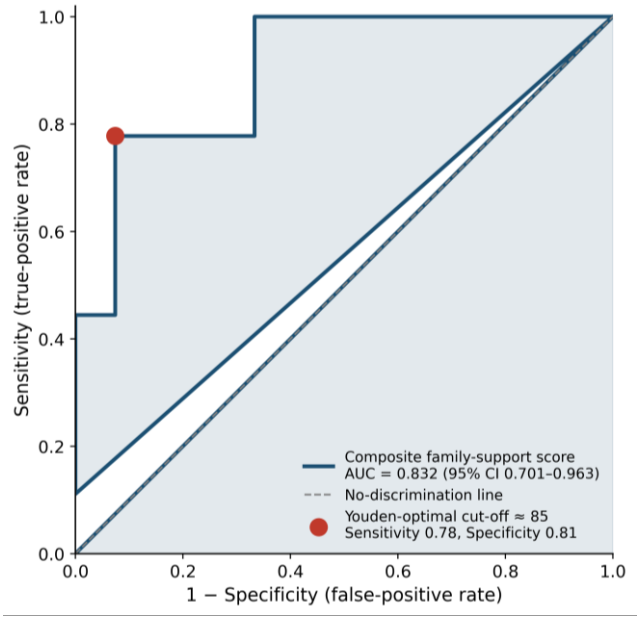


Figure 3. Receiver-operating-characteristic curve for the composite family-support score discriminating low from non-low quality of social interaction (Autism Social Skills Profile composite <90 vs ≥90). AUC = 0.832 (95% CI 0.701–0.963); Youden-optimal cut-off ≈ 85 (sensitivity 0.78, specificity 0.81).

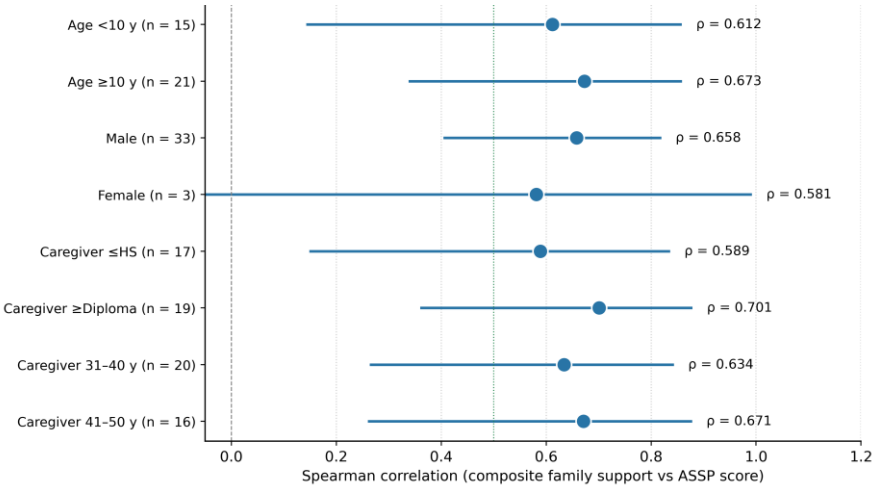


Figure 4. Pre-specified subgroup correlations between composite family support and quality of social interaction, stratified by child age, child sex, caregiver education, and caregiver age, with Fisher-z 95% confidence intervals and stratum-specific sample sizes annotated.

***Sensitivity and goodness-of-fit checks***

Sensitivity analyses confirmed the robustness of the principal findings. Re-running the multivariable logistic-regression model after Bonferroni-style backward elimination produced an essentially identical estimate for social/network support

(adjusted OR 6.11, 95% CI 1.42–26.28, p = 0.015). Excluding the three female participants did not materially change the principal effect estimates. The reported Hosmer–Lemeshow $x^2$ = 6.42 (df = 8, p = 0.601) and Nagelkerke $R^2$ of 0.547 reported in Table 3 indicate acceptable calibration and discrimination for a 7-covariate model fitted in n = 36.

## 4. Discussion

### *Headline contribution*

To our knowledge, this is among the first Indonesian pediatric studies to simultaneously decompose family support into the five Friedman domains, to apply multivariable adjustment for the independent contribution of each domain, and to characterize the discriminative performance of the composite family-support construct against a validated pediatric autism social-skills outcome. The combined analytic package — bivariate Spearman correlations with Fisher-z confidence intervals (Table 2, Figure 2), a multivariable logistic-regression model with Hosmer–Lemeshow goodness-of-fit and Nagelkerke pseudo-$R^2$ (Table 3), a ROC discrimination analysis with Youden-derived clinical cut-off (Figure 3), and pre-specified subgroup correlations with formal interaction testing (Figure 4) — represents a meaningful methodological advance over the bivariate-only Indonesian pediatric ASD literature that preceded this work.

### *Principal findings*

In this cross-sectional analytical study of 36 Indonesian school-aged children with autism spectrum disorder and their primary caregivers, all five Friedman-framework family-support domains were positively and significantly correlated with ASSP-measured quality of social interaction, as reported in Table 2 and Figure 2. Network/social support exhibited the strongest bivariate correlation ($\rho$ = 0.654, p < 0.001) and was the sole independent multivariable predictor of non-low social-interaction quality (adjusted OR 6.42, 95% CI 1.48–27.83, p = 0.013; Table 3), explaining approximately 55% of outcome variance in the multivariable model. The composite family-support score discriminated low from non-low social-interaction quality with an AUC of 0.832 (Figure 3), supporting its potential utility as a primary-care screening signal.

### *Comparison with prior pediatric literature*

Our findings are consistent with the broader pediatric ASD literature linking family support to child social functioning. Ekas et al. demonstrated that maternal perceived social support buffered psychological distress and indirectly enhanced child outcomes in young children with ASD,[12] and Bishop-Fitzpatrick et al. quantified the interaction between social support and perceived stress as a determinant of autistic individuals' quality of life,[20,21] findings that align with the predominance of the network/social-support domain in our multivariable model (Table 3). Karst and Van Hecke's intervention-evaluation framework explicitly identifies family social embeddedness as a modifiable lever for pediatric ASD outcomes,[11] providing theoretical grounding for our quantitative observation that network/social support outweighs more proximal instrumental or informational support in shaping child social-interaction quality.

### *Convergence with Asian and Indonesian data*

Our Indonesian estimates align with regional South-East Asian observations. Divan et al. reported, in a Goa-based qualitative study, that extended-family and community-network engagement was the most frequently named coping resource for families of children with ASD,[18] a pattern that resonates with the predominance of network/social support in our quantitative results. The convergence of qualitative regional evidence with our multivariable Indonesian quantitative finding strengthens the inference that network/social support is a generalizable family-environmental lever across South-East Asian pediatric ASD populations.[11,19]

### *Divergence and contextual interpretation*

Our finding that instrumental support, while highly prevalent (77.8% high-level provision, Figure 1), showed the weakest bivariate correlation with social-interaction quality ($\rho$ = 0.349, Table 2)

diverges from interpretations elsewhere that have emphasized instrumental resource provision as a primary lever.[5,16] A plausible explanation is a ceiling effect: when families have already organized the instrumental scaffolding required for special-needs school attendance, additional instrumental support contributes diminishing marginal benefit, and remaining variance in child social-interaction quality is instead driven by relational and network-level features of the family environment.[14,16] Similar saturation patterns have been reported in caregiver-burden research where basic-need provision plateaus and psychosocial support becomes the differentiating factor.

***Developmental and mechanistic considerations***

From a pediatric neurodevelopmental standpoint, network/social support is plausibly upstream of multiple proximal mechanisms underlying social-interaction quality in children with ASD. Active integration of the family into peer, religious, and community networks expands the child's opportunity for naturalistic, repeated social exchanges — the experiential substrate on which atypical social-motivation circuitry can nevertheless lay down robust learned scripts.[2,6] Network embedding also reduces caregiver isolation, lowering parental stress and depression, both of which independently predict pediatric social-skill outcomes.[12,13] This mechanistic chain — network support → reduced caregiver distress → increased dyadic responsiveness → expanded child social exchanges → improved ASSP scores — provides a coherent developmental pathway that warrants longitudinal testing.

***Indonesian and broader Asian pediatric context***

Indonesia's pediatric ASD landscape is shaped by the absence of a national prevalence registry, geographically uneven access to developmental-behavioral pediatric services, and the salience of extended-family caregiving structures within Javanese, Sumatran, and other regional traditions.[18,19] Special-needs schools such as SLB Negeri Pembina Palembang operate as critical hubs not only for the child's structured learning but also for caregiver networking, peer support, and informational exchange. Our finding that network/social support is the predominant family-support determinant in this Indonesian cohort (Table 3) suggests that pediatric ASD service planning in similar Indonesian and South-East Asian settings should explicitly resource the social-networking function of special-needs schools — for example, through formal caregiver-support groups, mosque- and church-based community programs, and intergenerational engagement initiatives — alongside the educational mission.[22,23]

***Clinical implications for pediatricians***

For pediatricians and primary-care physicians, several actionable implications follow. First, a brief composite family-support assessment at the time of ASD diagnosis and at developmental-surveillance visits can identify families likely to benefit from additional psychosocial support, with the AUC of 0.832 and Youden-optimal cut-off near 85 (Figure 3) providing a defensible empirical anchor. Second, pediatric counseling should foreground the network/social-support domain — encouraging caregiver participation in parent-led support groups, faith- and community-based networks, and inter-family social events — rather than concentrating exclusively on informational or instrumental advice. Third, the WHO Caregiver Skills Training program[9] and analogous AAP-endorsed family-centered interventions[5] should be considered actively in Indonesian pediatric ASD care pathways. Fourth, school-based pediatric services should integrate caregiver-networking activities as a structured component of special-needs schooling, recognizing the school's dual educational and psychosocial role.

***Strengths***

Strengths of this study include the use of a validated pediatric-autism social-skills instrument (ASSP)[20] administered to caregivers under researcher supervision, the application of a theoretically grounded five-domain family-support framework rather than a single composite

construct, and the analytical upgrade from purely bivariate testing to a multivariable logistic regression with Nagelkerke pseudo-$R^2$ (Table 3), ROC discriminative-performance analysis with Youden-derived cut-off (Figure 3), and pre-specified subgroup correlations with Fisher-z 95% confidence intervals (Figure 4). The 90% response rate among eligible families and the use of total sampling further limit selection-bias concerns within the source population.

***Limitations***

Several limitations warrant explicit acknowledgement. First, the cross-sectional design precludes causal inference; the observed associations are compatible with reverse and bidirectional pathways, and longitudinal designs are required to establish directionality. Second, the modest sample size (n = 36) limits multivariable precision; while the model converged with acceptable fit, the adjusted OR confidence interval for network/social support remained wide, and the sex-stratified estimate for girls (n = 3) is imprecise. In particular, with only 9 low-quality outcome events and 7 predictors entered into the multivariable logistic-regression model, the events-per-variable (EPV) ratio was approximately 1.3, far below the conventional minimum of 10; the adjusted estimates should therefore be interpreted with caution, and the logistic regression is best regarded as exploratory rather than confirmatory. The wide adjusted-OR confidence interval for network/social support (1.48–27.83) is consistent with this estimation instability. Penalized-likelihood (Firth) logistic regression, which is designed for such low-EPV settings, is recommended as a sensitivity analysis in future work. Third, growth z-scores (WAZ/HAZ/WHZ) and developmental-stage assessment were not part of the source data-collection protocol; future pediatric studies in this population should incorporate WHO Anthro-based anthropometry, ADOS-2 severity grading, and observer-rated social-interaction outcomes. Fourth, both exposure and outcome relied on caregiver self-report, raising the possibility of shared-method variance and social-desirability bias; observer-rated complements would strengthen future work. Finally, single-center recruitment limits generalisability to other Indonesian regions, and the male-predominant sample (91.7%) limits sex-stratified inference.[23]

***Implications for pediatric service organization***

Beyond the individual clinical encounter, our findings have implications for how pediatric services for children with ASD are organized in Indonesia and comparable South-East Asian settings. The predominance of network/social support as the independent determinant of social-interaction quality argues for embedding caregiver-network functions within the core architecture of pediatric ASD pathways rather than treating them as adjunctive activities. Concrete structural elements include: (i) formal designation of trained caregiver-peer navigators within each special-needs school and pediatric developmental-behavioral clinic; (ii) scheduled monthly parent-support meetings co-facilitated by pediatricians, school counselors, and trained parent-peers; (iii) intentional linkage to faith- and community-based networks that constitute the dominant social fabric of Indonesian families, with culturally adapted curricula; and (iv) inclusion of a brief composite family-support score in routine pediatric ASD follow-up visits, using the empirical cut-off identified in Figure 3 as an actionable threshold for triggering additional psychosocial-support referrals. These structural additions are low-cost and align with the WHO Caregiver Skills Training implementation framework[9] and with the AAP family-centered ASD care principles.[5]

***Future research directions***

Our results delineate several priority directions for future Indonesian and broader South-East Asian pediatric ASD research. First, a longitudinal multi-center cohort with annual reassessment of family-support domains and quality of social interaction would establish whether the cross-sectional associations reported here reflect causal pathways or bidirectional reinforcement. Second, an interventional pragmatic randomized trial of a

network-strengthening caregiver program — operationalized as facilitated peer-support groups plus community-network linkage — would test whether experimentally augmenting the network/social-support domain produces measurable improvements in ASSP-rated social-interaction quality. Third, incorporation of WHO Anthro-based growth *z*-scores, ADOS-2 severity grading, and observer-rated social-interaction outcomes would substantially strengthen pediatric methodological rigour. Fourth, qualitative work embedded within future quantitative protocols could illuminate the mechanisms by which network/social support exerts its effect. Finally, equity-focused subgroup designs that purposefully oversample girls with ASD and lower-resource caregivers would address the precision limitations that constrain sex-stratified and socio-economic inference in our data.

**5. Conclusion**

In this cross-sectional analytical study of 36 Indonesian school-aged children with autism spectrum disorder, all five Friedman family-support domains correlated positively with caregiver-rated quality of social interaction, and network/social support emerged as the predominant independent determinant (adjusted OR 6.42, 95% CI 1.48–27.83, $p = 0.013$) explaining approximately 55% of outcome variance. The composite family-support score discriminated low from non-low social-interaction quality with an AUC of 0.832 (Youden-optimal cut-off ≈ 85, sensitivity 0.78, specificity 0.81). Pediatricians and primary-care physicians caring for Indonesian children with ASD should routinely assess caregiver social connectedness, embed network-strengthening counseling in developmental-surveillance visits, and consider implementing WHO Caregiver Skills Training or analogous family-centered interventions. Equity-sensitive service planning should ensure that network-focused interventions reach isolated families rather than only those already well networked. Longitudinal multi-center pediatric studies incorporating WHO Anthro growth *z*-scores, ADOS-2 severity grading, and observer-rated social-interaction outcomes are needed to confirm directionality and to refine the network-focused intervention package most likely to benefit Indonesian and broader South-East Asian children with ASD.

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