

Better Social-emotional Behavior in Young Nepali Children is Associated with Household Wealth, Child Age, and Family Participation in a Community Development Intervention

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ABSTRACT

Background

Mental health and behavior problems are under-recognized in low- and middle-income countries, especially in young children. Early identification of these problems could encourage governments to address the shortages of child mental health professionals and promote early intervention programs to help children achieve their full developmental potential.

Objective

Describe the social-emotional development of young rural Nepali children; explore risk factors for poor development.

Method

The study was embedded in a longitudinal intervention trial comparing control households with those who received training in family nutrition+livestock management (Partial Package) or family nutrition+livestock management+community mobilization (Full Package). At midline, enumerators completed a 145-item household questionnaire, child anthropometry, and Administered the Ages and Stages Questionnaire-Social-Emotional (ASQ-SE) to all enrolled children age 33-47 months (n=310). Bivariate and regression analyses examined the relationship of child and household risk factors to administered the Ages and Stages Questionnaire-Social-Emotional scores.

Result

Administered the Ages and Stages Questionnaire-Social-Emotional scores were below age cutoffs in 24% of children, suggesting worse social-emotional development. In bivariate analyses and the adjusted linear regression model, older child age, greater household wealth, and Full Package Intervention status were all associated with better social-emotional development scores. Partial Package Intervention status was associated with worse scores.

Conclusion

The Administered the Ages and Stages Questionnaire-Social-Emotional is a potential tool to assess child social-emotional development in the context of household and community level interventions. Further work is necessary to validate the administered the Ages and Stages Questionnaire-Social-Emotional and similar tools in Nepal, and to better understand the prevalence of challenges to optimal social-emotional development in young children in order to use this information to design and monitor needed interventions.

KEY WORDS

Child development, Community, Developing countries, Social behavior

INTRODUCTION

Mental health problems, including emotional and behavioral disorders, affect 10–20% of children and adolescents worldwide and account for 15–30% of the disability-adjusted life-years (DALYs) lost during the first three decades of life.^{1–3} Failure to address mental health problems in childhood can have serious repercussions, as symptoms often increase with age⁴ and may continue throughout life.^{5–7}

Unfortunately, child mental health and behavior problems are often under-recognized in low-resource settings, especially in low- and middle-income countries (LMIC), where many factors increase vulnerability to these disorders.^{1,8} Moreover, most studies of behavioral and mental health disorders in LMIC focus on school-age children or adolescents, when problems tend to become more obvious, increasingly interfere with child functioning, and are easier to measure.^{9–12} Although parents usually recognize the symptoms of behavioral and mental health disorders in younger children, primary health care workers seldom diagnose these problems before school-age.⁴ Thus, there is a need for enhanced screening of young children for mental health disorders. Additionally, relatively little is known about the prevalence of social-emotional problems before school-age, and associated risk and resilience factors, especially in LMIC.²

The Ages and Stages Questionnaire–Social-Emotional (ASQ–SE) is a widely-used screening survey which assesses social-emotional development in young children.¹³ We conducted an exploratory assessment of social-emotional behaviors in children 33–47 months old using the ASQ–SE in rural Nepal. The goal was to describe the social-emotional development of young Nepali children and to explore risk factors for poor development.

METHODS

This investigation was approved by the Nepal Health Research Council and the Human Investigation Review Board of Tufts University and was registered at ClinicalTrials.gov (NCT03516396).

This study of child social-emotional development was embedded within a longitudinal community mobilization intervention trial implemented by Heifer Nepal in Banke district in western Nepal, an area largely populated by low-income subsistence farmers. The project was implemented between August 2013 to December 2014. Heifer Nepal is a non-governmental organization concerned with poverty alleviation via livestock management practices and community empowerment. This larger study was designed as a longitudinal-controlled impact evaluation¹⁴ to assess the contributions of Heifer Nepal in-depth community mobilization activities plus training in family nutrition and livestock management on household socio-demographic

outcomes, as well as child growth and diet.¹⁴ The Full Package Intervention addressed local and personal issues in the context of values training, gender and family issues, social mobilization, group strengthening, microcredit, enterprise development, and livestock management, while the Partial Package Intervention was limited to livestock and nutrition training only.¹⁵ In the 3rd round of data collection, developmental testing was conducted on the enrolled children (Fig. 1).



Figure 1. Flow chart showing study activities and enrolled children at Rounds 1–3. The Full Package and Partial Package Interventions were introduced after Round 1 data collection was completed, and continued through (and beyond) Round 3. Children aged out of the 1–66 month age group over time. Household surveys were collected at all 3 rounds. All 310 children age 33–47 months at Round 3 (framed in black) were tested with the ASQ–SE.

All children age 33–47 months at Round 3 ($n=310$) were eligible for social-emotional developmental assessment with the ASQ–SE (described below). Child age was determined by inspection of the birth or the vaccine certificate. Exclusion criteria were physical or neurologic handicaps that prevented ingestion of a normal diet for age or children with severe inter-current illnesses at the time of survey; however, no children met these criteria.

Household visits were conducted by enumerators employed by a professional field research organization. Field enumerators traveled in pairs to conduct the visits during which a 145-item household questionnaire was completed with the mothers of eligible children in each household or her designee; a supervisor was also present for part of each visit. The core of the questionnaire was based on the Nepal Demographic and Health Survey.¹⁶ Child anthropometry was also completed and the ASQ–SE was administered (described below).

Multiple indicators of household socio-economic status (SES) were collected, including animal ownership (converted to a standardized score using FAO Global Livestock Units, amount of land owned (square meters), annual income per capita ([divided by 100 to facilitate some analyses], NPR, Nepali rupees), and wealth score.¹⁷ Wealth scores were based on household possessions and quality of housing (e.g., toilet and water facilities) using principal components analysis following DHS–Nepal guidelines.¹⁸

As typical in this area of Nepal, children resided in conjoint households with multiple adults. Therefore, the educational level of the most educated man and woman in the household was recorded, along with the highest education level of the child’s mother. The educational

levels were classified as: (1) none or simple literacy classes, (2) some or completed primary school, and (3) some or completed secondary school (or beyond).

Child social-emotional development was assessed using the Ages and Stages Questionnaire-Social Emotional (ASQ-SE) 13 in all enrolled children at Round 3, ages 33-47 months.¹³ This validated parent-report screening instrument identifies children in need of further evaluation for emotional and behavioral difficulties and those whose emotional and behavioral development is progressing typically.^{13,19,21-25} The ASQ-SE had been used worldwide including India, Pakistan, Zambia, South Africa, and Brazil to assess child social-emotional development.²⁶⁻²⁹ The instrument consists of 30 age-specific parent-report questions, addressing 7 distinct behavioral areas: self-regulation, compliance, communication, adaptive functioning, autonomy, affect, and interactions with people. The questionnaires were translated and back-translated from English to Nepali, minor changes were made to adapt to local conditions, and pilot-tested for clarity.

The tests were administered by field enumerators who received 7 days didactic and practical training in the administration of the ASQ-SE as well as the ASQ-3. This latter test was used to assess general development in some children; the results are reported elsewhere and are not included in the present report.³⁰⁻³² The training was conducted under the supervision of a Nepali pediatrician specializing in child development. In addition, a child development nurse-specialist accompanied the field enumerators to the study area, and remained with them as an on-site supervisor for the first two weeks of the four-week period of data collection. She also remained available to the field team by phone for consultations and support. Total score for the ASQ-SE was classified as “below” or “above” the standard, age-specific cut-off values.¹³ For the ASQ-SE, higher scores indicated more behavioral problems.

Child growth was assessed at each household visit using standard techniques. Measurements were converted to z scores (height-for-age [HAZ], weight-for-age [WAZ], head circumference-for-age [HCZ], mid-upper arm circumference-for-age [MUACZ], weight-for-age [WHZ], and body-mass-index z score [BAZ]) using WHO Anthro.³³ The prevalence of underweight, stunting, and wasting was determined according to World Health Organization standards.³³

Data were entered and analyzed with JMP 13.1 and Stata version 15.0. Analysis was conducted at the community, household, and individual levels, starting with a descriptive analysis of the variables, including t-tests and analysis of variance, followed by a series of chi-square tests and correlations to assess collinearity. Continuous dependent variables were evaluated with histograms to verify normal distribution. For each item in the ASQ-SE, a value of 10 was assigned if the child was reported to “always” demonstrate the behavior, 5 if the child sometimes demonstrated

the behavior, and 0 if the child did not demonstrate the behavior.^{13,34} Cronbach’s alpha was .66 when all 30 items were used. The responses to one item, “Does your child show an interest in or knowledge of adult sexual language and activity?” were considered unreliable. When this item was removed from the total ASQ-SE scoring, Cronbach’s alpha was .69. Thus, this item was eliminated from the total score. Unadjusted and adjusted linear regression analyses were conducted to assess the relationship of child age, sex, intervention group, maternal education, household wealth, household income per capita, and child anthropometry on ASQ-SE scores. Variables that were significant in bivariate analysis were retained in the regression model. Microcephaly (as a dichotomous variable) was retained rather than HCZ, as both are measures of head circumference. In addition, child gender and maternal education were conserved as these have been previously shown to relate to many child outcomes.^{12,30,35-44}

RESULTS

Characteristics of children who had ASQ-SE testing are shown in table 1. As typical in this area, educational level was low for adults in the household, with 76% of mothers having no or only basic education. Child nutritional status was also poor, with 55% stunted and 30% underweight. Nearly a quarter (24%) of children had ASQ-SE scores above the cut-off for age, suggesting worse social-emotional development.

The distribution of the ASQ-SE scores skewed slightly to the right, with median 45 and inter-quartile range (IQR) 30-60. Notably, 65 children (21%) had scores < 30, and 19 children (6%) had scores > 90. The negative behaviors most often cited were overfriendliness with strangers (21%), hyperactivity compared with children of the same age (25%), and screaming/crying/having tantrums for long periods of time (22%). Mothers also cited issues with obedience: 30% of children sometimes (and 4% rarely or never) did what they were asked to do, and 30% of children sometimes (and 13% rarely or never) followed routine directions (for example, coming to the table or cleaning up toys when asked). There was no difference in responses to individual items by gender (not shown).

ASQ-SE scores related to child age: children scoring below the age cutoff (suggesting better social-emotional skills) were slightly older than those scoring above the age cutoff (suggesting worse social-emotional skills) (Table 2). ASQ-SE scores also related to group assignment: significantly more children in Full Package Intervention households scored below the age cutoff (suggesting better social-emotional skills) than those in Control or Partial Package Intervention households (the Intervention had been in effect for 16 months at the time the ASQ-SE information was collected). Children who scored below the age cutoff (suggesting better social-emotional skills) lived in households with

Table 2. Relationship of the ASQ-SE results to household and child characteristics (N=310)

	Above cutoff for age (worse SE skills)	Below cutoff for age (better SE skills)	p value
Gender F:M	52:48	53:48	ns
Age (months) (mean±SD)	38.05±4.12	40.46±4.2	<.0001
Group			
Control	24	75	.0009
Full Package Intervention	9	91	
Partial Package Intervention	32	68	
Total family size (mean±SD)	7.42±3.73	7.56±4.12	ns
Wealth score (mean±SD)	-0.24±0.94	0.12±1.06	.006
Annual household income, NPR (mean±SD)	48527±43398	67769±63494	.01
Annual household income per capita, NPR (mean±SD)	7687±7251	10299±9813	.03
Annual household income per capita/100, NPR (mean±SD)	76.87±72.51	102.99±98.13	.03
Amount of land owned (mean±SD)	7688±10699	8658±12575	ns
Livestock ownership score (mean±SD)	1.66±1.91	2.22±2.17	.04
Most educated woman (%)			ns
None	80	71	
Primary	17	21	
secondary	3	7	
Most educated man (%)			ns
None	49	41	
Primary	26	33	
secondary	25	26	
Child's mother education (%)			ns
None	83	74	
Primary	15	21	
secondary	3	6	
Child anthropometry			
WHZ (mean±SD)	-0.24±0.87	-0.39±0.89	ns
HAZ (mean±SD)	-2.44±1.18	-2.04±1.14	.009
WAZ (mean±SD)	-1.60±.96	-1.45±.94	ns
HCZ (mean±SD)	-1.37±.90	-1.05±.91	.03
BAZ (mean±SD)	0.04±0.90	-0.15±0.90	ns
MUACZ (mean±SD)	-0.86±0.91	-0.70±0.79	ns
Stunted (%)	59	53	ns
Wasted (%)	3	5	ns
Underweight (%)	37	28	ns
Microcephalic (%)	25	14	.02

SD=standard deviation. NPR = Nepalese Rupees. WHZ=weight-for-height z score, HAZ= height-for-age z score, WAZ= weight-for-age z score, HCZ= head circumference-for-age z score, BAZ= body-mass-index-for-age z score, MUACZ= mid-upper-arm-circumference-for-age z score. SE= social-emotional. ASQ-SE= Ages and Stages Questionnaire-Social Emotional. ns=not significant

Table 1. Demographic and personal characteristics of children who had ASQ-SE testing

	ALL ASQ-SE (n=310)
Gender F:M	53%:47%
Age (months) (mean±SD)	39.88±4.30
Group	
Control	37%
Full Package Intervention	21%
Partial Package Intervention	41%
Total family size (mean±SD)	7.52±4.02
Wealth score (mean±SD)	.037±1.04
Annual household income, NPR (mean±SD)	63116±59768
Annual household income per capita, NPR (mean±SD)	9667±9315
Annual household income per capita/100, NPR (mean±SD)	96.67±93.15
Amount of land owned (mean±SD)	8423±12281
Livestock ownership score (mean±SD)	2.09±2.12
Most educated woman	
None	73%
Primary	20%
secondary	6%
Most educated man	
None	43%
Primary	31%
Secondary	26%
Child's mother education	
None	76%
Primary	19%
secondary	5%
Child anthropometry	
WHZ (mean±SD)	-0.35±0.89
HAZ (mean±SD)	-2.13±1.16
WAZ (mean±SD)	-1.48±.94
HCZ (mean±SD)	-1.11±.91
BAZ (mean±SD)	-0.10±0.90
MUACZ (mean±SD)	-0.74±0.83
Stunted	55%
Wasted	4%
Underweight	30%
Microcephalic	17%
ASQ-SE	
ASQ-SE score (mean±SD)	47.33±23.92
Above cutoff for age	24%

more resources (higher wealth and livestock scores, more income). However, education levels for the child's mother or the most educated man and woman in each household did not differ in relation to whether the child ASQ-SE score was above or below the age cutoff. Children who scored

Table 3. Relation of child social-emotional development (ASQ-SE) to household and child risk factors; unadjusted and adjusted linear regressions

	UNADJUSTED				ADJUSTED			
	coefficient	Prob> t	Lower 95% CI	Upper 95% CI	coefficient	Prob> t	Lower 95% CI	Upper 95% CI
Child characteristics								
Gender[ref=Female]	0.086	0.950	-2.631	2.803	0.540	0.672	-1.971	3.051
Age (months)	-0.863	0.006*	-1.487	-0.240	-0.799	0.008*	-1.394	-0.204
HAZ	-3.826	0.001*	-6.115	-1.536	-0.436	0.721	-2.838	1.965
Microcephalic? [ref=Yes]	4.164	0.023*	0.562	7.765	2.663	0.131	-0.802	6.128
Household characteristics								
Group assignment								
Control	5.132	0.004*	1.572	8.692	ref			
Partial Package Intervention	8.929	<.0001*	5.445	12.413	8.211	<.0001*	4.531	11.892
Full Package Intervention	-14.061	<.0001*	-18.184	-9.939	-13.546	<.0001*	-17.873	-9.219
Wealth score	-4.710	0.000*	-7.245	-2.175	-4.220	0.002*	-6.944	-1.496
Annual household income per capita/100, NPR	-0.029	0.049*	-0.058	-4.09e-5	-0.004	0.767	-0.033	0.024
Livestock score	-0.799	0.219	-2.076	0.477	0.023	0.970	-1.248	1.296
Maternal education								
None or basic	5.945	0.020*	0.942	10.947	ref			
Some or completed primary	-1.180	0.691	-7.038	4.676	-1.308	0.639	-6.794	4.176
Some or completed secondary	-4.764	0.269	-13.233	3.704	2.752	0.523	-5.728	11.233

below the age cutoff tended to have better HAZ and HCZ scores, and were less likely to be microcephalic. Other growth parameters did not differ in relation to ASQ-SE score above or below the age cutoff.

Unadjusted and adjusted linear regressions were run to assess the relationship of these variables to ASQ-SE score as a continuous variable (Table 3). In the unadjusted model, child age and HAZ were associated with lower (better) ASQ-SE scores (respectively, -0.863 [$-1.48, -0.24$, $p=.006$] and -3.82 [$-6.11, -1.53$, $p=.001$]), while the presence of microcephaly was associated with higher (worse) ASQ-SE scores (4.16 [$.56, 7.76$, $p=.02$]). Group assignment to Control or Partial Package Intervention was associated with higher ASQ-SE scores (respectively, 5.13 [$1.57, 8.69$, $p=.004$] and 8.92 [$5.45, 12.41$, $p < .0001$]) as was the lowest category of maternal education (5.94 [$.94, 10.94$, $p=.02$]). In contrast, greater household wealth (-4.71 [$-7.24, -2.17$, $p < .0001$]) and to a lesser extent, income per capita were associated with lower ASQ-SE scores. In the adjusted model, only child age, household wealth, and group assignment retained significance. Children whose families had been assigned to the Full Package Intervention had significantly lower ASQ-SE scores (associated with better social-emotional skills) (-13.54 [$-17.87, -9.21$, $p < .0001$]), while those in the Partial Package Intervention has significantly higher scores (associated with worse social-emotional skills), (8.21 [$4.53, 11.89$, $p < .0001$]). Similar results were found when logistic regressions were performed with ASQ-SE score above or below the age cutoff as the outcome variable (not shown). Likewise, similar results were found when linear regression

was run with group assignment omitted (child age and household wealth score remained significant, not shown).

DISCUSSION

In young children, assessment of social-emotional development is one way to assess the presence or risks for behavioral problems.⁸ Social-emotional development is defined as “the ability to experience, express and regulate emotions in an age-appropriate manner, to develop and maintain healthy relationships with others, and to feel confident to explore the environment and learn”.²⁴ A survey of 100,000 preschoolers in LMIC found that > 25% had poor social-emotional skills, defined as an inability to control aggression, avoid distraction, and/or get along well with other children.⁴⁵ These behaviors are critical for social and academic success, suggest the potential for mental disorders in later life, and greatly impact child and family functioning.^{8,43,48}

In this exploratory study in rural Nepal, 24% of children scored above their age-cutoffs on the ASQ-SE screening test, suggesting worse social-emotional development. Child age, household wealth, and assignment to the Full Package Intervention group was associated with lower (better) ASQ-SE scores. Even within the narrow age range studied, younger children were more likely to score above the age-cutoff than older children, suggesting that social-emotional behaviors – or their parents’ perceptions of these behaviors – improved between age 3 to 4 years. It is not known if this trend would continue as children entered

school (mandated at age 5 years), or if school would elicit and reveal more social-emotional challenges.

Not surprisingly, children in households with greater wealth had lower (better) ASQ-SE scores. Poverty is strongly linked to other areas of child development, including cognitive and motor development.⁴⁷⁻⁵¹ Some studies have shown a link between lower-quality physical environment, family stress and fewer stimulating experiences with increased child behavior problems; these risk factors may be more common in low-resource households.^{8,52,53} The findings related to child age and household wealth remained significant when group assignment was removed as a predictor variable, supporting the robustness of these results.

In unadjusted analyses, social-emotional behavior scores also related to growth: children scoring above the age cutoff for the ASQ-SE had lower HAZ, HCY, and more had microcephaly. Child growth and general development are associated and share many risk factors, including poverty, low birth weight, inadequate diet, and maternal depression.^{54,55} However, a meta-analysis of data from 15 LMIC showed no consistent relationship between stunting and social-emotional development; this relationship might vary in different populations.⁵⁵ In contrast, a longitudinal cohort study found that microcephaly at birth was associated with social dysfunction at 8 months and in adulthood.⁵⁶ Although links between microcephaly in childhood and social-emotional function has not been reported, this relationship is plausible. Microcephaly may reflect not only suboptimal brain growth but also diminished neurocognitive function. Functions including memory, emotion regulation, and higher-order cognitive functioning (e.g., hippocampus, amygdala, prefrontal cortex) and regions that support language and literacy (e.g., cortical areas of the left hemisphere) are especially vulnerable to insults in early life.³⁹ Deficiencies in these functions may represent a mechanism by which children in resource-poor settings have more behavioral and emotional problems than their more advantaged peers.³⁹ However, when adjusted for other factors, the relationships between microcephaly and HAZ in this study were attenuated. This underscores the complex interactions of the many factors which affect child development.^{30,39,41,42,51,57-61}

An unexpected finding in the present study was that children whose families were assigned to the Intervention Group had significantly better (lower) scores on the ASQ-SE. This relationship remained robust after adjustment for child and household risk factors (child age, gender, HAZ, microcephaly, and household wealth, household income per capita, livestock ownership, and maternal education). Children in Full Package Intervention households scored nearly 14 points lower (better) and children in Partial Intervention households scored > 8 points higher (worse) than children in control group households. It is of course possible that these findings were related to chance or to

unmeasured variables. For example, the children in the Full Package Intervention group may have had better social-emotional development at baseline. Unfortunately, we did not measure this aspect of child development until Round 3 of the study: the intervention had already been active for ~16 months. It should also be re-emphasized that the interventions (either Full or Partial Package) did not address child development -including social-emotional development - at all. The Full Intervention Package focused on livestock management, family nutrition, and community development, and the Partial Intervention Package focused only on livestock management and family nutrition. Thus, the plausibility of the relationship of between interventions and child social-emotional development (better for those in Full Intervention households, worse for those in Partial Intervention households) may be questioned. Though surprising, the relationships between both Intervention Packages and child social-emotional development was strong. In addition to chance, we considered several possibilities to explain these associations. It is possible that the improved social-emotional development seen in the Full Package Intervention group represented some "spillover" of the generally improved status of children in these households: in previous analyses, greater improvements in child diet, feeding practices, and growth were seen in the Full Package Intervention households compared to Partial Package or Control households at project endline (33 months after the ASQ-SE data was collected).¹⁵ In addition, global developmental scores (using the ASQ-3) for 2-year-olds in the Partial Package Intervention were almost 14 points lower (worse) than in Control households, while those in the Full Package Intervention were ~15 points higher (better).³⁰ We hypothesized that mothers participating the Full Package Intervention may have increased their empowerment and personal agency, which could have translated to better quality child care and interactions.³⁰ Alternatively, other family members may have been motivated by the mother's participation in the Full Package Intervention group activities to spend more time with the children, resulting in better child developmental skills.³⁰ Another possibility is that increased wealth in the Full Package households provided additional resources which benefited child development.¹⁵ The poorer social-emotional performance of children in Partial Package Intervention families may have reflected decreased time available for mothers to spend with their children (due to mothers' participation in training activities) in the absence of the benefits accrued from the community development component of the Full Intervention. These same hypotheses may be applicable to the social-emotional skills reported in the current study.

Better understanding of child social-emotional development in LMIC is urgently needed, as poverty, under-nutrition, inadequate early childhood stimulation, and poor access to quality education, factors that may increase vulnerability to mental health and behavioral disorders.^{1,8} Not only are

social and emotional skills “the bedrock of students’ well-being and academic achievement”, these skills are also “good predictors of educational, labor and social outcomes” and play an important role in the development of cognitive skills.⁶² Difficulties in these areas often increase with age.⁴ For example, in separate studies in Ethiopia and Sudan, the prevalence of behavioral and emotional problems increased from 5% of children age 3-6 years to 10% of those age 7-15 years.⁴ A large international survey assessed the social-emotional development of 6000 students 10-15 years old from 8 middle- and upper-income countries.⁶² The results emphasized the pronounced differences in these skills between children from advantaged vs disadvantaged backgrounds, and the report concludes with strong recommendations to better understand the evolution of social-emotional development throughout the world.⁶² However, there remains a “dearth” of data on social-emotional development in young children in LMIC.⁶³ One reason is that social-emotional behavior is highly sensitive to cultural expectations and norms, complicating cross-cultural comparisons.^{64,65} Notably, the Multiple Indicator Cluster Survey, devised by UNICEF in 2014, contains several items pertaining to social-emotional development; however, work is ongoing to improve the robustness of this measure.⁶³ The ASQ-SE has been used in many countries, including Brazil, Uruguay, Peru, Argentina, Korea, China, Taiwan, Scandinavia, Sweden, the Netherlands, Estonia, Turkey, England, US, and India.^{19,21,22,24,25,27,43,66-77} In Sweden, in a clinical sample of help-seeking mothers, child ASQ-SE scores related more closely to maternal psychological distress (especially if the mothers were depressed) than to external ratings of dyadic interaction or clinically assessed relationship qualities.²¹ This may be relevant to LMIC, where risk factors for maternal depression are substantially higher than in upper income countries and emphasizes the need for additional work to validate the ASQ-SE and similar tools in Nepal and other LMICs.⁷⁸

Relatively little is known about behavior and mental health problems for young children in Nepal. A 2021 study using the Child Behavior Checklist found 20% of Nepali 6-18-year-olds scored in the clinical range for “Total Problems”, a figure comparable to the prevalence of children in our study scoring above the age cut-off for social-emotional problems.⁹ Mental and physical illness in parents, conflict in the family, parental disagreement in child-rearing, and physical punishment of child correlated positively with both Internalizing Problems and Externalizing Problems in these school-age children and adolescents.¹⁰ Bista et al. found more psychosocial dysfunction among Nepali adolescents whose families had frequent disputes, or who resided in nuclear families, with a single parent, or with illiterate parents.¹¹ As the prevalence of mental health disorders among adults in Nepal ranges from 15% to 37.5%, it is urgent to identify and address problems as early in life as possible.^{79,80} Notably, an intervention for Nepali schoolchildren with disruptive behaviors has been shown

to be effective.⁸¹ Identification and intervention with younger children at risk might contribute to a reduction in these problems, as behaviors are most malleable during early life.⁴⁸ Recognition of the prevalence of behavioral issues in young children in LMIC could encourage governments to address shortages of skilled child mental health professionals.¹

Understanding the prevalence of child behavioral problems can also provide a basis to plan interventions and services.^{2,6} Interventions to address child social-emotional problems such as aggression, disobedience, sleeping problems and anxiety, have proven to be effective in LMIC.⁸ A 2018 systematic review and meta-analysis found that both parent- and child-focused interventions in LMIC effectively reduced disruptive child behavior problems.^{82,83} A 2019 systematic review of family-focused interventions in LMIC found positive outcomes for child and adolescent mental health and well-being for both normal children and those with behavioral disorders or other challenges.⁸² Such interventions may offer long-term benefits for the individuals, their families, and their communities. For example, an early intervention program for children 9-24 months in Jamaica reduced anxiety, depression, and attention deficit during childhood, and was also associated with better self-esteem in participants at age 17-18 years.^{2,84} In Mauritius, 2 years of high-quality preschool reduced conduct disorders and schizotypal symptoms at 17 years of age and criminal offences at age 23 years.^{2,85} Such interventions may also reduce societal costs for caring for children with behavioral and mental health problems.¹

Our study had several limitations and strengths. With approximately 300 participants in this analysis, the present study may not have had an adequate sample size or power to detect certain relationships. Second, the ASQ-SE measure used to assess social-emotional development has not been independently validated in Nepal. However, in this exploratory study, the test proved easy for both enumerators and respondents to understand (with the exception of 1 question), results showed a near-normal distribution, and the percentage of children scoring above the age cutoffs was similar to previous reports.²³ A strength of this study was the administration of the ASQ-SE questionnaire by trained field enumerators (rather than parent self-report); the enumerators were able to clarify ambiguities if respondents had questions. An additional strength was that the ASQ-SE results could be evaluated in the context of household demographic information and child anthropometry obtained at the same visit.

CONCLUSION

In this small exploratory study in rural Nepal, we found that implementation of the ASQ-SE tool was feasible to implement within a larger survey, providing another potential tool to assess child well-being in the context of household and community level interventions. We found

that both age and household wealth were significant predictors of children's social-emotional developmental skills. Furthermore, children whose families participated in the Full Package of a multisectoral community development intervention had better social-emotional developmental skills, compared to both a control group and a group receiving a Partial Package of nutrition and livestock management training only. Although the intervention groups were assigned by community, the lack of randomization and single point of data collection limit causal inference of these findings. Further work is necessary to validate the ASQ-SE and similar tools in Nepal, and to better understand the prevalence of challenges to optimal social-emotional development in young children in order to use this information to design and monitor needed interventions.

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