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Relations of maternal health literacy and parenting practices with early childhood development: a cross-sectional study

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ABSTRACT

This study aimed to examine the relations of early childhood development with maternal health literacy and mothers' early parenting practices. This cross-sectional study was conducted on mothers with children aged 36–59 months ($n = 503$) with a survey form, Early Childhood Development Index (ECDI) and Turkish Health Literacy Scale-32. Children of mothers with sufficient/excellent health literacy levels, children who are breastfed for 12 months and longer, and children with a screen time of 2 h or less were more likely to be ECDI-on-track (AOR (CI) = 2.52 (1.53–4.15); 2.28 (1.41–3.70); 2.04 (1.18–3.50); respectively). In conclusion, children whose mothers were adequately health literate, who were breastfed longer and who had less screen time were better on ECDI indicators. Increasing the knowledge and skills of mothers on early parenting practices and supporting them to be good health literacy will contribute positively to the early development of children.

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Early childhood development; maternal health literacy; parenting practices

Introduction

Early childhood development (ECD) is defined as "a maturing and interactive process that ensures the regular progression of motor, cognitive, language, social-emotional and regulatory skills and capacities during the first few years of life". Optimal brain development requires a stimulating environment, adequate nutrition, and social interactions provided by responsive caregivers (UNICEF 2017). Lack of early learning opportunities and lack of appropriate caregiver–child interactions lead to loss of developmental potential. Mothers, especially with early parenting practices (EPP), support the well-being and development of their children (Breiner et al. 2016). EPP include behavioral traditions or rituals of care that promote or compromise the growth and development, health, safety, well-being, and socialization of children in the context of the home environment (Kolobe 2004; Walker and Kirby 2010; Çiçek and Yalçın 2022; Sarı et al. 2023; Yalçın et al. 2022).

Early childhood covers the first 8 years. The first five years are passed within the family in most countries and 3–4 years of age is a very important period in order to improve the parenting skills of the mother and to increase the child's adaptation to school in the preschool period. Undiagnosed neurodevelopmental problems in this period will affect the school success, psychosocial development and adult quality of life of the child (WHO 2020). Currently, ECD is included as an Sustainable Development Goal (SDG) target and the ECDI was taken as a primary tool for measuring progress towards the SDG target in 2021.

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UNICEF formed the Early Childhood Development Index (ECDI) for the assessment of development in children aged 3–4 years (UNICEF 2017; Loizillon et al. 2017; Emerson and Llewellyn 2022). Previous studies for ECDI focused on maternal education, wealth index, nutritional status, and anemia (Gil et al. 2020; Lu et al. 2020; Benedict et al. 2022; Hasan et al. 2023). The ECDI is known to be associated with nurturing care and early education, early stimulation at home, children's books in the home, children play games at home (Allel et al. 2021). However, there is no published study on ECDI for the interaction with both caregiver's health knowledge and EPP.

Health literacy has gained attention as a concept related to the health of individuals today and was first defined by Nutbeam in 1998 (Nutbeam 2000). Although health literacy is important for individuals of all ages in society, maternal health literacy (MHL), which is described as "cognitive and social skills that determine the motivation and ability of women to understand and use information in ways that promote and maintain their own and their children's health", has emerged as a factor affecting child well-being (Skeens et al. 2016). It was also shown that MHL was positively related to parenting self-efficacy and EPP (Lee et al. 2018). The relationship between MHL and ECD was investigated for the first time in a descriptive study in Mexican immigrant mother-child pairs, and it was found that women with low health literacy were at least four times more likely to have children at risk of developmental delay (Hernandez-Mekonnen et al. 2016). This relationship has not yet been supported by a methodologically appropriate, observational study and not yet been investigated in Turkish mothers and their children.

Given the central role of mothers in ECD, we believe that improving mothers' MHL and EPP is a priority for interventions in this area to be effective. Based on this foresight, the aim of this study is to examine the relationship between the ECD status of 36–59 month-old Turkish children and their mothers' sociodemographic characteristics, MHL, and EPP. This study will reveal the need for interventions on MHL and EPP in supporting ECD.

Materials and methods

Study design

This cross-sectional study was conducted on mothers with children aged 36–59 months living in Afyonkarahisar, Turkey, between January/2019-June/2021. Permission to carry out the study was approved by local ethics committee Afyonkarahisar Health Sciences University (Project no: 2011- KAEK-2). All study procedures were performed in accordance with the Declaration of Helsinki.

Study population and sample size

Considering N:32,763 (the number of children aged 36–59 months living in Afyonkarahisar) (Turkish Statistical Institute 2021) (p):74% (frequency of children show normal development in at least three of the four developmental domain in Turkey) (Turkey Demographic and Health Survey 2018); (d): 5% (confidence limit), the sample size was calculated as 500 with a 97% confidence interval using "OpenEpi (https://www.openepi.com/SampleSize/SSPropor. Htm) calculator" according to n=[DEFF*Np(1-p)]/[(d2/Z21-α/2*(N-1)+p*(1-p)] equation. It was planned to reach a total of 550 mothers, taking into account the 10% disagreement rate.

The research was carried out in 15 family health centers serving individuals from different socioeconomic levels, determined by cluster sampling method among 35 family health centers in Afyonkarahisar province. It was planned to include 36 mother-child couples from each family health centers in the study.

Data collection

Children aged 36–59 months, who do not have a mental or physical illness requiring continuous follow-up or medication, and their literate volunteer mothers were included in the study. When there was more than one child in the 36–59 age group in the same family, the youngest child was included in the study. Mothers who applied to family health centers due to healthy child follow-up, vaccination or illness, and whose children met the criteria for participation in the study were identified and informed about the content and purpose of the study. After obtaining written consent from the mothers who agreed to participate in the study, a structured questionnaire, Early Childhood Development Index (ECDI), and The Turkish Health Literacy Scale-32 (THLS-32) were applied to the mothers.

Measures

Sociodemographic and personal characteristics questionnaire

With the questionnaire consisting of 32 questions, the sociodemographic characteristics of mother-child couples, general health literacy characteristics of mothers (the sources they use and prefer to reach health information), and the parenting practices of the mothers were questioned. The questionnaire tool consisted of three parts: 1. Sociodemographic characteristics of mother such as age, literacy, education, occupation, residence, number of children, number of people living at home, income and demographic characteristics of child such as age, gender, and birth order, 2. General literacy characteristics of mothers such as frequency of reading, getting help for reading and writing, the sources they consulted for information about their children's health, 3. EPP markers of the mother such as child's duration of breastfeeding, consumption of main and snack meals per day, consumption of junk food, sleeping room, car seat use, smoking exposure, immunization status, and screen time.

Early childhood development index

This index was created for UNICEF's Multi-Indicator Cluster Studies to measure ECD (Loizillon et al. 2017). ECDI is an internationally comparable and standard indicator which is used in population-based surveys such Multiple Indicator Cluster Surveys of all countries including high-income countries (UNICEF 2017; Loizillon et al. 2017; Emerson and Llewellyn 2022). ECDI, consisting of 10 items, consists of specific milestones that children are expected to pass by age 3 and 4 (36–59 months). These 10 items are used to determine whether children are at the required level in four developmental areas (domains); reading-numerical skills (3 items), physical (2 items), social-emotional (3 items) and learning (2 items). For each of the domains, a child is considered on track if she/he passes on two, one, two, and one items, respectively. The development of children who pass at least three of these four domains is considered normal and expressed as "ECDI-on-track" (UNICEF 2017). The five items from the reading-numerical and learning domains reported to have an acceptable degree of internal consistency (median country-level alpha = 0.65, inter-quartile range 0.57–0.66) (Emerson and Llewellyn 2022). Similarly, Cronbach's Alpha value of these two domains was 0.57 and that of ECDI-10 was found to be 0.42 in our study.

The Turkish health literacy scale-32

In 2012, the European Health Literacy Consortium conducted a health literacy survey using a self-report tool in eight European countries, and European Health Literacy Scale (HLS-EU) was developed. THLS-32 for adults was developed concurrently with the Turkish adaptation of the HLS-EU. THLS-32 is 32-item Likert-type scale. The reliability of the scale was examined with internal consistency (Cronbach's Alpha) and was found to be 0.93. Total score is standardized to take a value

between 0 and 50 with the formula 'Index= (arithmetic mean-1)×[50/3]' for ease of calculation. The total score ranges from 0 to 50, with a higher score indicating better health literacy. The health literacy of individuals is classified into four categories according to the Index score. These are (0–25): insufficient health literacy, (>25–33): problematic health literacy, (>33–42): sufficient health literacy, and (>42–50): excellent health literacy. Mother's health literacy status was analyzed for two groups: insufficient/problematic health literacy and sufficient/excellent health literacy in this study (Okyay and Abacıgil 2016). In our data, Cronbach's Alpha value for THLS-32 was 0.96 showing high reliability.

Statistical analysis

Statistical evaluation was performed using the IBM-SPSS 26.0 (IBM-SPSS Inc., Chicago, IL, USA) program. The normal distribution of the data was evaluated with the Shapiro–Wilk test. Categorical variables were expressed as n (%), data with normal distribution from continuous variables were expressed as mean ± standard deviation. Chi-square test was used when comparing the percent distribution of categorical data between groups. The differences in percentages of variables having more than 2 subgroups with sufficient ECDI score were compared with adjusted standardized residuals. Due to the fact that the vaccination status was 99%, it was not included in the pairwise comparison analysis.

The percentages of sufficient ECDI according to mother-child parameters were evaluated with univariate logistic regression analysis. Birth order was included in logistic regression analysis because of the relationship between birth order and number of children. To investigate the interaction with the ECDI-on-track status, multiple logistic regression (Stepwise: backward elimination) analysis included parameters of sociodemographic characteristics and general literacy [maternal age, age of child, gender of child, gestational duration, birth weight, birth order of child, primary caretaker, maternal education, household members, working mother, residence, level of income, preferred healthcare provider, maternal reading frequency, and MHL level] for Model 1 and EPP [Duration of breastfeeding, consumption of daily meals and snacks of child, consumption of junk food of child, sleeping room of child, car seat use of child, parental smoking, smoking at home, keeping a regular schedule for child, and screen time of child] for model 2. Model 3 covered both Model 1 and Model 2 variables. Adjusted odds ratio (AOR) and 95% confidence interval (CI) were calculated. A $p < 0.05$ level was considered significant.

Results

A total of 503 child-mother couples were included in the study. The general characteristics of the participants are shown in Table 1. It was determined that the mean score of THLS-32 of participant mothers was 31.8 ± 10.7 and the ratio of mothers with adequate (sufficient/excellent) health literacy level was 47.5%.

The number of children who were ECDI-on-track was found to be 393 (78.1%). Distribution of children by ECD module indicators is shown in Table 2. Analyzing the mothers' EPP, we found that only four mothers did not vaccinate their children. It was determined that three of them did not have the vaccines because they did not trust their content, and one of them did not have it due to side effects. Association of children's sociodemographic characteristics, MHL and EPP with children's status of ECDI-on-track are seen in Table 3.

As seen in Table 4, after controlling for confounding variables in multivariable analysis, the following variables were all associated with being ECDI-on-track: age of child, birth order of child, maternal education, maternal reading frequency, MHL level, duration of breastfeeding, and screen time. Children with the age of ≥48 months were more likely to be on track overall on ECDI [AOR (95% CI): 2.82 (1.73–4.60); $p < 0.001$]. Children who are the first child were more likely to be ECDI-on-track [AOR (95% CI): 1.82 (1.13–2.94);

Table 1. General characteristics, n = 503.

Sociodemographic characteristics and literacy	mean±SD/n(%)	Early parenting practices	mean±SD/n(%)
Maternal age		Duration of breastfeeding	
≤35 years	376 (74.8)	<12 month	180 (35.8)
>35 years	127 (25.2)	≥12 month	323 (64.2)
Age of child		Daily meals and snacks	
36–47 months	245 (48.7)	Adequate consumption	311 (61.8)
48–59 months	258 (51.3)	Inadequate consumption	
Gender of child		Consumption of junk food	
Male	230 (45.7)	Once a week or less	179 (35.6)
Female	273 (54.3)	More than once a week	324 (64.4)
Time of births		Sleeping room	
<38 week	164 (32.6)	Parents' bedroom	233 (46.3)
≥38 week	339 (67.4)	Own bedroom	270 (53.7)
Birth weight		Car seat use	
<2500 gr	61 (12.1)	Yes	236 (46.9)
≥2500 gr	442 (87.9)	No	267 (53.1)
Birth order		Immunization status	
1st	280 (55.7)	Fully immunized child	499 (99.2)
≥2nd	223 (44.3)	Incomplete immunization	4 (0.08)
Number of child(ren)		Parental smoking	
1	182 (36.2)	At least one parent	432 (85.9)
≥2	321 (63.8)	None	71 (14.1)
Primary caretaker		Smoking at home	
Mother	224 (44.5)	Yes	69 (13.7)
Kindergarten	134 (26.6)	No	434 (86.3)
Others (father, grandmother)	145 (28.8)	A regular schedule for child	
Number of family members	4.1 ± 1.2	Yes	404 (79.4)
Maternal educational level		No	99 (20.6)
Primary	92 (18.3)	Screen time of child	
High school or college	411 (81.7)	≤2 hours	395 (78.5)
Working mother	280 (46.9)	>2 hours	108 (21.5)
Residence		ECDI-on-track*	
Rural	91 (18.1)	Yes	393 (78.1)
Urban	412 (81.9)	No	110 (21.9)
Level of income			
High	128 (25.4)		
Low	375 (74.6)		
First choice healthcare provider			
Family health center	134 (26.6)		
State/University Hospital	162 (30.2)		
Private hospitals and clinics	207 (41.2)		
Reading frequency of mothers			
Sometimes	344 (68.4)		
Often	159 (31.6)		
THLS-32-indices scores of mothers	31.8 ± 10.7		
MHL level			
Insufficient	101 (20.1)		
Problematic	163 (32.4)		
Sufficient	148 (29.4)		
Excellent	91 (18.1)		

*If a child who is on track in three of the four domains of ECDI was considered as "ECDI-on-track".

$p = 0.014$]. Children of mothers who graduated from high school or college, mothers who read more often, and mothers with sufficient/excellent health literacy levels were more likely to be ECDI-on-track [AOR (95% CI): 2.41 (1.39–4.18), 1.79 (1.01–3.18), and 2.52 (1.53–4.15); $p = 0.002$, $p = 0.048$, and $p = 0.001$; respectively]. Children who are breastfed for 12 months and longer and children with a screen time of 2 h or less were more likely to be ECDI-on-track [AOR (95% CI): 2.28 (1.41–3.70), 2.04 (1.18–3.50); $p = 0.001$, $p = 0.010$; respectively].

Table 2. Distribution of children by ECD module indicators, n = 503.

	N (%)
Having sufficient learning material, yes	
Having 3 or more children's books	460 (91.5)
Having 10 or more children's books	362 (72.0)
Having sufficient toys	483 (96.0)
Having inadequate care, no	
Left alone or with a child younger than 10 years old for at least 1 hour in the past week	460 (91.5)
Having adaquate care, yes	
Doing at least 4 activities with their mother	383 (76.1)
ECDI-on track*, n(%)	
Developing normally in at least three of four domains	393 (78.1)

*If a child who is on track in three of the four domains of ECDI was considered as "ECDI-on-track".

Discussion

In this study, we investigated the relationship of ECD with MHL and EPP in the context of social-environment, together with sociodemographic covariates. We found a similar rate of 78.1% for children on track in at least three of the four developmental domains of the ECDI. Comprehensive national assessment of the ECD of 36–59-month-old Turkish children with ECDI was made for the first time in the Turkey Demographic and Health Survey, which was held in 2018, and it was determined that 74% of them were on track developmentally (Turkey Demographic and Health Survey 2018).

Present study showed that children with developmentally on track are more likely to be older. This may be related to the tendency of parents to do activities that will support development as the child's age increases. Although no difference was found in this study, another reason may be that older children are more likely to be in environments that support their development, such as kindergartens. This result is also consistent with the results of previous studies (Haq et al. 2021; Hossain et al. 2021; Islam and Khan 2023) covering both the same age group and infant period. Bornstein et al. (2015) reported that caregivers do more activities such as reading books, telling stories, reading together, counting and drawing as the baby age increases each month.

Previous studies reported that having siblings positively supports the development of the child (Hua et al. 2014). On the contrary, it has been reported that having siblings in rural households has negative effects on the child's early development as parental investments are divided among children (Zhong et al. 2020). A recent study (Islam and Khan 2022) also found a significant negative association between maternal parity and ECDI.

We found that children with developmentally on track were more likely to be first child than their peers. While previous studies did not focus on the effect of being the first child on ECD, the findings that the first child is lucky in terms of supporting development were reported in a large-scale study investigating the impact of birth order on a range of health and well-being in Norwegian population. It was shown that first-born children spend more time for reading and homework and less time in front of a screen. It was also reported that mothers spend less time discussing school-work with later-borns, mothers are more likely to quit smoking in their first pregnancy and they are more likely to breastfeed their first-born babies (Black et al. 2015).

Moreover, present study showed that children's developmentally on track status did not change with gender. This finding is inconsistent with some previous studies reporting results in favor of girls. In a study of children under 5 years of age in Ghana, Costa Rica, and Indonesia, Haq et al. (2021) also reported that boys were less likely to be developmentally on track. Similarly, Islam et al. found that when conditions are good, female children were more likely to be developmentally on track (Islam and Khan 2022). A recent study (Hossain et al. 2021) from Bangladesh reported that male children were less likely to be developmentally on track both in an urban and rural area.

One of the main concerns of this study was the relationship between MHL and ECD. In a limited number of previous studies, the relationship between MHL and child health was investigated and found that MHL is extremely important as a source of qualitative and quantitative skills, such as correctly

Table 3. Association of children's sociodemographic characteristics, MHL and EPP with being ECDI-on-track.

		ECDI-on-tract*		
		N(%)	P value	OR (95% CI)
Maternal age	<35 year	292 (77.7)	0.660	1.00
	≥35 year	101 (79.5)		1.12 (0.68–1.83)
Age of child	36–47 month	173 (70.6)	**<0.001**	1.00
	48–59 month	220 (85.3)		1.55 (1.55–3.74)
Gender of child	male	175 (76.1)	0.309	1.00
	female	218 (29.9)		1.25 (0.82–1.90)
Gestational duration	<38 week	126 (76.8)	0.623	1.00
	≥38 week	267 (78.8)		1.12 (0.72–1.75)
Birth weight	<2500 gr	43 (70.5)	0.169	1.00
	≥2500 gr	350 (79.2)		1.59 (0.88–2.89)
Birth order of child	1st	233 (83.2)	**0.002**	1.95 (1.27–3.00)
	≥2nd	160 (71.7)		1.00
Number of child(ren)	1	146 (80.2)	**0.390**	1.00
	≥2	247 (76.9)		0.82 (0.53–1.29)
Primary caretaker	Mother	164 (73.2)[a]	**0.004**	1.00
	Kindergarten	118 (88.1)[b]		2.70 (1.48–4.91)
	Others	111 (76.6)[a]		1.19 (0.74–1.94)
Maternal education	Primary	53 (57.6)	**<0.001**	1.00
	High school or college	340 (82.7)		3.52 (2.17–5.73)
Household members	≤5	358 (79.6)	**0.024**	2.00 (1.08–3.69)
	>5	35 (66.0)		1.00
Working mother	Yes	231 (82.5)	**0.008**	1.78 (1.16–2.72)
	No	162 (72.6)		1.00
Residence	Rural	58 (63.7)	**<0.001**	1.00
	Urban	335 (81.3)		2.48 (1.51–4.06)
Level of income	Low	291 (77.6)	0.622	1.00
	High	102 (79.7)		1.13 (0.69–1.86)
Prefered healthcare	Family health center	103 (76.9)	0.164	1.00
	Public Hospital	120 (74.1)		0.86 (0.50–1.47)
	Private Centers	170 (82.1)		1.38 (0.81–2.36)
Maternal reading frequency	Sometimes	254 (73.8)	**0.001**	1.00
	Often	139 (87.4)		2.46 (1.45–4.17)
MHL level	Insufficient/Problematic	185 (70.1)	**<0.001**	1.00
	Sufficient/Excellent	208 (87.0)		2.87 (1.81–4.54)
Duration of breastfeeding	<12 month	126 (70.0)	**0.001**	1.00
	≥12	267 (82.7)		2.04 (1.33–3.14)
Daily meals and snacks of child	Adequate	253 (81.4)	**0.026**	1.00
	Inadequate	140 (72.9)		0.61 (0.40–0.94)
Consumption of junk food of child	Once a week or less	246 (75.9)	0.107	1.00
	More than once a week	147 (82.1)		1.45 (0.92–2.30)
Sleeping room of child	Parents' bedroom	166 (71.2)	**0.001**	1.00
	Own bedroom	227 (84.1)		2.13 (1.38–3.28)
Car seat use of child	Yes	199 (84.3)	**0.002**	2.02 (1.30–3.15)
	No	194 (72.7)		1.00
Parental Smoking	At least one parent	338 (78.2)	0.884	1.00
	None	55 (77.5)		0.96 (0.52–1.75)
Smoking at home	Yes	46 (66.7)	**0.013**	1.00
	No	397 (80.0)		2.00 (1.15–3.47)
Keeping a regular schedule for child	Yes	317 (78.5)	0.818	1.00
	No	76 (76.8)		0.91 (0.54–1.53)
Screen time of child	≤2 hour	318 (80.5)	**0.014**	1.82 (1.13–2.93)
	>2 hour	75 (69.4)		1.00

OR = odds ratio; CI = confidence interval.
*If a child who is on track in three of the four domains of ECDI was considered as "ECDI-on-track".

adjusting drug doses, preparing food appropriately, and determining the correct portion size, along with the general care of their children (Yin et al. 2012). Fong et al. (2018) showed that insufficient health literacy was associated with low parental self-efficacy in neonatal care. Khorasani et al. (2017) reported that breastfeeding self-efficacy was associated with MHL. Cheng et al. (2016) found that inadequate

Table 4. Association of sociodemographic characteristics, MHL and EPP with being ECDI-on-track*, multiple logistic regression models (Stepwise: backward elimination).

	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 3 AOR (95% CI)
Sociodemographic Characteristics And Literacy			
Age of child			
36–47 month	1.00		1.00
48–60 month	2.65 (1.66–4.24)		2.82 (1.73–4.60)
Birth order of enrolled child			
1st	1.65 (1.04–2.63)		1.82 (1.13–2.94)
≥2nd	1.00		1.00
Maternal education			
Primary	1.00		1.00
High school or college	2.68 (1.56–4.60)		2.41 (1.39–4.18)
Maternal reading frequancy			
Sometimes	1.00		1.00
Often	1.78 (1.01–3.13)		1.79 (1.01–3.18)
MHL level			
Insufficient/Problematic	1.00		1.00
Sufficient/Excellent	2.31 (1.43–3.76)		2.52 (1.53–4.15)
Early Parenting Practices			
Duration of breastfeeding			
<12 month		1.00	1.00
≥12 month		1.99 (1.28–3.10)	2.28 (1.41–3.70)
Sleeping room of child			
Parents' bedroom		1.00	
Own bedroom		1.90 (1.22–2.96)	
Car seat use of child			
Yes		1.71 (1.08–2.71)	
No		1.00	
Screen time of child			
≤2 hour		1.66 (1.01–2.74)	2.04 (1.18–3.50)
>2 hour		1.00	1.00

*If a child who is on track in three of the four domains of ECDI was considered as "ECDI-on-track".
Model 1 included sociodemographic characteristics and general literacy variables; Model 2 included early parenting practices; Model 3 included both Model 1 and Model 2.
AOR = adjusted odds ratio; CI = confidence interval.

parental health literacy was associated with parental depression, increased television viewing in children, and risky parental behaviors against child. Morrison et al. (2014) also reported that low health literacy was associated with an increase in non-emergency visits to the emergency department. The only study investigating the relationship between mothers' health literacy levels and ECD was conducted on Mexican immigrant mothers and showed that low health literacy in mothers is a risk factor that delays the child development (Hernandez-Mekonnen et al. 2016). The children of mothers with adequate health literacy in our study were more likely to be developmentally on track. In accordance with the previous literature (Rao et al. 2021; Hasan et al. 2023), present study also showed that the children of mothers with a high level of education were more likely to be ECDI-on-track. Supportingly, recent studies reported that empowerment of women has positive effect on the child development (Ewerling et al. 2020; Bliznashka et al. 2021).

We evaluated the relationship between parenting practices and ECD through various parameters and found that children who were breastfed longer (≥12 months) were more likely to be developmentally on track. This finding is consistent with Eidelman (2013) and Kramer et al. (2008). It has been observed that exclusive breastfeeding for at least three months and continued breastfeeding for at least six months resulted in an increase in verbal and overall IQ, as opposed to breastfeeding for less than three months (Kramer et al. 2008). Eidelman (2013) emphasized that the added value of breast milk in facilitating maximum infant neurodevelopment is not surprising, given the diversity of critical nutritional and neurotrophic agents present in breast milk and not found in any human milk substitute.

We also found that children who had shorter daily screen exposure (≤2 hours per day) were more likely to be ECDI-on-track. As young children are exposed to screens, their development can be impaired as they miss important opportunities to practice and master their motor and communication skills. A recent study (Madigan et al. 2019) showed that higher levels of screen time at 24 and 36 months were found to be significantly associated with lower performance on developmental screening tests at 36 months and 60 months.

The strength of this study is that it is the first cross-sectional study to show an association between MHL and ECD using the ECDI. This study has also some limitations. Firstly, MHL is measured with the THLS-32, which is limited to measuring functional health literacy, and is not specific for caregivers (Kumar, et al. 2010). A recent scoping review on the progression on the measurement instruments of MHL mentioned that scientific and reliable MHL measurement instruments can greatly advance high-quality maternal and child health (Chen et al. 2022). Secondly, since this study was mainly mother-oriented, the effect of fathers on early childhood development was ignored. Thirdly, we did not question whether mothers use a health information resource for ECD and what this resource is. These limitations should be taken into consideration in further studies.

Conclusion

Among the interventions to be made to improve ECD, improving the skills of caregivers is perhaps the one that will yield the fastest results. Focusing especially on mothers' attitudes and skills and eliminating problems are the right steps to support ECD. In this context, this study, based on the thesis that MHL and EPP can affect not only the physical health of children but also their development, revealed the relationship between MHL and EPP and ECD. This relationship needs to be reviewed in future studies with the development of appropriate tools to measure the adequacy of mothers' health literacy skills and early parenting practices.

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Authors' contributions

AO conceptualized and designed the study, developed the data extraction instrument, collected data and carried out the initial analysis, drafted and revised the manuscript. SSY conceptualized and designed the study, developed the data extraction instrument, carried out the initial analysis, drafted and revised the manuscript, completed quality control, conceptualized the study, supervised data collection, and critically screened important intellectual contents of the manuscript. All authors have read and approved the manuscript as submitted and agree to be accountable for all aspects of the work.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Written informed consent was provided by each participant. Permission to carry out the study was approved by local ethics committee of Afyonkarahisar Health Sciences University (Project no: 2011-KAEK-2). All study procedures were performed in accordance with the Declaration of Helsinki.

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