TAUB CENTER
FOR SOCIAL POLICY STUDIES IN ISRAEL

The Roots of Disparity: Exploring Socioeconomic Influences on Early Childhood Development

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This research was generously supported by the Beracha Foundation, the Bernard van Leer Foundation, and Yad Hanadiv

Taub Center Early Childhood Research Series

Research Paper No. 16, Jerusalem, June 2024

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Please cite this publication as:

Silverman, S. (2024), The Roots of Disparity: Exploring Socioeconomic Influences on Early Childhood Development. The Taub Center for Social Policy Studies in Israel. https://doi.org/10.5281/zenodo.11120763

The Roots of Disparity: Exploring Socioeconomic Influences on Early Childhood Development

Sarit Silverman

Introduction

Approximately 10% of the Israeli population is under the age of four, in contrast to an average of 5.4% in the OECD (OECD, 2020). This demographic composition generates unusually high demand in Israel for educational and health services for young children and families. Israel's health system provides universal, accessible health services, including Tipat Halav (Hebrew for *drop of milk*) clinics that provide cost-free, universal pediatric preventive care to children from birth to age six. These clinics are at the forefront of safeguarding the health of Israel's young population and provide many services including routine vaccinations and surveillance of child growth and development, which is conducted by assessing age-appropriate milestones from four domains: gross motor skills, fine motor skills, language development, and personal-social development. These milestones have been adapted from well-established developmental scales (Ball, 1977; Frankenburg et al., 1992; Frankenburg & Dodds, 1967; Provence et al., 1995). Recently, an evidence-based surveillance scale was created based on the Tipat Halav dataset (Sudry et al., 2022).

Future Taub Center research will delve into the Tipat Halav database and examine socioeconomic differences in milestone attainment. In preparation for these studies, the current paper reviews the scholarly literature on early childhood development, focusing in particular on its relationship with family SES (socioeconomic status) within each developmental domain assessed in the Tipat Halav clinics. The key goal is to understand the degree and timing of unfolding disparities, and shed light on environmental influences on developmental paths in each domain.

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Background

Early childhood is the most formative stage in human development (Bailey, 2001; Blossfeld et al., 2017; Phillips & Shonkoff, 2000). It is a critical period characterized by rapid growth and skill acquisition that sets the trajectory for children's future well-being and functioning (Gilmore et al., 2018; Lejarraga, 2012). Child development can be assessed by (Bilu et al., 2023) tests that measure a child's ability in a given skill at a certain age and screening tests that ascertain if a child is at risk for developmental delays (DD)[1] (Fernald et al., 2009). Screening for early childhood development is conducted around the world by measuring *milestone attainment*. Milestones are categorized into groups by domain. They include language, gross motor, fine motor, and personal-social skills. Developmental screens consist of a list of domain-specific milestones that children are expected to achieve by certain ages. If a child does not reach a developmental milestone on time, it may indicate DD, which could imply the need for additional monitoring and possibly interventions.

Development does not occur in a vacuum: children learn and grow in interaction with their environments (Bronfenbrenner & Morris, 1998; Nelson et al., 2019). Nature and nurture work together in tandem: children's genetic predispositions interact with their environments creating complex developmental trajectories. Early life experiences and environments heavily influence early childhood development and life course outcomes. The quality of a young child's environment is of utmost importance for healthy development (Phillips & Shonkoff, 2000). Yet children are not born into, nor raised in, equal environments. Family circumstance, measured by income or SES, heavily influences children's developmental potential (Bradley & Corwyn, 2002; Fernald et al., 2009, 2012). Family SES comprises many components including parental education, occupation, and household assets. While family income is a significant factor that relates to SES, they do not completely overlap. For instance, a family with a high income may still have a lower SES if parental education or occupational prestige are not equally elevated.

1 For example, an ability test for early language skills would provide a continuous score for vocabulary, whereas a screening test would examine if the child begins to produce words by a certain age.

In addition to biological, anthropometric measures (e.g., weight for age, premature birth, low birth weight, health complications), low family SES and maternal education are significant risk factors for early childhood DDs (Acharya et al., 2023; Ahmadi Doulabi et al., 2017; Potijk et al., 2013). Young children from disadvantaged homes are more likely to experience DD because they are disproportionately exposed to risk factors such as poor nutrition, chronic stress, overcrowded housing, exposure to violence, lack of stimulating toys and language, and environmental toxins that negatively impact development (Bradley & Corwyn, 2002; Duncan et al., 2017; Fernald et al., 2009; Walker et al., 2011). Brain imaging studies have found that brain regions associated with language, memory, executive function, and emotion processing are particularly vulnerable to the effects of poverty, and these differences are apparent as early as the first year of life (Farah, 2017; Johnson et al., 2016; Noble et al., 2012, 2015; Noble & Farah, 2013; Noble & Giebler, 2020).

The effect of family income, specifically during early childhood, has a greater impact on academic outcomes than during other periods in childhood (Shay & Shavit, 2022). Even considering upward mobility from economic disadvantage in early childhood to subsequent improved financial circumstances, the experience of poverty from the prenatal period through the earliest years negatively predicts cognition at age seven and reading skills in kindergarten (Johnson et al., 2022; Riser et al., 2022). These findings demonstrate how family circumstance in early childhood plays a pivotal role in the unfolding development of core competencies during this time, which shape brain development and lay the foundation for emerging skills for the whole life course.

Zooming out, the prevalence of DD is higher in areas with higher poverty rates, such as rural regions (Acharya et al., 2023; Ahishakiye et al., 2019; Bello et al., 2013; Bishwokarma et al., 2022; Rubio-Codina et al., 2015; Sharma et al., 2019; Wei et al., 2015). On the global scale, children from low- and middle-income countries are at greater risk for DD than children from wealthier countries (Emerson et al., 2018; Fink et al., 2020; Gil et al., 2020). In 2010, an estimated 250 million children worldwide were at risk for DD due to exposure to stunting and extreme poverty (Lu et al., 2016). Altogether, these findings demonstrate that poverty, both on the family and national levels, puts children at risk of not fulfilling their developmental potential (Fernald et al., 2012; Fink et al., 2020).

Early language development

Language is a complex, multifaceted system that utilizes a convention of sounds for the purpose of communication (Hoff, 2014). Newborn infants, who initially cannot speak or understand language, gradually develop the ability to comprehend, speak, question, and express themselves. By around six months, most babies recognize their own name, and by eight to ten months, they understand a few more words. Typically, children say their first word around their first birthday. During the second year of life, children's vocabulary rapidly grows from a handful to hundreds of words, a pattern observed across different languages (Frank et al., 2021). Early language skills are mainly divided into receptive and expressive communication (Hoff, 2014). Receptive communication measures assess language comprehension (e.g., understands simple instructions), while expressive communication measures assess word production (e.g., says 2–3 words).

Why early language matters

Early language skills are consistently one of the strongest predictors of school readiness,[2] reading skills, and academic achievement (Alloway & Alloway, 2010; Burchinal et al., 2016; Grøver, 2017; Hoff, 2013; Lee & Burkam, 2002; Scarborough, 2009). Many standardized academic and IQ tests rely heavily on language skills, and vocabulary at school entry predicts later achievement. These seeds are planted early: individual differences in vocabulary at ages three to four persist through childhood, such that children with a rich vocabulary in early childhood continue to have a rich vocabulary later (Bornstein et al., 2014; Hoff, 2014; Rowe et al., 2012).

Adding family SES to the mix complicates matters since it positively associates with language skills, school readiness, and academic achievement (Brooks-Gunn & Duncan, 1997; Farah et al., 2006; Marks et al., 2006; Merz et al., 2020; Noble et al., 2006; Pace et al., 2017; Sirin, 2005). Yet, most research examines these relationships in pairs, which yields an incomplete picture. One study longitudinally examined the relationship between family SES, early language skills, and school readiness by tracking how individual differences in family SES and the pace of vocabulary growth amongst toddlers aged 14–46 months

2 School readiness refers to a set of behaviors and skills required for successful schooling including cognitive, social, emotional, and motor skills (see Duncan et al., 2007).

predicted school readiness at 54 months (Rowe et al., 2012). It found that SES, measured by parental education and family income, was a significant predictor of vocabulary growth during toddlerhood, and this growth predicted vocabulary skills at school entry. Similarly, other studies have found that SES-based differences in language ability at the onset of schooling predict later academic achievement (Durham et al., 2007; Lee & Burkam, 2002; Walker et al., 1994). These findings suggest that differences in language abilities among children from low- and high-SES families have significant implications for school success, with the SES achievement gap discernible before children even set foot in a school (Hoff, 2013).

An additional concern in early childhood language development is the early identification of developmental and learning disorders, which disproportionately affect children by family SES. Children from low SES homes are at a greater risk of developing language and communication-related disorders, including autism spectrum disorder and developmental dyslexia (Durkin et al., 2010; Nowell et al., 2015; Peterson & Pennington, 2015; Ribeiro et al., 2023; Scarborough, 2009; Thomas et al., 2012). Despite the higher risk factor for language disorders, prevalence rates for diagnoses of autism and dyslexia can be skewed, with higher rates observed among children from wealthier homes (Rai et al., 2012; Schelbe et al., 2022). This discrepancy may stem from lower access to diagnostic and other related services for children from disadvantaged homes, which could be due to limited financial and time resources in low SES homes or lower awareness of available services in their communities. Early diagnosis is crucial for successful interventions for these disorders, placing children from low SES homes at an even greater disadvantage if they are not diagnosed early. An in-depth understanding of early childhood language developmental trajectories among children from all SES levels can help identify these disorders across diverse populations and provide all children with the support they need irrespective of family background.

SES disparities in early childhood language development

Research has consistently found that children from disadvantaged homes have poorer language skills than their peers, and the language gap contributes to later differences in reading and school success (Abufhele et al., 2022; Farah et al., 2006; Hoff, 2013; Merz et al., 2020; Noble et al., 2006). But when does the language gap between children from low- and high-SES homes begin to

appear? Findings from multiple studies have that found SES disparities in language skills are detectible as early as the second year of life, and the gap widens from these early years, suggesting that the groups have differential development trajectories for language (Arriaga et al., 1998; Betancourt et al., 2015; Dailey & Bergelson, 2022; Fernald et al., 2013; Halle et al., 2009; Hoff, 2003; Huttenlocher et al., 2010, 2010; Noble et al., 2015; Rowe et al., 2012, 2012; Rowe & Goldin-Meadow, 2009). Betancourt et al. (2015) found SES-based differences in seven-month-old infants' preverbal skills. However, the generalizability of this finding is low due to the small sample size and the fact that the participants were exclusively female.

Arriaga et al. (1998) compared the language skills of toddlers (16–30 months old) from very low-income homes (younger siblings of Head Start participants) to toddlers from middle-income homes on a standardized communication scale (MacArthur Communicative Development Inventory). They found that the children from very-low income homes scored significantly lower on all the scale indices: size of expressive vocabulary, age of appearance of word combinations, and utterance complexity. Their findings highlight the language gap between toddlers from high- and low-income homes and the importance of diversity when building norms for assessment tools.

One study analyzed data from the Early Childhood Longitudinal Study Birth Cohort (ECLS-B)[3] and examined language and cognitive differences among nine and 24-month-old infants by family income level (Halle et al., 2009). Findings from 9-month-olds suggest subtle differences in the assessment measures between infants from high- and low-income homes (explores objects, explores purposefully, jabbers expressively, early problem-solving, and names objects). At 24 months, the gap was more apparent, and there were significant differences in all measures (receptive vocabulary, expressive vocabulary, listening/comprehension, matching/discrimination, early counting). The study also examined the cumulative effect of additional risk factors associated with low-income homes, e.g., low maternal education, minority status, and non-English speaking home, and compared children from low-income homes to

3 The ECLS-B is a nationally representative sample of over 10,000 children born in the U.S. in 2001, conducted by the National Center for Education Statistics in the U.S. Department of Education. Data were collected at three time points (9 months, 2 years, and 4 years) to inform policy makers, researchers, parents, teachers, and early childhood care providers of information on early childhood development, health, and education (see Andreassen & Fletcher, 2007).

children with additional risk factors. The effect of cumulative risk factors was small for 9-month-olds, while at 24 months, two or three additional risk factors created very large disparities. The findings suggest that language disparities emerge very early and are clearly evident by age two, and cumulative risk can contribute more to the gaps.

Fernald et al. (2013) compared children aged 18 and 24 months old from low and high SES homes based on the Hollingshead Four Factor Index of Socioeconomic Status[4] in two language tasks: vocabulary (based on a parent report of expressive vocabulary) and a looking-while-listening task. In the looking-while-listening task, babies are shown two pictures of familiar objects and simultaneously hear labels for one of the pictures; looking time and accuracy were measured to assess language receptivity. SES disparities were evident in both language tasks among the 18-month-olds. For the 24-month-olds, the difference between the groups was the equivalent of a 6-month gap.

Noble et al. (2015) examined the cognitive and language skills of infants from diverse SES backgrounds at ages 9, 15, and 21 months to pinpoint the emergence of SES-based language disparities. They found differences in receptive vocabulary by 15 months and in expressive vocabulary by 21 months; indicating that children of parents with higher education levels had higher language skills than their peers before their second birthdays. They also found environmental factors such as parental warmth uniquely mediated the relationship between SES and language ability but not the relationship between SES and other cognitive tasks. This finding suggests that language may be more susceptible to environmental factors than other cognitive tasks.

Altogether, these studies highlight that SES disparities in children's language abilities are evident in the very first years of life, and are consistently found across different measures of SES and language skills. Despite the robustness and consistency of these findings, it is important to bear in mind individual differences, and being born into a low-income family does not guarantee a child will develop poor language skills. Many factors mediate the relationship between SES and language development.

4 This measure uses a combination of education, occupation, sex, and marital status to create a composite score for family SES (see Hollingshead, 2011).

Mediators of the relationship between early language development and SES

The home language environment significantly shapes children's language development, encompassing factors such as the quantity, quality, and complexity of language exposure (Brito, 2017). Children from low SES homes have a less enriched home language environment in all these dimensions (Brito, 2017; Fernald et al., 2013; Hart & Risley, 1995; Hoff, 2003; 2006). In their landmark study, Hart and Risley (1995) recorded the number of words addressed to children in one-hour monthly observations over two years and compared the output by SES level. Based on these recordings, they extrapolated that by the age of four, children from higher SES homes heard approximately 30 million more words than their peers from less advantaged homes, which contributed to differences in the children's vocabulary.

The 30-million-word gap study has sparked subsequent replication studies and became a source of debate (Dailey & Bergelson, 2022; Golinkoff et al., 2019; Sperry et al., 2019). Replication studies supported the notion of the 30-million-word gap and found that parents' speech mediated the relationship between SES and language development (Hoff, 2003; Huttenlocher et al., 2010). The term *30-million-word-gap* suggests that policy should prioritize increasing speech exposure for disadvantaged children, leading to the implementation of many programs in the United States (Dailey & Bergelson, 2022; Sperry et al., 2019). However, subsequent research has clarified that simply increasing the quantity of speech exposure is insufficient for improving language development. What really matters is language quality, which includes rich vocabulary, complex sentences, and child-directed speech (Cartmill et al., 2013; Golinkoff et al., 2019; Hirsh-Pasek et al., 2015; Hoff, 2003; Huttenlocher et al., 2010; Rowe, 2008; 2012). For example, one study found maternal speech quality fully accounted for SES-based differences in their young children's (16–31 months old) expressive vocabulary (Hoff, 2003).

Research on the home language environment emphasizes the vulnerability of language skills and how optimal environments foster rich language development, while environments with lower levels of conversation, social engagement, and shared reading contribute to poorer language skills. How parents talk to their children shapes their language development. In addition to measures of speech quality and quantity, other aspects of parent-child interaction, such as the use of gestures, can play important roles in developing

language (Perkins et al., 2013; Raviv et al., 2004; Rowe, 2012; Rowe & Goldin-Meadow, 2009). Early gesture use can be a good indicator of imminent verbal skills in very young children and point to early SES disparities.

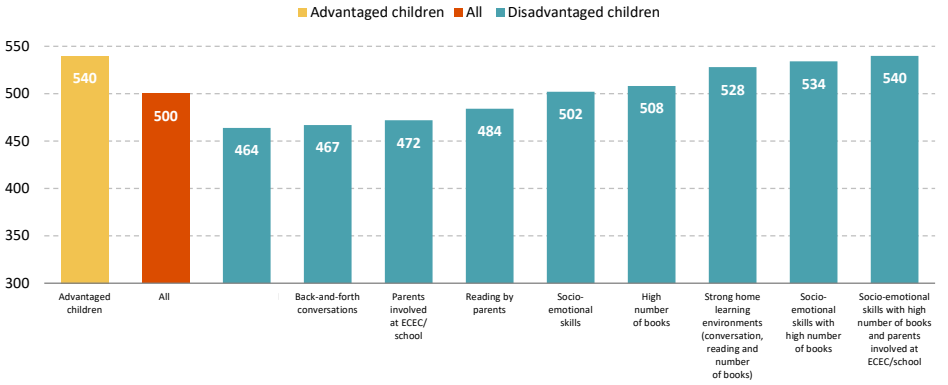
Another characteristic of the home language environment is the alignment of the primary language spoken at home with the prevalent local language. In the context of the United States, households where English is not the primary language spoken are often associated with low family SES, posing an additional risk factor for toddlers' language skills (Halle et al., 2009). Bilingual children typically exhibit lower scores in receptive vocabulary than monolingual children, however, bilingualism offers other cognitive benefits, such as improved executive functions (Bialystok, 2017; Bialystok et al., 2010). When considering family SES and bilingualism separately, higher SES is associated with better performance in language and executive function tasks, while bilingualism is associated with poor performance in language and better performance in executive functions (Bialystok & Shorbagi, 2021). The interacting relationship between family SES and bilingualism in developing language is less researched than each factor independently. There is concern that the co-occurrence of low family SES and bilingualism can doubly disadvantage children, however, the limited available findings are mixed. Some studies have found a significant interaction, while others have not (Bialystok & Shorbagi, 2021; Brito et al., 2018; Calvo & Bialystok, 2014). Notably, no studies conducted to date have examined these relationships in the first years of life, leaving the current findings inconclusive.

There is also evidence of within-SES variability in home language environment measures (Pace et al., 2017). Hirsh-Pasek et al. (2015) examined how communication quality amongst mother-child dyads at age two predicted expressive language at age three within a sample of low-income families. They found that measures of dyadic communication quality were more powerful predictors of expressive language than the number of maternal words. Another study of mother-child dyads from predominantly low-SES families found that maternal speech quality when their children were 18 months old predicted vocabulary and speed of lexical access at 24 months, suggesting that, beyond vocabulary, maternal speech quality can also influence their children's verbal processing skills (Hurtado et al., 2008). These findings demonstrate the variability of interactions within low-income families and suggest that the quality of parent-child interactions can be a source of resilience for disadvantaged children's developing language.

Preliteracy, such as early shared reading in early childhood, is important for language development and later academic achievement (Dickinson et al., 2012; Zivan & Horowitz-Kraus, 2020). Children with illiterate parents may have slower language development than their peers (Fernald et al., 2006). Interestingly, Shahaeian et al. (2018) found that the relationship between early shared reading and later academic achievement was stronger among children from low-SES homes than for children from high-SES homes. This may be because children from high SES homes have other factors that contribute positively to academic achievement, decreasing the salience of shared reading. Nonetheless, it also serves as a protective factor that can buffer the effects of family SES for at-risk children.

In addition to the number of books, other material differences in the home environment, such as the availability of cognitively stimulating toys and learning materials, can also mediate the relationship between SES and early language development (Gershoff et al., 2007; Pace et al., 2017; Rodriguez et al., 2009). Lurie et al. (2021) found that cognitive stimulation at home longitudinally mediated the relationship between SES and language skills in 5–6-year-old children. Similarly, evidence from the OECD International Early Learning Survey showed that by the age of five, disadvantaged children were already lagging behind their peers in emerging literacy skills. However, the data also indicated that the gap could narrow if certain conditions were met within the home environment or if parental behaviors promoted these skills (e.g., back-and-forth conversation, reading by parents, socioemotional skills, number of books), see Figure 1.

Figure 1. Disadvantaged children can achieve equity with advantaged children



Source: Phair, 2022

In addition to language environments, different parenting styles can encourage or inhibit children's developing language (Hoff & Laursen, 2019). Parents in lower SES homes are more likely to adopt a more authoritarian, punishment-focused parenting style, while higher SES parents tend towards higher sensitivity and positive regard (Hoff & Laursen, 2019; Lareau, 2018; Lugo-Gil & Tamis-LeMonda, 2008; Perkins et al., 2013). A large-scale study in the United States found that maternal sensitivity, based on a composite score of hostility, supportiveness, and respect for autonomy, partially mediated the relationships between SES and three-year-old expressive and receptive language ability (Raviv et al., 2004). Conversely, research on parenting strategies found mothers who used high levels of negative control had children who spoke in shorter, less diverse sentences compared to their peers (Taylor et al., 2009).

Research has also investigated the influence of the language environment in daycare facilities. Daycare centers that ranked high in language development practices, such as helping children understand and use language, and incorporating books, contributed to the vocabulary development of the attending children and predicted their vocabulary in kindergarten, even when controlling for vocabulary at age three (Hansen & Broekhuizen, 2021). One study examined whether preschool education could close SES gaps in young

children's vocabulary and found that although preschool attendance positively influenced the vocabulary of children from low SES homes, it did not close the gap (Becker, 2011). Taken together, these findings suggest that children from low-SES homes who receive more cognitive stimulation at home, and higher quality interactions with their caregivers at home and daycare, can overcome gaps in language development.

The role of stress

Exposure to chronic stress is another differentiator between children from low- and high-SES homes that can impact language development (Bradley & Corwyn, 2002; Farah, 2017; Merz et al., 2019; Noble & Giebler, 2020). Increased cortisol levels in response to chronic stress can contribute to neurocognitive differences between children from different SES backgrounds (Merz et al., 2019). Brain imaging research has found that areas associated with language are one of the main sources of neurocognitive differences between SES groups (Farah, 2017; Farah et al., 2006; Noble et al., 2012; Noble & Farah, 2013; Perkins et al., 2013). Similar to the findings regarding SES and early language development, increased stress has also been associated with lower language skills in children as young as two years old (Magill-Evans & Harrison, 2001; Noel et al., 2008). The frequent co-occurrence of stress with low SES suggests they both play a role in developing language.

Research from the Baby's First Years project found that increased stress among low-income families was associated with fewer language milestones among one-year-olds (Troller-Renfree et al., 2022). Similarly, data from the Kids in Columbus Study measured poverty and stress at 4–7 months and then language skills when the children were two years old (Justice et al., 2019). They found children from poverty-stricken homes performed poorly in expressive and receptive language, and caregiver-child interactions and maternal distress contributed to their language skills.

Summary

Language plays a crucial role in communication, and early language skills are pivotal predictors of academic success. Research has consistently found that SES-based gaps in language skills emerge in the second year of life, and these gaps set different trajectories for emerging language that influence later school and life success. However, the influence on language development does not

seem to stem from low SES or family income. Instead, environmental factors associated with low SES such as the home language environment, chronic stress, and parenting styles, explain most of the observed language gap. Although the research indicates the SES language gap begins in early childhood and widens over time, it also suggests that changes in parenting practices that encourage language development amongst disadvantaged children can close these gaps.

Early motor development

Gross motor skills involve movement and control of large muscle groups, including the arms, legs, and whole-body movement. In infancy, gross motor milestones include rolling over, sitting up, pulling to stand, and walking (Sudry et al., 2022). Gross motor skills enable infants to engage in physical activities, explore their environment, and influence their long-term physical fitness and overall health (Brian et al., 2019). Fine motor skills involve the coordination and control of small muscle groups, such as the hands and fingers, enabling precise movements that require dexterity and hand-eye coordination. Early childhood fine motor milestones include grasping an object, transferring an object from one hand to another, and thumb-finger pincer grasp (Sudry et al., 2022). Fine motor skills foster independence in young children through self-care activities like self-feeding and tying shoelaces, as well as for pivotal academic tasks such as writing and nurturing creative expression through activities like drawing. Therefore, early motor skills are crucial for the developing child's physical health, emerging cognitive skills, social-emotional well-being, and laying the foundation for independence.

SES disparities in early gross motor development

In contrast to the expansive body of research on the role of family SES in shaping early language development, studies that examine the relationship between family SES and early gross motor development are more limited. This may be because early gross motor skills are rudimentary, and gaps may not become evident until motor skills become more advanced. In addition, motor development in the early years is influenced more by biological maturation and genetic factors, and after this period, it becomes influenced more by practice and opportunity related to environmental factors (Austerberry et al., 2022;

Barnett et al., 2016; Golding et al., 2014). The SES gap in motor skills is evident in preschool- and school-aged children, but differences in early childhood are less researched (Chowdhury et al., 2010; Goodway et al., 2010; Gosselin et al., 2021; Hua et al., 2016; Jin et al., 2016).

Using the Bayley Scale of Infant Development, Black et al. (2000) examined the mental, motor, and behavioral performance of children from low-income families compared to the scale's normative scores. They found infants' (<12 months) motor scores were within the normative range, while toddlers' (>12 months) scores were lower than the normative sample, suggesting the environmental influence begins in toddlerhood, not infancy. A few small-scale studies found poor object manipulation and manual exploration amongst infants from low SES homes (Clearfield et al., 2014; Tacke et al., 2015). However, due to the small sample sizes and subdivisions by age and SES in all three studies, the generalizability of these findings is limited.

A study in Bolivia tracked the relationship between family SES, anthropometric measures, health, and nutrition, and their impact on the motor development of children under the age of five (Celhay et al., 2020). They found significant differences in motor skills between children from the poorest and wealthiest quintiles at 24–36 months old but not in infancy. Fink et al. (2020) compared language and motor milestone attainment rates in infants and toddlers living in high-and low-income countries. They found significant gaps in both domains between countries with high versus low human development index scores amongst infants as young as six months, though this gap was larger for language skills than for motor skills. However, cross-cultural studies need to consider differences in local norms and practices related to expectations in motor development that can influence the timing of motor milestones (Black & Richter, 2022; Karasik & Robinson, 2022; Libertus & Smith, 2020; Valentini et al., 2022).

Although there is insufficient evidence on SES gaps in motor development in infancy, there are findings on how the home environment in early childhood can play an influential role in shaping emerging motor skills later in life. Studies that used the Affordance in the Home Environment for Motor Development — Infant Scale, a tool that assesses opportunities for motor development in the home, found that infants from higher SES homes had higher scores on the scale (Defilipo et al., 2012; Freitas et al., 2013). Access to outside space and toys that promote motor development can positively

influence motor development (Hua et al., 2016). In addition, low maternal education and family SES increases the risk of developmental coordination disorder, a neurodevelopmental condition manifested in impaired motor coordination that affects approximately 5%-6% of school-aged children (Blank, 2012; Engel-Yeger et al., 2010; Lee & Zwicker, 2021; Tran et al., 2023; Zwicker et al., 2012). While SES gaps are not consistently evident in early childhood gross motor skills, the home environment in this period can set the stage for differences in maturing motor competence later in childhood, which impacts later physical fitness and health.

SES disparities in early fine motor development

Studies that examine SES disparities in fine motor development cannot compare in scope to the research on early language gaps. However, unlike gross motor skills, there are indications that gaps are evident in the first two years of life (Comuk-Balci et al., 2016; Ye et al., 2019). Using the Ma'anshan Birth Cohort data in the Anhui Province of China, Ye et al. (2019) found that children from higher-income homes (measured during pregnancy) with parents with higher education levels had lower rates of delayed fine motor development at 18 months. In line with the previous section, they did not find a significant relationship between SES measures and gross motor skills at this age. Comuk-Balci et al. (2016) found that socioeconomic group significantly predicted performance in a battery of fine motor tasks in infants 0–24 months of age. Studies that examine the relationship between SES and performance in developmental assessments have found positive associations between infant and toddler fine motor skills and family SES (and not gross motor skills) (Koutra et al., 2012; Rubio-Codina et al., 2015). The SES disparities in fine motor skills persist throughout preschool and into school-aged children (Aiman et al., 2016; Bobbio et al., 2007).

The relationship between fine motor skills and academic achievement

Predictors of school readiness and academic achievement often emphasize skills directly linked to early learning, such as pre-reading and math skills, as well as cognitive skills like executive functions (Duncan et al., 2007). However, there is evidence that fine motor skills are a foundational predictor of school readiness and academic achievement (Cameron et al., 2012, 2016; Carlson et al., 2013; Grissmer et al., 2010; McClelland & Cameron, 2019). In early

education classroom settings, fine motor skills play a crucial role in activities such as writing, cutting, and drawing, all essential for successful learning. The skills positively correlate with hand-eye coordination and attention to detail, aiding children in navigating classroom spaces and materials effectively. Fine motor skills also require coordination between visual perception and motor movements, known as visuomotor integration, which associates with reading and math skills that also require the processing of visual symbolic stimuli (Cameron et al., 2012; Grissmer et al., 2010). Neuro-imaging research shows that fine motor skills activate similar areas in the brain to those required for executive functions and attention (the prefrontal cortex, cerebellum, and basal ganglia), supporting the relationship between these skills (Cameron et al., 2012; Grissmer et al., 2010).

Previous studies examining fine motor skills and academic achievement have predominantly included samples of children from middle SES families. Dinehart & Manfra (2013) expanded on these findings and found that fine motor skills in preschoolers from low-income families predicted their reading and math scores in second grade, even after controlling for demographic variables, as well as early language, numeracy, and cognitive skills. Using the Early Childhood Longitudinal Study Kindergarten cohort data (ECLS-K),[5] Potter et al. (2013) found that kindergartners from high-SES families exhibited more advanced fine motor skills than their peers, a portion of which was explained by measures of family resources such as the educational home environment. These differences in fine motor skills explained part of the SES gap in reading, math, and general knowledge tasks, demonstrating how family circumstances can influence access to stimulating activities that facilitate fine motor skills related to subsequent cognitive development.

The embodied cognition theory supports the link between cognition and motor skills, illustrating how cognitive processes are influenced and molded by the physical context of the body (Needham & Libertus, 2011; Roessingh & Bence, 2018). The cognitive-motor link is apparent in infants as they negotiate their physical surroundings, and learn to move their ever-changing bodies through goal-oriented behavior and trial and error (Adolph, 2008; Grissmer

5 Similar to the ECLS-B, the ECLS-K is a nationally representative sample of over 20,000 children who attended kindergarten in the U.S. in the 1998–1999 academic year and followed the children through middle school to learn about early school experiences (see: Tourangeau et al., 2005).

et al., 2010). Learning to grasp, sit, and walk demonstrates some of children's earliest learning achievements. In other words, motor skills teach children how to learn. Differences in early opportunities to practice fine motor skills, and access to toys and environments that encourage exploration may not yield large SES differences in early motor skills but incrementally lead to differential trajectories of these skills over time, which later contribute to gaps in motor skills and academic outcomes.

Summary

Early motor skills are the foundation for physical movement and allow children to explore their environments and gain independence. There does not seem to be an SES gap in early gross motor development; however, the research does indicate a relationship between family SES and early fine motor development. Fine motor skills are a foundational predictor of school readiness. In contrast to the breadth of research on how the SES language gap contributes to the SES achievement gap, studies on fine motor skills are more limited. Nonetheless, existing research suggests that SES disparities in fine motor skills contribute to the achievement gap, but more research is needed to confirm this.

Personal, social, and emotional development

Personal, social, and emotional (PSE) development includes multifaceted skills such as empathy, emotion regulation and understanding, sense of self, building relationships, and social competence (Darling-Churchill & Lippman, 2016). Children internalize early social and emotional interactions to form emerging competency in these skills (Rosenblum et al., 2009). At the onset, the newborn infant has immature self-regulation. The expression of emotions at this stage signals biologically based needs that evolved to alert the caregiver to provide protection and care. The infant's emotional experience quickly becomes more sophisticated. Within a few months, s/he can engage in social interactions, exhibit emotions such as sadness or anger with facial expressions, and use the caregiver's emotional cues to decide how to react in a particular circumstance. In toddlerhood, young children's skills become more advanced, and they begin to display empathy and increase their self-awareness demonstrated in emotions such as embarrassment and guilt.

Longitudinal studies have found that social and emotional skills in early childhood predict school readiness, academic achievement, and outcomes in adulthood (Denham, 2006; Jones et al., 2015; Moffitt et al., 2011). Children with higher levels of self-control during early childhood had greater outcomes than their peers with lower self-control in adulthood in terms of better physical health, lower levels of substance abuse, higher SES, and lower rates of criminal offenses (Moffitt et al., 2011). Similarly, kindergarteners who demonstrated greater socioemotional skills fared better than their peers in those areas as well (Jones et al., 2015).

Despite the importance of PSE skills, there is a lack of consensus regarding its theoretical conceptualization, resulting in inconsistent measuring techniques since each tool will focus on different aspects based on what that approach considers important (Campbell et al., 2016; Darling-Churchill & Lippman, 2016; Halle & Darling-Churchill, 2016; Jones et al., 2016; Riser et al., 2022). The Bayley socioemotional subscale has a greater focus on sensory processing, while the Ages and Stages subscale looks more at emotions and acting out behavior (Krijnen et al., 2021). The THIS scale includes personal-social milestones (e.g., smiles responsively; responds when addressed by name) and does not include emotional milestones (Sudry et al., 2022). Other studies use measures of maladjustment, problem behaviors, and externalizing and internalizing behaviors as indicators of poor PSE well-being. Some studies that examine PSE in infants assess temperament and attachment (McIntosh et al., 2021). Due to the wide breadth of PSE competencies, it is difficult to draw conclusions on research findings under the umbrella of PSE development since each study will focus on one isolated aspect of PSE skills depending on its approach or measurement method (Jones et al., 2016).

Another challenge in measuring PSE is that there is a greater element of subjectivity compared to other developmental domains. Parent reports are a methodological dilemma for all domains, but even more so for PSE because there is a higher element of subjectivity. For example, an item from the Brief Infant-Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan et al., 2004) is: “My child seems nervous, tense, or fearful,” to which the parent needs to select the appropriate answer (0 = not true/ rarely, 1 = somewhat true/ sometimes, 2 = very true/often). The answer can reflect the parent’s appraisal of what is considered nervous behavior, cultural differences regarding these emotions, and even the recent context of the infant’s mood on that given day

(Campbell et al., 2016; Fernald et al., 2009; Jones et al., 2016; Yates et al., 2008). PSE skills are important for healthy emotional well-being and life course outcomes; however, one needs caution when interpreting their findings.

SES disparities in PSE development

Studies that examined the SES gap in early childhood developmental assessments have found more modest effect sizes for gaps in socioemotional development compared to the more robust differences in early language (Abufhele et al., 2022; Halle et al., 2009; Richards et al., 2018; Rubio-Codina et al., 2015; Vásquez-Echeverría et al., 2022). Rubio-Codina et al. (2015) found evidence of the gap as early as 6 months using the Bayley III scale, which widened over time. Using a nationally representative sample in Uruguay, Alvarez-Nuñez et al. (2020) examined SES differences in socioemotional development using the Ages and Stages questionnaire. They found children from low-income homes had poorer socioemotional skills than their peers by the age of 18 months. Similarly, Koutra et al. (2012) found maternal education related to socioemotional skills among 18-month-olds. The study using the ECLS-B data compared infants from low- and high-income families at 9 and 24 months in social-emotional development and found a small difference at nine months and a moderate effect size at 24 months (Halle et al., 2009).

Wolf et al. (2021) mapped social-emotional development in children four to seven years old and characterized two groups based on the rate of development. The low-growth group initially lagged behind their peers in the normative growth group and continued to develop social-emotional competency at a slower pace. Children living in poverty were more likely to be in the low-growth group. Using ECLS-K data, Fletcher & Wolfe (2016) found a relationship between family income and socioemotional skills (measured by approaches to learning, interpersonal skills, and self-control) among kindergarteners, such that children from lower-income families had poorer socioemotional skills. The gap in these skills between children from low- and high-income families doubled by fifth grade. Throughout childhood, children from low SES homes are at greater risk of developing psychopathology and poor mental health outcomes (Golberstein et al., 2016; Peverill et al., 2021). These findings suggest a modest gap in socioemotional skills emerges in the first two years of life, which appears to widen throughout childhood. However, the inconsistencies between studies regarding the emergence of the gap, and

small effect sizes may be attributed to measurement issues discussed in the previous section.

The role of stress and parenting style on PSE

Stress in the home can contribute to the impact of poverty in early childhood on developing PSE skills. Research from the Baby's First Years project found that increased stress among low-income families was associated with poorer socioemotional development amongst one-year-olds, demonstrating the cumulative risk of poverty and stress on children's developmental outcomes (Troller-Renfree et al., 2022). The increased levels of stress in low-income families can contribute to less emotional resources for parenting and harsher parenting styles (Conger & Donnellan, 2007). Differences in parenting style by SES group can influence PSE development since positive parenting practices such as acceptance and warmth, which are associated with high SES parents, positively relate to PSE competency, and harsher parenting styles, which are associated with low SES parents, adversely affect these skills (Conger & Donnellan, 2007; Cui et al., 2018; Emmen et al., 2013; Hoff & Laursen, 2019; Lugo-Gil & Tamis-LeMonda, 2008; Perkins et al., 2013). Examination of the cumulative risk factors for externalizing and internalizing behaviors among young children growing up in low-income families found that nurturing and involved parenting can overcome some of the negative risk factors (Trentacosta et al., 2008).

Summary

PSE skills allow children to process their emotions, gain a sense of self, and build relationships. Since these skills are wide-ranging and have an element of subjectivity, they are more challenging to assess in early childhood. The findings point to an SES gap in PSE skills in early childhood; however, the emergence of the gap depends on the assessment tool used. Future research should comprehensively examine the SES gap in PSE development using multiple assessment tools to fully understand how these crucial skills impact children from disadvantaged backgrounds and the long-term consequences on their future mental health and well-being.

General discussion

This review revealed that developing language is more vulnerable to the effects of family SES than other developmental domains. Research has consistently found SES-based gaps in multiple language tasks before children reach their second birthday, and these gaps widen over time and contribute to the education achievement gap. In contrast, the research on fine motor and PSE skills is less expansive. Fewer studies specifically examine fine motor skills, and PSE research has psychometric issues and theoretical inconsistency. Nonetheless, the findings suggest the SES gap is also evident in the early years in fine motor and PSE skills. Unlike the other domains, the evidence does not point to an SES gap in early gross motor skills, suggesting that early gross motor skills are less vulnerable to environmental factors in the early years and are more biologically determined. The pattern of a substantial early SES gap in language, followed by a more moderate gap in PSE and fine motor skills, and no SES differences in gross motor skills, has been replicated in multiple studies conducted in different countries (Koutra et al., 2012; Playford et al., 2017; Potijk et al., 2013; Richards et al., 2018; Rubio-Codina et al., 2015; Vásquez-Echeverría et al., 2022).

The interplay between heritable traits and environmental influences has been a classic question in the nurture versus nature debate. Several of the findings presented in this review, such as the influence of the home language environment and affordances in the home, suggest that primarily environmental factors mediate the relationship between family SES and child outcomes. However, these studies did not consider the role of genetics. One method to examine the respective contribution of genes and family SES on child development uses maternal IQ as a proxy for maternal genetic influence. Ronfani et al. (2015) aimed to understand the different contributing roles of maternal IQ, family SES, and the home environment on cognitive, language, and motor development at 18 months of age. Consistent with the collected findings presented in this review, they did not find a direct or indirect relationship between family SES and gross motor skills. They found that both maternal IQ and family SES were related to cognitive and language skills. However, adding a measure of the home environment into the model completely mediated these relationships, demonstrating how the home environment is a more influential factor over family SES and maternal IQ on early cognition and language.

The gold standard experimental paradigm that aims to attribute the unique contributions of genetic and environmental influences is twin studies that can provide separate estimates for each component. A meta-analysis of 139 twin studies, including a sample of over 79,000 pairs of monozygotic twins, assessed estimates for heritability and environmental influence of psychological traits and developmental milestones in the first two years of life (Austerberry et al., 2022). It found that motor development had the strongest association with genetic factors, whereas language development had the strongest association with environmental factors in the first two years of life. Although this study did not include a measure of family SES, its conclusion aligns with the findings of this review: Early language skills are strongly influenced by the child's environment, whereas early gross motor skills are less susceptible to environmental influences.

Children are not embarking on life at the same starting line: family SES creates disparities from the very beginning of early childhood development that have long-term ramifications on life-course outcomes. If we want to rectify SES disparities in education, health, and the labor market, we need to first address poverty in early childhood to interrupt the trajectory and give every child the opportunity to actualize their full potential. Reviewing how these disparities unfold in early childhood by developmental domain has revealed that despite the pervasive effects of family SES, the degree of impact varies by the vulnerability of different developmental areas to environmental factors during this period.

Bringing it together: Early childhood in Israel

Understanding the relationship between family SES and early childhood development and how it influences life course outcomes is crucial for Israel, not only because of the large percentage of young children in the population but also due to the high poverty rates among children. Approximately a third of Israeli children under the age of four live in households below the poverty line (Navon & Bowers, 2023). This finding, in conjunction with the collected findings of this review, should raise a concern that a substantial proportion of young Israeli children may be at risk of delayed development, particularly in language.

Prevention in early childhood is considered an effective strategy, as it not only mitigates potential long-term societal costs, it also fosters a solid foundation that supports healthy, on-track development (Heckman, 2012). However, Israel's early childhood education and health systems lack sufficient investment, hindering equitable access to quality services and perpetuating socioeconomic disparities. Access to high-quality early childhood education is crucial for leveling the playing field and fostering language, cognitive, and socioemotional development during formative years (Vandenbroeck, 2020). Specific measures of the language environment in daycare centers, including helping children understand and use language, and teaching with books, have been found to predict children's vocabulary in kindergarten, even when controlling for their vocabulary at age three (Hansen & Broekhuizen, 2021). However, Israel's ECEC system falls short in terms of quality, affordability, and accessibility, requiring comprehensive improvements as proposed in a previous position paper (Blank & Silverman, 2022).

Tipat Halav has the potential to be a cutting-edge resource for preventative health services since most families visit the clinics for vaccinations. However, this resource has not been fully utilized since the National Health Insurance Law was implemented in 1995, which placed the responsibility of Tipat Halav in limbo between the health funds and the Ministry of Health. The lack of a clear, regulatory mechanism has impeded further investment in the system, stalling much-needed updates in staffing, salaries, and services. While developmental surveillance services are provided in the Tipat Halav clinic to identify children at risk of delayed development, follow-up assessments and subsequent health services (e.g., speech therapy) are provided elsewhere, complicating the continuity of care. Increasing investment and developmental services provided at Tipat Halav would ease the accessibility of health services to all children and increase the likelihood of on-track development regardless of family background.

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