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Stability of Core Language Skill across the First Decade of Life in Children at Biological and Social Risk

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Abstract

Background—Command of language is a fundamental skill, a cornerstone of multiple cognitive and socioemotional aspects of development, and a necessary ingredient of successful adjustment and functioning in society. Little is known about the developmental stability of language in at-risk youth or which biological and social risk factors moderate stability.

Methods—This four-wave 10-year prospective longitudinal study evaluated stability of core language skill in 1780 children in varying categories of biological and social risk in a multiage, multidomain, multimeasure, and multireporter framework.

Results—Structural equation modeling supported loadings of diverse age-appropriate measures of child language on single latent variables of core language skill at 15 and 25 months and 5 and 11 years, respectively. Core language skill was stable over the first decade of life; significant and comparable stability coefficients were obtained for children with diverse biological and social risks, including poor health, welfare status, teen motherhood, ethnicity, gender, birth order, and families that changed in income and maternal education over the study period; stability in language was strong even accounting for child nonverbal intelligence and social competence, maternal education and language, and the family home environment.

Conclusions—Core language skill varies in stability with age but is robustly stable in children regardless of multiple biological and social risk factors.

Keywords

Language development; health risk; social risk

Introduction

At every age children display an impressively wide range of individual differences in their language skills (Bornstein, Hahn, & Haynes, 2004; Fenson et al., 2000). These individual

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Supporting information
Additional Supporting Information may be found in the online version of this article:

differences are meaningful in that early language skill anticipates children's later cognitive and socioemotional functioning. In the cognitive domain, individual differences in early language skills merge into higher-order verbal and mental functioning (Lewontin, 2005) and so have predictive validity for the later development of speech (Tamis-LeMonda, Bornstein, Baumwell, & Melstein Damast, 1996), grammar (Reynell & Huntley, 1985), reading (Anderson & Freebody, 1983; Chall, Jacobs, & Baldwin, 1990; Udwin & Yule, 1982), intelligence (Neisser et al., 1996), and academic functioning (Duncan et al., 2007; Morgan & Levy, 2015). Early language skills have consequences too for outcomes in other related domains of development, such as number concepts (Carey, 1994), spatial skills (Gentner, Özyürek, Gürcanli, & Goldin-Meadow, 2013; Pruden, Levine, & Huttenlocher, 2011), memory (Fivush, 1994; Fivush & Haden, 2005; Lazaridis, 2013), theory of mind (Astington & Baird, 2005; de Villiers, 2005; Schick, de Villiers, de Villiers, & Hoffmeister, 2007; Watson, Painter, & Bornstein, 2001), and social and behavioral problems (Bornstein, Hahn, & Suwalsky, 2013; Petersen et al., 2013; Petersen, Bates, & Staples, 2015).

In consequence, understanding the stability of individual differences in language across the first decade of life is of interest to parents, psychologists, psychiatrists, and practitioners. For example, interventions that enhance language skills also improve behavioral regulation in children (Barnett et al., 2008; Diamond, Barnett, Thomas, & Munro, 2007; Winsler, Manfra, & Diaz, 2007). The present study of language stability in children is pertinent to child psychology and psychiatry in two key ways: a principal characteristic of child development, language, is measured longitudinally over the first decade of life, and moderation of language stability is assessed across multiple health and social risk groups.

Developmental stability and its significance

Although development is commonly identified with change, some features of development are theorized to remain (more or less) consistent or stable over time. Stability describes consistency through time in the relative order or standing of individuals in a group (Bornstein & Bornstein, 2008). Stability in language, for example, obtains when the individual differences children display at one point in time are displayed similarly at a later point in time. By contrast, continuity or mean-level analysis documents group-level consistency (or change) over time. Together, stability and continuity are central constructs in developmental science. This study is concerned with developmental stability.

Stability in development is significant for several reasons. First, stability is essential to normal functioning of living organisms. For example, in language development, children's vocalizations and words used during social interactions have been employed to quantify how children socialize with others (Eckerman, Davis, & Didow, 1989), and toddlers' understanding of language relates to their appropriate compliance with adult commands (Kaler & Kopp, 1990). Second, stability provides key information about development. Developmental science is concerned with description, explanation, and prediction. Stability describes the ontogenetic course of a characteristic, insofar as individuals do or do not maintain their order relative to one another in their cohort. The fact that a characteristic is stable implies that the characteristic assessed at one point in time likely reflects the past as well as the future of the characteristic (Roberts, Block, & Block, 1984). For example, children's vocabulary size predicts later vocabulary size and growth (Bornstein, Tamis-LeMonda, & Haynes, 1999; Fenson et al., 1994), reading achievement (Marchman & Fernald, 2008; Griffin, Burns, & Snow, 1998), grammatical development (Bates & Goodman, 1999; Dionne, Dale, Boivin, & Plomin, 2003; Marchman, Martínez-Sussmann, & Dale, 2004), and cognitive skills, including working memory and IQ (Marchman & Fernald, 2008). Third, stability is psychologically informative about important phenomenology in development. From the perspective of so-called evocative interactions (Scarr & Kidd, 1983), consistent characteristics in individuals at one time can be expected to differentially shape responses from the environment that contribute to later outcomes in those individuals. Consistently chatty versus wordless toddlers likely have different childhoods insofar as their adult interlocutors adjust to match that consistent characteristic (Bellinger, 1980; Clarke-Stewart, Vanderstoep, & Killian, 1979; McLaughlin, White, McDevitt, & Raskin, 1983). Fourth, stability is a cornerstone of key conceptions and theories in developmental science. For example, finding strong stability of language from an early age, regardless of social experience, supports nativist theories of language development, whereas finding that stability is moderated by the environment supports interactionist theories of language development (Bates, Dale, & Thal, 1995). Thus, different stability findings lead to contrasting conclusions about the origins of language development (e.g., nativism vs. evocative interactions and environmental sensitivity). Fifth, stability even has multiple implications for measurement in development. To be psychometrically meaningful, a characteristic should be stable (at least across short time spans), and stability is a gateway to prediction because antecedent reliability of a characteristic sets the limit on that characteristic's predictive validity for the same or a different characteristic (Muchinsky, 1996). In short, stability is central to multiple conceptual facets of developmental science.

Significant stability has been reported for individual measures and multivariate factors of language over short and long intervals in typically developing middle-class European American samples (Blake, Quartaro, & Onorati, 1993; Bornstein et al., 2004; Bornstein, Hahn, Putnick, & Suwalsky, 2014; Bornstein & Putnick, 2012; Feldman et al., 2000; Pine, Lieven, & Rowland, 1996; Sparrow, Balla, & Cicchetti, 1984). However, it remains unclear whether stability obtains in ethnically diverse samples of children at biological and social risk.

Biological risk, social risk, and stability in child language

Several factors are known to influence language development, and so we examined each as a potential moderator of the stability of language (that is variables that may alter the magnitude of stability). Group mean-level differences do not directly address developmental questions, but might portend continuing group disparities, and it could be that a higher or lower level at the start instigates evocative effects that maintain stability over time. Thus, risk status for group differences early in life may have implications for stability in development. It is possible that the mechanisms that produce mean-level differences in language also generate variability in stability over time. For example, stability of language in children with language disabilities may be higher than that in children without disabilities because the processes that restrict language skills also maintain language-disabled children's fixed order relative to their typically developing peers.

Based on existing evidence of mean differences in language performance in children born at biological and social risks, we explored several moderators of language stability in children including health, welfare status, adolescent motherhood, ethnic group membership, gender, and birth order. We also explored changes in family life circumstances, such as in income and maternal education, as they may also affect stability of child language. Full justification for each moderator is detailed in the Supporting Information.

The main focus of “developmental” studies of biological or social risk in child language has heretofore fallen on the analysis of cross-sectional age-held-constant mean-level group comparisons, a decidedly non-developmental approach. Here, we studied developmental stability of language over the first decade of life. If biological and social risk factors moderate language stability, it could help elucidate mechanisms that limit or promote language development. If no risk factors moderate stability, it would suggest a common developmental process that maintains stability regardless of biological and social condition.

This study

Language comprises many domains (phonology, lexicon, grammar, pragmatics), however different domains of language covary suggesting that a core language skill contributes to all (Bornstein & Haynes, 1998; Colledge et al., 2002; Tomblin & Zhang 2006; Trouton, Spinath, & Plomin, 2002). Is there stability in children’s core language skill across age? Do central health and sociodemographic risk factors moderate that stability? Some questions about individual differences, covariation, stability, and moderation of language have limited answers already available in the extant literature. Other important ones are addressed for the first time in the present study. Here we apply a latent variable approach to measure the long-term stability of core language skill across childhood in samples of children in a number of biological and social risk categories; our analyses also took several common-cause third variables into account.

This study adds to the extant child psychology and psychiatry literatures by (1) assessing multiple language domains using multiple age-appropriate measures from multiple sources across 4 data waves in the first decade of life to (2) evaluate their empirical covariation in latent variables at each of 4 child ages and (3) the long-term stability between latent variables of core language skill from the end of infancy to the start of adolescence in (4) relatively large samples that varied across (5) a diversity of biological and social risks. To our knowledge, no previously published reports of stability of child language in such diverse samples have appeared, exposing significant gaps in the literature regarding a basic tenet of development, stability, of a basic child skill, language, in the face of risk. The extant language literature is largely circumscribed to investigations of short-term stability in individual language measures in small homogeneous normative samples; long-term longitudinal multivariate data are needed with larger and more diverse risk samples of children to open a window on language stability in childhood.

Method

Participants

This report uses data from the U.S. national Early Head Start Research and Evaluation study (EHSRE; U.S. Department of Health and Human Services, Administration for Children and Families, 2011), designed to evaluate the impacts of 17 Early Head Start (EHS; see Supporting Information) programs across the United States (ACF, 2002a; Love et. al., 2005). To be eligible for enrollment in the EHSRE, families had to meet the program's income guidelines, agree to random assignment, and be expecting a child or have a child under 12 months of age. The final EHSRE datasets were composed of 2977 families. Of them, we included European American and African American children from English-speaking households who provided language data at any of 4 waves. (For inclusion criteria see Supporting Information). Altogether, 1780 children provided data. On average, children were 15.03 months (SD=1.78, n=1536), 25.09 months (SD=1.94, n=1430), 5.27 years (SD=0.33, n=1238), and 11.07 years (SD=0.32, n=1051) old at the 4 assessment waves. Applicants to the EHSRE were biological mothers (99.4% at baseline) and averaged 21.80 years (SD=5.28) at the child's birth.

Procedures, child language measures, and covariates

Child language data derived from parent interviews and child and family assessments (videorecorded in-home observations and direct child tests by center-trained administrators). The EHSRE technical report includes informed consent procedures and descriptions and psychometric information for all measures (ACF, 2002a&b; details in the Supporting Information). At 15 months, mothers reported on children's early gestures, vocabulary comprehension, and vocabulary production using the MacArthur Communicative Development Inventory-Words and Gestures (CDI-W&G; Fenson et al., 2000). At 25 months, mothers reported on children's vocabulary production and sentence complexity using the MacArthur Communicative Development Inventory-Words and Sentences (CDI-W&S; Fenson et al., 2000), and the Bayley Scales of Infant Development, Second Edition (BSID-II; Bayley, 1993) was administered (a 12-item language factor that assesses receptive vocabulary, syntax, and conversational skills was used; U.S. DHHS, 2001). At 5 years, the Peabody Picture Vocabulary Test, Third Edition (PPVT–III; Dunn & Dunn, 1997) and the Letter–Word Identification subtest in the Woodcock-Johnson III (Woodcock, McGrew, & Mather, 2001) measured receptive vocabulary and word identification and reading, respectively. At 11 years, the PPVT–III and the Early Childhood Longitudinal Study, Kindergarten Cohort (ECLS-K) tests measured receptive vocabulary, and academic language skill and metalinguistic awareness, respectively.

Based on an extensive body of research on constructs associated with child language, and to guard against threats to validity, we controlled for five prominent constructs that might affect child language stability separate from our moderators of interest: children's nonverbal intelligence (using two age-appropriate measures) and social competence (using an observational measure at 15 months), maternal education and language (using the picture vocabulary subtest of the Woodcock-Johnson Tests of Achievement; Woodcock & Johnson, 1990), and the family home environment (using the 15-month Home Observation for

Measurement of the Environment total score; Caldwell & Bradley, 2003). (Justifications and details appear in the Supporting Information).

Results

Preliminary Analyses and the Analytic Plan appear in the Supporting Information.

Language stability from 15 months to 11 years

Descriptive statistics—Table S1 see Supporting Information) shows the *M*s, *SD*s, and ranges as well as the pairwise correlation matrix of the language measures for the total sample. The standard deviations and ranges of all language measures indicate considerable variation, as is common in the literature and prerequisite to assessments of stability.

Language stability—We assessed the fit of a structural model to the data to assess the common convergence of multiple measures on single latent variables of child core language skill at 15 and 25 months and 5 and 11 years, and the stability between those latent variables. The a priori model fit the data well: $\chi^2(32)=173.58$, $p<.001$, CFI=1.00, SRMR=.05, RMSEA=.01, 90% CI [.00, .02]. Figure 1 presents the standardized solution of this stability model. Language stability was large between succeeding waves, and, despite the wider time spans between successive waves as the children got older, stability was larger at older ages: The stability estimate (standardized regression coefficients in Figure 1) from 5 years to 11 years (.88) exceeded estimates from 15 to 25 months (.65), $\Delta\chi^2(1)=8.05$, $p<.01$, and 25 months to 5 years (.50), $\Delta\chi^2(1)=158.64$, $p<.001$, whose stability estimates did not differ, $\Delta\chi^2(1)=3.51$, *ns*. The standardized estimate of language stability from 15 months to 11 years, with indirect effects mediated by interim language factors, was .29, $p<.001$. There was large stability between each successive wave and medium stability from infancy to early adolescence.

Language stability, controlling for covariates—As a check against threats to validity, we re-evaluated the stability model adding child nonverbal intelligence and social competence, maternal education and language, and the family home environment as exogenous variables to the SEM. Direct paths from child social competence, maternal education and language, and the family home environment to all core language variables, and paths from 25-month nonverbal intelligence to 25-month and 5- and 11-year language, and from 11-year nonverbal intelligence to 11-year language, as well as the stability path from 25-month to 11-year child nonverbal intelligence were added to the stability model. Figure 2 shows this covariate model which fit the data well: $\chi^2(80)=640.25$, $p<.001$, CFI=1.00, SRMR=.09, RMSEA=.00, 90% CI [.000, .004]. The stability estimates of core language skill were large between successive waves (but stability between 25 months and 5 years attenuated from .50 in the stability model to .30 in the covariate model), and the standardized estimate of core language skill stability from 15 months to 11 years, with indirect effects mediated by interim language factors, was .14, $p<.001$, controlling for five constructs.

Moderation of core language stability by biological and social risks to children

Configural invariance—In preliminary multiple-group analyses for moderators of stability, the configural invariance model fit the data across biological risk and the social risks of welfare status, teen motherhood, ethnicity, gender, and birth order, suggesting that the same "model form" (Bollen, 1989) could be applied to all and that more restrictive tests were appropriate. Table 1 displays fit statistics and χ^2 difference test statistics for multiple-group comparisons.

Metric invariance—The difference in χ^2 statistics of the two nested models testing metric invariance was not significant across biological risk, welfare status, teen motherhood, and birth-order (Table 1). Full metric invariance was established, suggesting that all four language factors were similar constructs for children who had one or more health risks vs. who had no risk, children whose family received welfare vs. those whose did not, children of teen vs. adult mothers, and laterborns vs. firstborns.

For ethnic groups, full metric invariance was established for 25-month and 5- and 11-year language factors, but partial metric invariance (Byrne, Shavelson, & Muthén, 1989) was indicated for the 15-month language factor across ethnic groups. For girls and boys, full metric invariance was established for 15-month and 5- and 11-year language factors, but partial metric invariance was indicated for the 25-month language factor across child gender. In both cases, the loadings that differed were large and significant in both groups (see Supporting Information).

Stability invariance—We compared a model with constrained (or partially constrained) factor loadings to a model with constrained (or partially constrained) factor loadings and stability estimates to test differences in stability estimates in the uncontrolled and covariate stability models. The difference in χ^2 statistics of the two nested models was not significant across biological risk, welfare status, teen motherhood, child gender, and birth order in either the uncontrolled or covariate stability models (Table 1) demonstrating that stability coefficients were similar for children who had one or more health risks and those who had no risk, children whose family received welfare and those whose did not, children of teen mothers and adult mothers, boys and girls, and laterborns and firstborns, even accounting for child nonverbal intelligence and social competence, maternal education and language, and the family home environment. However, in both the uncontrolled and covariate stability models, stability from 15 to 25 months was slightly stronger in European American than African American children (see Supporting Information), but both stability coefficients were large (>.60) and significant, suggesting that the ethnicity difference was not practically meaningful.

Changes in family income and maternal education—All children in this study (by definition) came from low-income families, but over the decade of the study some families changed in poverty status whereas others did not, and some caregivers changed in educational accomplishments whereas others did not. Families who improved their income or education might be better equipped to advance their children's language over time, thereby improving their rank order and disrupting stability. We addressed whether changes in income (remaining poor vs. improving vs. staying above the poverty line) and maternal education (stable vs. improved) moderated stability. All groups showed robust stability, and multiple-group analysis indicated no group differences in stability (model details in Supporting Information).

Discussion

Language skills in early childhood are keys to performance in a variety of domains in later development due to their direct role in cognition and their spread to behavioral adjustment. This study addressed several under-researched issues related to stability of individual differences in core language skill across early childhood. We estimated comparative longitudinal stabilities for children at different biological and social risks with several measures of language at 15 and 25 months and 5 and 11 years; we also tested whether a diverse set of controls for third variables and background characteristics accounted for stability in child language between infancy and adolescence. Clear evidence emerged for individual variation in a core language skill at each of the 4 ages and for the convergence of multiple developmentally appropriate indexes of language at each age on latent variables representing core language skill. Latent variables present certain advantages: as multimeasure, multivariate, multisource data take more different aspects of language into account their shared latent variable provides a more comprehensive and therefore richer picture of language; variance uniquely associated with rater bias, random measurement error, or specific error (error variance arising from some characteristic unique to a particular indicator that was not accounted for by the factor) is relegated to the residual term of the latent variable allowing more stable and more accurate estimates of a core skill; latent variables are therefore purer representations of constructs, so relations among constructs can be assessed with greater precision; and with respect to stability, language at different ages manifests differently, but latent variables at each age can have different age-appropriate indicators and different loadings for the same indicators, so using latent variables allows the measurement of core language skill to vary (appropriately) across time (as the construct does) but keeps comparability of the construct that is requisite to stability assessment.

Our analyses unveiled long-term stability of individual variation in core language skill across 10 years of childhood in children at diverse health risks (e.g., birth defects, illnesses, and syndromes as well as maternal substance abuse) and in low-SES samples who received welfare, children of teen and adult mothers, girls and boys, firstborns and laterborns, and European American and African American children, as well as across changes in family income and maternal education. Core language skill was also stable in the long-term, independent of child nonverbal intelligence and social competence, maternal education and language, and family home environment. The fact that stability of core language skill across childhood transcended these several heterogeneous moderating factors points to a highly conserved and robust individual-differences characteristic and suggests that the mechanism(s) underlying stability of core language skill are likely shared by children with widely varying characteristics.

Stability coefficients for core language skill were all large between successive ages, even when separated by up to 6 years. However, the long-term stability (indirect effect) of core language skill from 15 months to 11 years was medium in uncontrolled models (and small in controlled models). It is tempting to discount small effects as unimportant or uninfluential, but developmentally even small early effects are commonly acknowledged to aggregate into large and meaningful later repercussions (Abelson, 1985; Bornstein, 2014). Furthermore, the measures, reporters, and contexts for language sampling at the different ages differed. From one point of view, this procedural variation undercuts stability, as methodological variation likely attenuates correlation; from another, the findings are conservative and likely underestimate true stability. Heterotypic stability between different individual indexes of child language may represent lower-bound estimates of stability of individual variation because of the variance introduced by differences in assessment measures and procedures used at different times; however, homotypic stability of the common latent variable may more closely approximate true stability in language development.

In the balance of this discussion before concluding, we briefly address three additional issues raised by our findings: child age as a moderator of developmental stability, individual differences, and the implications of stability in child language for child psychology and psychiatry.

Generally, infancy and early childhood are thought to be less stable or predictive periods in life, and people are thought to become increasingly consistent in relation to one another as they age (Roberts & Del Vecchio, 2000; Sternberg et al., 2001). In our study as children aged past 5 years there was more stability (less inconsistency) in language; that is, stability from 5 to 11 years was large (.88), whereas the .65 coefficient between 15 and 25 months and the .50 coefficient between 25 months and 5 years imply that 58% and 75%, respectively, of the variance in the later core language skill were not explained by the earlier core language skill. It could be that core language skill is more malleable at earlier ages, underscoring the importance of promoting multiple aspects of the language environment before formal schooling as a means to supporting positive language development and its sequelae. Furthermore, maximizing the influence of factors that motivate language development early in life may prove advantageous in improving many other domains of development. However, there were no differences in stability for children who received early head start and those who did not (see Supporting Information), or for those whose family circumstances improved and those whose did not. This pattern of results has implications for what sorts of remediation might be helpful at what intensities.

Individual differences in core language skill were present by 15 months of age, and so relatively stable individual differences in child language seem to be established before the end of the second year of life. These stability coefficients might in turn mislead researchers and practitioners to conclude that language skill in children is set by 15 months. This is not necessarily the case. First, focusing solely on stability overlooks or minimizes changes in mean level of language. Stability of individual differences is mathematically independent of group mean-level consistency or change (Bornstein & Bornstein, 2008), and all children normally increase dramatically in their language skills even if they remain stable relative to one another. Second, the language skills of individual children relative to their peers still change across time: Even large relative stability leaves substantial common variance unaccounted for. Our largest stability estimate (.88) from 5 to 11 years leaves 22% of the variance in 11-year core language skill unexplained by 5-year core language skill. To be stable does not mean to be immutable to change, experience, or intervention, and language is ultimately modifiable and plastic. Children can change in relative standing with respect to their language, just as they do more evidently in their mean level, as they grow.

Language skills are associated with and predict attention, regulation, and behavioral adjustment (Yew & O'Kearney, 2013). For example, language in the form of private (self-directed) speech fosters problem solving, self-regulation, and psychosocial adaptation (Luria, 1961; Vygotsky, 1962). Tight binding of language skill with socioemotional symptomatology suggests that interventions aimed at improving child language may also promote other domains of psychological well-being (Wassenberg et al., 2008). Thus, individual differences in language skill merit closer clinical attention.

Strengths, limitations, and future directions

This study has notable strengths including its large sample size, longitudinal design over 4 developmental waves from the end of infancy to the start of adolescence, and use of multiple different language measures from different language domains from different reporters, with foci on biological and social risks of diverse kinds and controls. However, the study was also limited by several factors. The 15-month language scales were all maternal report and derived from the same measure, so source variance may contribute to the 15-month core language factor. It is challenging to assess many aspects of language in very young children, and measurement of language at an early stage perforce cannot include all components of language (e.g., grammar). Nonetheless, our 15-month measures included nonverbal communicative gestures. Furthermore, the switch from a mostly maternal report at 25 months to an exclusively testing methodology at 5 years may partially explain the lower stability coefficient between those time points. Nonetheless, stability was still large despite attenuation due to this method variance. The models fit very well without accounting for shared method variance, but future research should test alternate models that include method factors (or correlated residual terms) that account for similar testing methodologies across time points (e.g., maternal report, experimenter assessment). Many measures we used assessed vocabulary, and the study might have benefitted from including a greater diversity of language domains. However, vocabulary is a key and pervasive component of child language skill, and extant research demonstrates good agreement between maternal report and other measures.

Future studies should examine, first, factors that give rise to individual variation in language skills, second, mechanisms underlying language stability, and third, the predictive validity of early language skill for cognition and for other developmental domains, such as behavioral adjustment. On the first line of future research, stability of language is a joint product of biology and experience (Harlaar, Trzaskowski, Dale, & Plomin, 2014; Hayiou-Thomas, Dale, & Plomin, 2012). Molecular and quantitative behavior genetics studies alike point to heritability in language (Dale, Dionne, Eley, & Plomin, 2000; Hart, Petrill, & Kamp Dush, 2010; Stromswold, 2006). In addition, positive, sensitive, and responsive parenting in infancy enriches language in early childhood (Bornstein & Tamis-LeMonda, 1989; Hardy-Brown, Plomin, & de Fries, 1981; Tamis-LeMonda & Bornstein, 2002; van IJzendoorn, Dijkstra, & Bus, 1995). Expectedly, Hayiou-Thomas et al. (2012) identified dynamic genetic/biological *and* environmental/experiential sources of individual differences in language skills in a 2- to 12-year longitudinal twin study.

On the second line of future work concerning the identification of mechanisms of action, research to date supports several complementary models. A biological model asserts that phenotypic manifestations of stability are driven in part at least by stable genetic factors (e.g., Harlaar et al., 2014); a systems model maintains that development in some domains is a hierarchic organization of abilities that become increasingly differentiated over time and that newly emerging abilities subsume and build on earlier appearing ones (e.g., Lewontin, 2005); and a mediation model contends that third variables (e.g., self-regulation) likely intervene between early language ability and later phenotypic variation (e.g., inattentive-hyperactive behavior problems; Petersen et al., 2015).

On the third line of future work, language appears to play a causal role in the emergence and development of internalizing and externalizing behavior problems (Lynam & Henry, 2001). A number of independent longitudinal studies support prospective associations between language skills and later behavior problems, even after taking into consideration children's nonverbal intellectual functioning and performance in other academic and intellectual domains and after controls for prior levels of behavior problems, gender, and ethnicity, maternal verbal intelligence, education, parenting knowledge, and social desirability bias, as well as family socioeconomic status (Bornstein et al., 2013; Petersen et al., 2013, 2015). Achieved language skills constitute a key criterion by which children are judged by others and by themselves, and more research is warranted about the consequences of language development for child cognitive, social, and behavioral functioning.

Conclusions

The common variance in multiple measures of language is robustly stable across childhood. This study adds to the literature by showing that children, regardless of biological or social risk, share a core language skill and some stability of that core language skill begins very early in life and transcends multiple moderation by risk, methodological variance, and conservative controls.

Our findings specifically suggest a number of implications for different stakeholders in young children's healthy mental and socioemotional development. For parents, the promotion of early positive development in language may foster children's verbal and cognitive development. For practitioners, the positive focus on language offers a valuable guidelight for fostering a child's positive developmental future.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Key points

- Heretofore, child language was shown to be stable in the short-term for individual variables in largely European American middle-class samples.
- Core language skill is also stable in low-income ethnically diverse children over the first decade of life.
- Significant and comparable stability coefficients are obtained for children with diverse biological and social risks.
- Stability in language is strong after accounting for child nonverbal intelligence and social competence, maternal education and language, and the family home environment.
- Findings suggest common mechanisms that maintain language stability in children at biological, economic, and social risk.

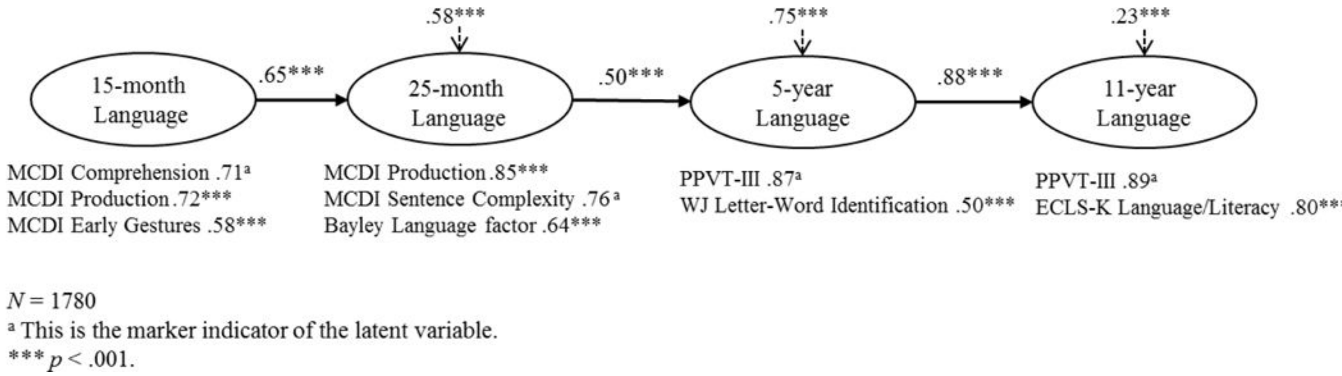

Figure 1.

Model of language stability from 15 months to 11 years. Numbers associated with single-headed arrows are standardized path coefficients; numbers associated with dashed single-headed arrows are disturbances, the amount of variance not accounted for by paths in the model. Indicators of each language latent variable are listed below the latent variable with their factor loadings.

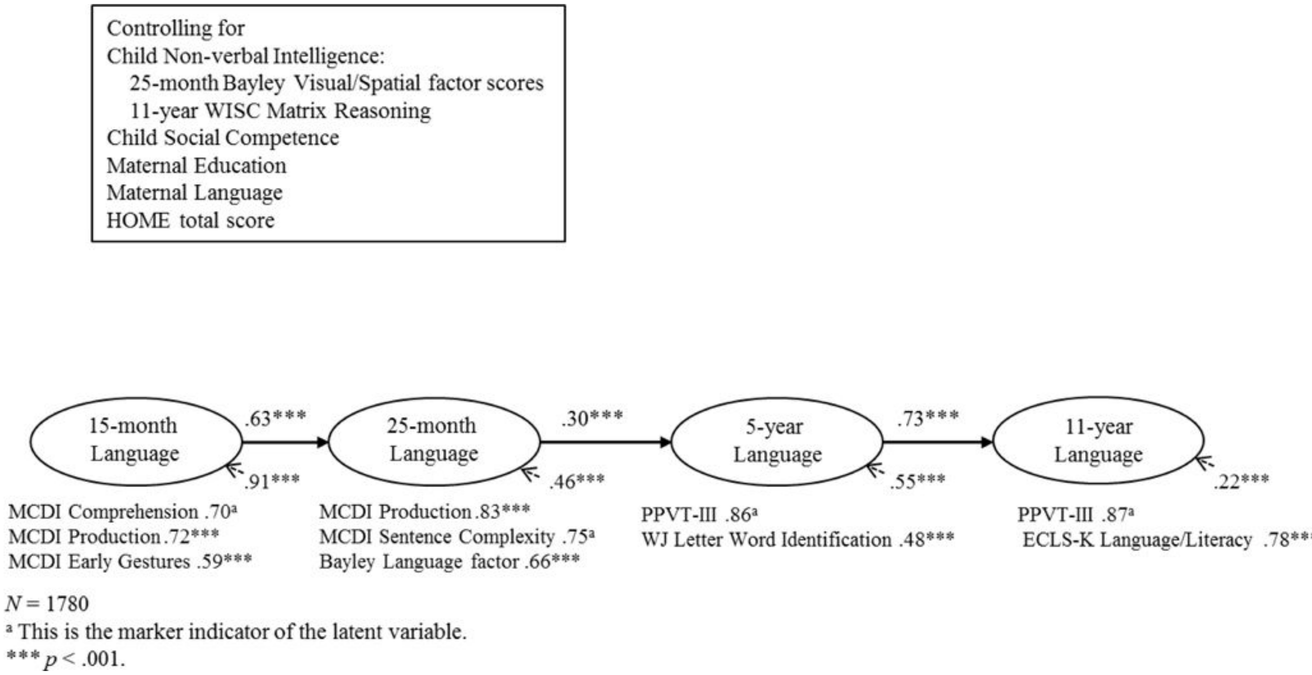

Figure 2.

Covariate model of language stability from 15 months to 11 years. Numbers associated with single-headed arrows are standardized path coefficients; numbers associated with dashed single-headed arrows are disturbances, the amount of variance not accounted for by paths in the model. Indicators of each language latent variable are listed below the latent variable with their factor loadings.

Table 1

Fit Statistics and Chi-Square Difference Test Results for Multiple-Group Comparisons

	Biological Risk Status: One or More vs. None	**Welfare Recipient: Recipients vs. Not Recipients**	**Teen Motherhood: Teen vs. Adult Mothers**	**Gender: Boys vs. Girls**	**Birth Order: Laterborns vs. Firstborns**	**Ethnicity: African Americans vs. European Americans**
Configural Model Fit Statistics						
$\chi^2(64)$	206.00	195.50	194.66	204.75	192.65	181.49
p-value	<.001	<.001	<.001	<.001	<.001	<.001
CFI	1.00	1.00	1.00	1.00	1.00	1.00
SRMR	.06	.05	.05	.05	.05	.04
RMSEA	.00	.00	.00	.00	.00	.00
Chi-Square Difference Test						
Metric Invariance Test						
$\Delta\chi^2(6)$	6.91	7.52	3.68	$\Delta\chi^2(5)=10.41$	3.54	$\Delta\chi^2(5)=9.17$
p-value	.33	.28	.72	.06	.74	.10
ΔCFI	.00	.00	.00	.00	.00	.00
Stability Invariance Test – Uncontrolled Model						
$\Delta\chi2(3)$	4.09	3.20	1.05	3.61	3.18	$\Delta\chi^2(2)=1.09$
p-value	.25	.36	.79	.31	.36	.48
ΔCFI	.00	.00	.00	.00	.00	.00
Stability Invariance Test – Covariate Model						
$\Delta\chi^2(3)$	3.08	1.02	1.11	0.64	5.18	$\Delta\chi^2(2)=4.49$
p-value	.38	.80	.78	.89	.16	.11
ΔCFI	.00	.00	.00	.00	.00	.00

Note. Configural invariance tests whether the same model form (pattern of loadings and paths) applies across groups. Metric invariance tests whether the language factors were similar constructs (had similar loadings) across groups. Stability invariance tests whether the stability coefficients were similar across groups.