The Home Observation for Measurement of the Environment Revisited

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This review describes the Home Observation for Measurement of the Environment (HOME). After describing the structure of the instrument, it shows how it has been used successfully in studies on normally developing children and on samples drawn from high-risk populations. These are followed by studies showing how the HOME has been used to evaluate interventions. Although most interventions are not designed primarily on the basis of the HOME outcomes, the instrument has been used as a measure of the effectiveness of the intervention schedule. HOME has been used extensively in research to reveal relationships between several aspects of the home environment and children's developmental outcomes. The very good relationship between HOME scores and children's measures of developmental competence has also been found in non-normative populations and research has attempted to identify the specific aspects of the home environment, as indexed by the HOME subscales that reveal the strengths or the weaknesses of homes of at-risk populations.

Keywords: HOME; observation; parenting assessment

What is the HOME?

Home Observation for Measurement of the Environment (HOME) is a descriptive profile which yields a systematic assessment of the caring environment in which the child is reared. The primary goal of the instrument is to measure, within a naturalistic context, the quality and quantity of stimulation and support available to a child in the home environment. Its focus is on the experience of the child in the home environment, the child as an active recipient of inputs from objects, events and transactions occurring in connection with the family surroundings (Bradley, 1993). It is intended to be used by practitioners, as well as researchers, and ideally it should be combined with information from individual assessments of the child in a context of a multimodal assessment procedure.

The present review aims to identify the ways HOME has been used by researchers and practitioners to describe children's family environment as it relates to their developmental outcomes or to interventions which have been implemented. Our aim is to identify the strengths and limitations of the instrument as they are revealed through numerous studies over the past thirty years, and describe the advantages of using the HOME for intervention purposes. This review is far from exhaustive of the literature as the vast number of studies conducted on HOME makes that impossible. Our intention is to summarise the evidence coming from research studies on the usefulness of the HOME in research, and then to explore its potential usefulness in clinical practice.

The initial version of HOME is the Infant-Toddler HOME (0-3). Information is obtained through observation and interview with the primary caregiver (usually the mother) of the child in the family home. Items are scored on the basis of information obtained from the answers to the questions of the semi-structured interview and from direct observation of the home environment by a trained assessor. All items are scored according to a manual that provides explanation of each item and some examples for scoring them. The child is physically present and active along with the caregiver during the interview in order to obtain immediate information about the patterns of interactions between the caregiver and the child. The whole assessment lasts approximately one hour.

The Infant Toddler-HOME (IT-HOME) is composed of 45 items that are presented as statements to be scored as YES or NO. Higher total HOME scores indicate a more enriched home environment, always in relation to the children's contextual and organismic features. Even though no cut-off points are specified in the manual, the range of scores falling in the top and bottom quarter and the middle half are reported on the Summary Sheets (Caldwell & Bradley, 2001). In general, scores falling in the lowest fourth of the score range indicate an environment that may pose a risk to some aspect of the child's development. An examination of the pattern of subscale scores within a family is also advisable. The items are designed to reflect six main dimensions. Table 1 contains information about the subscales and also gives some examples of the items scored. The next age group for whom HOME assesses the environment is 3- to 6-year-olds. The Early Childhood HOME (EC-HOME, Table 2) is made up of 55 items that are grouped in eight different subscales and are also scored in a binary manner (YES/NO). Two more versions of HOME have been developed for older children: the Middle Childhood HOME for children between 6 and 10 years and the Early Adolescence HOME for children between 10 to 15 years old.

HOME was first developed and used by Bettye Caldwell and her colleagues in a longitudinal study they

Table 1. The Infant-Toddler HOME inventory (ages 0 to 3)

Name of subscale	Description	Example item
Emotional and verbal responsivity of the primary caregiver (*items* 1–11)	The communicative and affective interactions between the caregiver and the child	Mother spontaneously vocalises to the child at least twice during visit
		Mother caresses or kisses child at least once during visit
Avoidance of restriction and punishment (*items* 12–19)	How the adult disciplines the child	Primary caregiver (PC) does not shout at child during visit
		PC does not express overt annoyance with or hostility about the child
Organisation of the physical and temporal environment (*items* 20–25)	How the child's time is organised outside the family house. What the child's personal space looks like	When PC is away, care is provided by one of three regular substitutes
		The child's play environment appears safe and free of hazards
Provision of appropriate play materials (*items* 26–34)	Presence of several types of toys available to the child and appropriate for his/her age	Child has one or more large muscle activity toys or pieces of equipment
		Provides equipment appropriate to age e.g. infant seat, infant rocker, playpen
Parental involvement with the child (*items* 35–40)	How the adult interacts physically with the child	PC tends to keep child within visual range and look at him/her often
		PC talks to child while doing her work
Opportunities for variety in daily stimulation (*items* 40–45)	The way the child's daily routine is designed to incorporate social meetings with people other than the mother	Father provides some care-giving everyday. Family visits or receives visits from relatives approximately once a month

Table 2. The Early Childhood HOME inventory (ages 3 to 6)

Name of subscale	Description	Example item
Learning materials (*items* 1–11)	Toys and activities directed towards the intellectual development of the child	Child has toys that teach colours, sizes and shapes
		Child has three or more puzzles
Language stimulation (*items* 12–18)	Verbal communication between child and caregiver that is intended to help language development	Child has toys that help teach names of animals. Child is encouraged to learn the alphabet
Physical environment (*items* 19–25)	The family house	Building appears safe and free of hazards. Outside play environment appears safe
Responsivity (*items* 26–32)	The verbal interactions between the caregiver and the child	Parent holds child close for 10-15 minutes per day. Parent converses with child at least twice during visit
Academic stimulation (*items* 33–37)	Encouragement of the child's intellectual development	Child is encouraged to learn colours
		Child is encouraged to learn patterned speech
Modelling (*items* 38–42)	Use of boundaries in the caregiver-child relationship	Some delay in food gratification is expected
		TV is used judiciously
Variety (*items* 43–51)	Indoors and outdoors activities of the child	Child has real or toy musical instrument
		Child is taken on outing by a family member at least every other week
Acceptance (*items* 52–55)	The way the caregiver disciplines the child	No more than one instance of physical punishment occurred during the past week
		Parent does not scold or yell at or derogate child more than once

conducted during the 1960s, which examined the relationship between home environments, day care and children's development (Elardo, Bradley, & Caldwell, 1975). At this time, theorists and practitioners had accepted that the home environment makes an independent and significant contribution to children's development. It had become clear that assessment of IQ or of language development (or any kind of cognitive assessment on its own) could not provide sufficient basis for the prediction of children's developmental

outcome. Three main factors led to the construction of the HOME: a) the realisation of the importance of the environment's contribution to the cognitive development of children, b) the inadequacy of the environmental measures used until then (mainly socio-economic status), and c) the need for a comprehensive environmental assessment when planning interventions (Bradley & Caldwell, 1984).

The HOME profile approaches child development through the 'ecological systems' theory developed by

Bronfenbrenner which places the developing individual in a context of interdependent environmental systems of differential impact. The assessment procedure of the HOME draws information on the 'dyad' of the child and the primary caregiver, which is seen as the fundamental building block of the 'microsystem' and upon which the formation of larger interpersonal structures is based (Bronfenbrenner, 1979).

The items that compose the instrument were first chosen on the basis of empirical evidence and then validated by testing in practice. The items have not been modified over the years but within the subscales they have been re-ordered, so that all observation items are grouped together, all interview items are together and all mixed items together. The latest Administration and Scoring manual was published in 2001 (Caldwell & Bradley, 2001) containing the administration instructions and revised information on the psychometric properties of the instrument.

More than 20 years ago, Antony Cox started conducting research using the HOME inventory in the UK in cooperation with Michael Rutter and his research team. In the UK the instrument has maintained exactly the same item structure and wording as in the US but Cox has improved the administration manual to incorporate detailed schedules for interviewing. These were designed to help primarily the newly trained interviewers by providing a structured framework for the conduct of the assessment. However, Cox advises interviewers to develop a more flexible approach to the interview as soon as they have acquired substantial experience in the administration of the instrument (Cox, 2002).

The HOME Training Pack is commissioned in the UK by the Department of Health. The Department of Health has attempted to set a framework for assessing the child in the home environment by making a distinction between the child's developmental needs, the familial and environmental factors and the parenting capacity. These three domains can be visualised as the three

sides of a triangle that emphasize both the independence of each dimension and the interactions taking place among them to influence the child's developmental outcome (Figure 1). In this context of practice, the Department of Health is proposing that the HOME can be used to assess these three main areas, always keeping in mind that the focus is being placed on the child's experience and the extent to which this experience meets the child's developmental needs.

HOME used in research on children developing normally

A very large part of the literature on HOME consists of studies that used samples drawn from the normal population to explore relationships between aspects of the home environment and the children's cognitive, emotional and social development. Research is oriented towards testing more sophisticated ecological models where both direct and indirect environmental influences are included in order to account for the interaction of the developing child with the environment.

HOME as a predictor of cognitive development

One of the stronger advantages of HOME is the substantial correlation it has with cognitive measures. This is firm validation that the instrument measures factors in homes which stimulate thinking and learning. It is a general finding that HOME scores obtained after the age of 2 years have better correlations with mental test scores than the correlations between very early HOME scores (at 6 or 12 months) and cognitive assessments conducted throughout infancy and childhood (Elardo et al., 1975; Bradley & Caldwell, 1976; Bradley & Caldwell, 1979; Bradley, Caldwell & Rock, 1988).

When exploring the relationship between socio-economic status (SES) measures and HOME scores, the
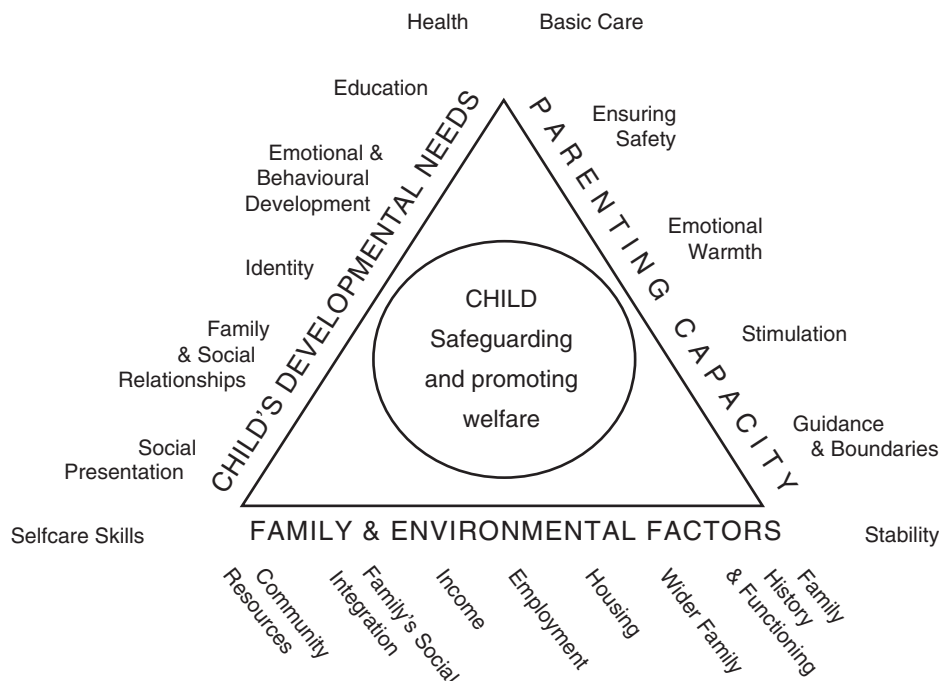

Figure 1. The Assessment Framework developed by the Department of Health (2000)

two indices are moderately associated with one another; they can however independently predict cognitive development (Bradley et al., 1989; Bradley, 1993; Molfese, DiLalla, & Bunce, 1997; Johnson et al., 1993). There are also some indications that HOME scores mediate the relationship between parental IQ and child IQ. Luster and Dubow (1992) found that in preschool children the HOME scores and the maternal IQ measures made independent but equally significant contributions to the prediction of the children's cognitive competence whereas during the school years maternal IQ provides a better prediction than do the HOME scores. The reason for this latter finding could well be the lack of control for the quality of school variable from the study, as school becomes an environment of increasing importance in the child's life, aiming to enhance the child's cognitive performance.

Another interesting dimension in the relationship between HOME scores and intelligence was revealed by the Colorado Adoption Project, a longitudinal sibling adoption study that studied adoptive and nonadoptive siblings in an attempt to distinguish between environmental and genetic effects in the HOME scores. Larger correlation coefficients were found between the HOME scores of nonadoptive siblings both at 12 and 24 months than for adoptive siblings, suggesting that the HOME scores obtained were partly explained by genetic effects (Plomin, 1994; Saudino & Plomin, 1997). More specific analyses suggested that about 40% in the HOME variance can be attributable to genetic effects. The importance of this finding is that because the HOME inventory is an objective measure of the home environment, the presence of genetic effects in the HOME scores suggests that the genetic influences exerted in the familial environment are explained by caring behaviours related to the genes of the parent(s).

The relationship between HOME scores and the child's mental test scores is far from straightforward. Large-scale longitudinal research, much of which is under way, may enable more precise explanations on the relationship between the child's home environment and cognitive development.

HOME as a predictor of attachment status
Maternal sensitivity and responsiveness to the child are two composite measures comprising items of the IT and the EC-HOME. These were shown by the National Longitudinal Survey of Youth (NICHD) study to relate to parental behaviour in relation to the attachment patterns expressed by infants at 36 months. It was found that mothers who exhibited more sensitivity and responsiveness on the HOME were more likely to have securely attached children than children who were insecure-controlling or insecure other (according to the MacArthur system of attachment status) and also more likely to have insecure-avoidant children than insecure-controlling or insecure other (NICHD Early Child Care Research Network, 2001). Maternal sensitivity as measured on the HOME was a strong predictor of the child's attachment pattern along with income and child gender, controlling for a number of other factors (maternal education, maternal separation anxiety, maternal depression, two-parent status, hours per week in child care, number of child care arrangements, age of child at entry in child care and quality of childcare).

Ethnic differences in HOME profiles
In a large US longitudinal study across three different ethnic groups – white Americans, black Americans and Mexican Americans - Bradley and his colleagues (1989) concluded that the relationships between HOME scores, social status and cognitive measures were not the same across the three groups. The correlations between HOME scores and cognitive development are generally higher for whites and lower for blacks and almost non-existent for Mexican Americans. This means that the HOME is more sensitive to facets of the caring environment of white families, although it is *still* significantly related to development of children in non-white groups. A general trend found in this study is that correlations between HOME scores and cognitive test scores increase during the second year of life and stabilise thereafter. As far as social class is concerned, the correlations between the 3-year HOME scores and maternal education and family occupation were low for the lower class, small for the lower middle class and moderate for the middle class (.3 to .5). The correlations between the 3-year HOME scores and children's cognitive test scores were lower for the disadvantaged groups (maximum .34) but for more advantaged social groups they were higher (up to .6). One of the conclusions of this large longitudinal study in the US with children from birth to 13 years was that the effects of poverty on the home environment are more pronounced than are the effects of belonging to a particular ethnic group (Bradley et al., 2001). In all three ethnic groups, both in poor and in non-poor families and at almost every age, learning stimulation (a composite subscale of HOME) was significantly associated with early motor and social development, language competence and behaviour problems, controlling for maternal education, child's age and household size (Bradley et al., 2001).

In a review of the use of HOME outside the US Bradley and his colleagues (1996) present findings from countries in northern Europe, Latin America, Asia and Africa, as well as Australia and Israel. There is not one single conclusion that can be reached about the way the HOME inventory can be used in these varying contexts, because research designs are not comparable. The HOME scores relate differently to children's development in each different context, and differ also in terms of distribution properties and psychometric properties, mainly because the instrument reflects a western theoretical background and has been normed on middle class samples, thus relating more to a western-type middle class family setting.

Does the HOME work for at-risk populations?

In an attempt to extend the findings of the impact of the home environment on development to non-normative populations, or to populations different from the samples used for the standardisation of the inventory, researchers have studied the caring environments of pre-term infants, infants from poor families or generally children growing up in high-risk environments.

Disability and poverty
Poverty and mothers' learning disability are two risk factors for children's developmental delays. The

IT-HOME can detect significant differences in the home environments of poor mothers and poor mothers with mental retardation (of non-organic type), either as a total IT-HOME score or as the scores on the responsivity and involvement subscales (Keltner, 1994). When it comes to prevention of mental disability in children, it was shown many years ago that the IT-HOME can successfully discriminate between children at high-risk for learning difficulties and children from the general population (Ramey et al., 1975). Even the 6-month HOME scores have been shown to successfully discriminate between three levels of intelligence at the age of 3 years: low, low to average and average to superior (Bradley & Caldwell, 1977). Coons and Frankenburg (1982) report developing shorter forms for both the IT and the EC-HOME called HOME Screening Questionnaire (HSQ). They suggest that HSQ can be useful in screening the home environment for identifying environmentally-caused learning difficulties.

Medical problems
HOME can be useful in identifying aspects of the home environment that place medically fragile children (with or without neurological problems) at risk for later cognitive problems, even as early as 6 and 12 months of age, thus HOME can be used in clinical practice to guide interventions for these populations (Holditch-Davis et al., 2000). It was found however that two of the IT-HOME subscales, organization of the environment and avoidance of restriction, performed differently than in the general population; therefore the researchers suggested that it is more appropriate to use the total HOME scores and not the subscale scores when assessing the environments of medically fragile infants.

Maternal psychopathology
The mother's psychiatric diagnosis influences the quality of the home environment and these influences are reflected in significantly different HOME scores among depressed, schizophrenic and well mothers in a study conducted by Goodman and Brumley (1990). In general (total IT and EC HOME scores), schizophrenic mothers provide the lowest quality of home experiences compared to the well mothers, with the depressed falling somewhere in between. More specifically, it is the maternal responsiveness subscale and the provision of play stimulation subscale that can tap these differences in the quality of the rearing environment. The only dimension of HOME where depressed mothers scored significantly more than both other groups was avoidance of punishment and discipline. None of the HOME subscales or the total HOME scores was significantly related to the children's IQ but the subscale avoidance of punishment and discipline had a small though significant negative effect on psychomotor development in children. Maternal responsiveness was significantly related to the children's social functioning.

Parental substance abuse
In the studies conducted so far the HOME inventory has not managed to detect any significant relationship between parental substance abuse and the cognitive development of the children raised in these environments. Howard and her colleagues (1995) did not find any significant associations between 6-month HOME

scores and the 6-month Bayley MDI scores of infants born to cocaine-abusing mothers. The authors were puzzled by the discrepancy between their findings and the findings from studies with nonsubstance-abusing families and attributed the results to the diminished sensitivity of the scoring system of the HOME (e.g. a mother who smacks a child once in a week receives the same score as a mother who repeatedly smacks). Beckwith (1996) also notes that HOME may be less sensitive to individual differences for some samples of infants exposed to substance-abusing mothers. (see also Rodning, Beckwith, & Howard, 1991).

Azuma and Chasnoff (1993) compared 3-year-old children exposed prenatally to cocaine and other drugs to children exposed to drugs other than cocaine (tobacco, alcohol, marijuana etc.) and also to matched control children using the HOME Screening Questionnaire mentioned above. It was found that the mean home score did not differ among the three groups but in all three groups the mean score was in the at-risk range. A subsequent path analysis suggested that the home environment, as assessed by the HOME Screening Questionnaire (HSQ), is a mediator in the relationship between intrauterine drug exposure and intelligence measures at 3 years, along with head circumference and level of perseverance. Jacobson and colleagues (1993) found a loose association between the 12-month HOME and the Bayley MDI in infants prenatally exposed to alcohol and no associations at all between HOME scores and measures of visual recognition memory and the ability to transfer information across modalities, concluding that moderate to heavy exposure to alcohol in uterus does not adversely affect these abilities. Although HOME has not managed to pick up directly any effects on cognition from prenatal drug exposure, there is an indication that it can tap effects of postnatal exposure to substance-abusing parent behaviour and the subsequent parental psychopathology: sons of alcoholic fathers were compared to sons of non-alcoholic fathers living in the same neighbourhood and it was found that the HOME scores in the families of both groups significantly related to the children's overall measures of cognitive and motor abilities and personal/social development measures (Noll et al., 1992). Extreme behavioural problems associated with maternal smoking both during and after pregnancy are also independently associated with low HOME scores (HOME Short-Form, Weitzman, Gortmaker, & Sobol, 1992).

Pre-term infants
The ability of the HOME inventory to independently predict the developmental outcomes of premature infants has been studied extensively and it has been concluded that the HOME scores interact with the medical status of the children (Bradley & Casey, 1992); the fewer postnatal medical problems accompany a premature infant, the more the HOME scores of pre-term infants resemble the ones obtained from children in the normal population. HOME is an independent predictor of the cognitive scores of pre-term low and very low birthweight infants especially after the age of 2 (Weisglas-Kuperus et al., 1993; Molfese et al., 1996) and a significant mediator in the relationship between maternal IQ and child IQ after the age of 3 (Bradley

et al., 1993). The HOME scores are also associated with children's behaviour problems, which have usually been measured through parental reports, (Benasich & Brooks-Gunn, 1996; Koniak-Griffin & Verzemnieks, 1995). Furthermore, it has been shown that the caring environment, as assessed by the HOME, exerts a direct influence on the parents' reports of behaviour problems whereas it affects clinicians' reports only indirectly, through the modest direct relationship it has with cognitive development across time (Weisglas-Kuperus et al., 1993).

Poverty

The HOME scores of children coming from poor families are significantly different from those of children from non-poor families. Significant differences related to poverty have been found in the composite subscales from the EC-HOME: learning environment, the physical environment and parental warmth (premature toddlers; Brooks-Gunn, Klebanov, & Liaw, 1995) and also in the EC composite subscales: intellectual stimulation and emotional support (Zill et al., 1995). This latter finding comes from the large longitudinal NLSY study that compared poor families receiving welfare allowances to non-poor families and concluded that about one third of the preschool, age 3 to 5, children received emotional support and intellectual stimulation from their parents (as measured by the EC-HOME composite subscales) on a level that was comparable to that received by most families that were not poor or welfare dependent. However, the learning dimension of the home environment tends to higher scores when the family income improves as opposed to when the discontinuation of the welfare is not accompanied by a change in poverty status (Smith et al., 2001). The more time a family was receiving welfare support the lower was the HOME learning subscale score when the child was 3 years old but this negative association disappeared when there was control for family, child and parent characteristics.

Use of the HOME for evaluating interventions (pre and post)

HOME is being used to measure the change in the family environment and in the quality of parenting that is brought about by intervention programmes. The context in which HOME has been used to assess intervention programmes is mainly in health services. Interventions targeting children at risk (preterm infants, children reared in poverty, etc.) and/or their parents usually lead to a change in some aspects of the caring environment and, as a consequence, to certain developmental gains in children.

The interventions discussed below include both home- and centre-based programmes, aiming mainly to enhance the interactional style between parent and infant or aiming to promote the infant's cognitive development through creating a more stimulating learning environment in the child's home.

Targeting cognitive development

Martin, Ramey and Ramey (1990) implemented a centre-based intervention programme for children of impoverished multi-problem families, who were at risk of learning difficulties. The programme was an educational day care programme that randomly selected experimental children entering between 6 and 12 weeks after birth. Children were followed and assessed from birth to 54 months of age and it was found that the intervention children profited considerably from their participation in the programme but at the same time the home environment affected cognitive development independently of any gains produced by the centre-based programme; the effects of a more stimulating home environment were positive at all time points and increased over time. Although the authors do not provide effect size measures, the findings they report suggest a significant main effect of HOME on performance. It is reported that at the final assessment at 54 months children coming from highly stimulating homes averaged an IQ score of 7.9 points higher than that of children from less stimulating homes, controlling for the effects of educational day care and IQ. Gains in cognitive performance were reported by another educational day care intervention as well (project CARE; Wasik et al., 1990) that targeted children growing up in poverty at high-risk for learning difficulties recruited at birth. The programme lasted for 18 months and compared the educational day care group to a group that was receiving the intervention in the family house and to a control group that did not receive any intervention at all. The cognitive gains were reported for the group in the educational day care program whereas the family education program did not manage to affect the home environment, as it was measured by the HOME (6 measurements from 6-months to 54 months) or to change parents' attitudes. In this study, use of the HOME showed that the child's caring environment had not been changed by the home-based intervention, thus explaining why the children's developmental scores in this group did not improve.

Metzl (1980) developed an intervention programme focusing on language stimulation of full-term healthy infants coming from middle-class families. She found that the cognitive test scores of all groups of children increased over time and at the same time there was a significant change in the home environment, as assessed by HOME, both when the intervention was administered to the mother only and when it was administered to the mother and father together. Once again, using the HOME in intervention studies such as this provides an explanatory mechanism for addressing the improvement in children's developmental outcomes.

Fostering parent-infant relationships

Roman and her colleagues (1995) developed an intervention to assist parents whose first child was born prematurely. It was a nurse-managed intervention administered both in the home and in the hospital, where 'veteran' parents of pre-term infants offered emotional, informational and appraisal support to first-time parents. It was found that mothers who participated in the intervention, when compared to a comparison group, had higher scores on the HOME total score, the Responsivity and the Organisation subscale at 12 months postpartum. An attempt was made to extend the facilitative effects of interventions on pre-term infants to full-term healthy infants and it

was concluded that an enrichment of the infant's environment (in terms of sensory stimulation) during the first three months of his/her life does not affect cognitive, emotional and linguistic development, or the quality of the home environment, as it is assessed by HOME at 24 months, suggesting that interventions on full-term healthy infants coming from middle class homes have little to add to adequate childrearing practices (Koniak-Griffin, Ludington-Hoe, & Verzemnieks, 1995). It has to be noted though that a serious limitation of both the above studies is that they administered the HOME only after the intervention was completed, relying only on comparison of mean scores (post-tests) to draw any conclusions about the effects of the intervention on the caring environment.

Combination of programmes
An intervention aimed at low birth-weight infants compared two types of treatments: a home-based intervention aimed primarily to improve the quality of mother-infant interaction with a home-based intervention aimed mainly to improve the infant's developmental level of functioning (Barrera, Rosenbaum, & Cunningham, 1986). Both interventions lasted for a whole year starting at birth. It was concluded that both types of intervention succeeded in raising the child's developmental outcomes when compared to full-term control subjects. However, only the parent-infant intervention strategy led to marked changes in the home environment (as measured by HOME at 4, 8, 12 and 16 months), some behavioural changes and modest changes in infants' cognitive development. Thus, the programme aimed at changes in parenting behaviours was shown to be more effective than the one aimed solely at improving the child's developmental level.

Another home-based intervention combined the two types of contents on the same sample of teenage, lower-class black mothers of premature babies. These mothers received education on child-rearing practices and information on their infants' developmental milestones. They were also taught to use exercises and age-appropriate stimulation in order to facilitate sensorimotor and cognitive development of the infants. Finally, training the mothers to develop communicative skills facilitated the mother-infant interactions. The intervention group was then compared to teenage mothers of full-term babies and adult mothers of both full-term and pre-term babies and it was found that the HOME scores of the intervention mothers were higher and they rated their children as having easier temperament than the control teenage mothers of full-term infants (Field et al., 1980). The specific HOME subscales sensitive to the intervention were the emotional and verbal responsivity and maternal involvement with the child.

The Infant Health and Development Program-IHDP (Brooks-Gunn et al., 1995) combined home visits, centre-based educational programme and parent support groups. This complex intervention targeted at families of children who were extremely disadvantaged: low birth-weight pre-term infants born to poor families with a multiple number of risk factors. The treatment content focused both on improving the cognitive stimulation provided by the parents to the infant and on helping the parents manage self-identified problems. The intervention started as soon as the baby left the neonatal nursery and ended at 36 months of age. At that age the EC-HOME was administered and it showed that the intervention affected significantly the home learning environment of both poor and non-poor homes, although the families that profited mostly by this program were the non-poor families who had many risk factors. The intervention did not affect the home physical environment and maternal warmth. The reasons for not affecting the physical environment seem straightforward but the lack of effect on maternal warmth was unexpected and the authors attributed it to the diminished sensitivity of this composite HOME subscale. The clear message emerging from this study was that interventions that target poverty and home stimulation should focus primarily on improving parenting training.

Data from the same sample (IHDP) were used to assess whether this multifaceted intervention program affected the incidence of failure to thrive (FTT). The results suggested that although the programme did not manage to decrease the incidence of FTT in the intervention group as compared to the control group there were again some indications that the intervention had an effect on the 3-year IQ and HOME scores, after controlling for other effects (Casey et al., 1994).

The Early Head Start programme is a large scale intervention using a combination of approaches, aimed at improving the lives of low-income families (Love et al., 2002). Analysis of the outcomes when the children were 2 and 3 years-old, suggested Early Head Start had an overall positive impact on several developmental outcomes. HOME was one of the measures given at both time points to assess parenting behaviour and it was shown that parents receiving the programme showed significantly more warmth and provided more support for language and learning than did control parents.

Psychometric characteristics

The first study conducted to assess the psychometric properties of HOME suggested that there is a 90% agreement between observers and internal consistency ranges from moderate to strong (.44 to .89). Test-retest reliability was moderate for a period of 18 months. As for concurrent validity, small to moderate correlations were found between HOME and seven socioeconomic status variables: welfare status, maternal education, maternal occupation, presence of father in the house, paternal occupation and crowding in the home (Elardo et al., 1975). Since this initial study, several researchers have studied the psychometric properties of IT-HOME and it has been concluded that interobserver agreement has never fallen below .80 while the internal consistency of the total scores was found to be as high as .80 and internal consistency of the subscales ranged from .30 to 80 (Bradley, 1993).

The EC HOME was initially designed to be used as a screening instrument for children at risk of developmental problems. In a study conducted in 1979 by Bradley and Caldwell the psychometric properties of this version were explored after the scale had been shortened to include 55 items. Internal consistency was again estimated as split-half reliability (KR-20) and it ranged from .53 to .83 for the subscales while for the total scale it was .93. Test-retest reliability ranged from

.05 to .70 for both the subscales and the total scores over a period of 18 months. Agreement between raters reached 90%. In order to assess validity, correlation coefficients were computed between the HOME scores and five socioeconomic variables: maternal education, maternal occupation, paternal education, paternal occupation and the amount of crowding in the home. Maternal education, paternal education and crowding ratio were moderately correlated with the total HOME scores (.57, .47 and .47 respectively). The highest correlation was observed between stimulation through toys, games and materials and maternal education (.65).

More recent studies focus on a wide range of children and families (pre-term infants, poor children, low SES families, etc.) and composite subscales made up from the initial HOME items also report a very good level of interrater reliability (at least 90%) and adequate levels of internal consistency (ranging from moderate to high). Using a normative sample Saudino and Plomin (1997) report test-retest reliability at 12 months (two weeks time) to be .94 and stability over time (from 12 to 24 months) to be .64. Prodromidis and her colleagues (1995) report stability coefficients from 16 to 28 months to be .42, from 16 to 40 months .40 and from 28 to 40 months .50. Moderate levels of stability have been found with low income families: Shaw and Vondra (1995) found a mean stability from 12 to 24 months of .56 for the six subscales of IT HOME and .77 for the total HOME score. Holditch-Davis et al. (2000) validated HOME for use with medically fragile infants and found the internal consistency coefficients for the total HOME score to be .84 and .80 for the 6 and 12 month-old children (subscales ranging from .28 to 73 for the 6-month assessment and from .12 to .73 for the 12-month). They also calculated the correlations between every subscale and the total HOME score and these range from .58 to .80 for the 6-month HOME and from .32 to .80 for the 12-month HOME.

A factor analysis conducted relatively recently on the IT and EC HOME to test the instrument's fit with different sociocultural families of preterm infants concluded that for both whites and blacks the factor structures found are in agreement with the organisation of the items into subscales whereas the fit for Hispanics is less good (Bradley et al., 1994). This study is in line with other studies showing the robust psychometric properties of the HOME, especially for the cultures on which it was originally developed.

Research related to the validity of the HOME has already been presented throughout the paper, e.g. in the section referring to the concurrent and predictive relationship between HOME and cognitive development, HOME and SES, changes in HOME following intervention programmes, etc. More information about the criterion validity (concurrent and predictive) established with Caldwell and Bradley's initial standardisation samples can be found in the HOME manual (Caldwell & Bradley, 2001) and in a number of papers: Elardo et al., 1975; Bradley, 1982; Bradley & Caldwell, 1979, 1976, 1988; Bradley et al., 1988; Molfese et al., 1996 (data about the ability of HOME to predict later intelligence and also language development); Stevens & Bakeman, 1985; Luster & Dubow, 1992 (the ability of shortened forms of HOME, as used in the NLSY study, to predict

verbal intelligence). Similarly, some examples of studies with information about the construct validity of HOME are the Bradley and Caldwell (1977) and Ramey et al. (1975) papers about the instrument's ability to discriminate children of different IQ levels. Tesh and Holditch-Davis (1997) established the positive relationship between the Nursing Child Assessment Teaching Scale (NCATS) and the relevant subscales of HOME.

Strengths and limitations

The HOME Inventory has been used successfully in research and in practice. It is easy to administer and score and has sound psychometric properties. Even though it requires special training, it is straightforward to complete and to score and at the same time the whole procedure is not threatening to the family.

The combination of interview and direct observation allows for an assessment of the caring environment along with a more detailed assessment of individual children. It has been relatively easy for people in the UK to adapt the HOME interview because it uses an approach that was already familiar to clinicians and social workers in their everyday practice. It has been used in such a way that places the focus directly on examples of the child's experience in the family home. Interviewers provide specific time limits as a framework for the conversation by asking the caregiver to focus on the facts of a very specific day of the week. Thus, the practitioner manages to elicit more valid information on the child's actual experience and not on the interviewee's feelings and mental representations of the situation. The emphasis it places on obtaining factual information does not hinder the interviewee from expressing his/her own feelings at the end (Cox, Hopkinson & Rutter, 1981; Cox, Rutter & Holbrook, 1981; Rutter et al., 1981).

However one of the most serious restrictions of this inventory is the lack of a standardised procedure for administration. Solutions to this limitation have been suggested by Cox (2002) who advises researchers to conduct their own measures in order to assess the psychometric properties of their measurements within any one study. Training practitioners to follow a standardised procedure of administration by focusing on a specific day in the child's life (e.g. yesterday) and on obtaining factual information, can also overcome this issue. Another limitation comes from the measurement scale itself. The choice of a binary scale makes it easier for the interviewer to score but it deprives the researcher or the practitioner of more subtle information needed to make informed judgements. When for example the interviewer finds that a parent has physically punished the child once during the last week, it is scored as Yes. If, however, this child is being physically punished several times every week, then the scale does not accommodate this more detailed information. Researchers have reported that working with certain non-normative samples can make this limitation more apparent (e.g. infants of cocaine abusing mothers; Howard et al., 1995). When the goal of the assessment is to decide whether an intervention is appropriate, it is obvious that the exact scores of HOME should be supplemented by other information obtained during the administration of the instrument. HOME is very useful

for describing the main areas of the child's home environment. The profile is broader and more useful than most other instruments but clinicians would be wise to interpret each family situation over and above the numerical scores. HOME might be considered a broad but valid 'brush' for painting the child's caring environment.

We also need to acknowledge the fact that information is obtained by only one informant each time on only one occasion which might be unrepresentative of a child's full life conditions. A comprehensive assessment calls for a combination of information obtained from the administration of a number of tests not only on the particular person-target, e.g. the child, but also on the familial and environmental context. A more holistic approach in the study of human development examines the interdependence of three factors that mainly affect developmental outcome: the person, the process and the context (Bronfenbrener, 1986). The basic assumption is that the developing child is not only affected by the environmental factors within and outside the family house but also the individual characteristics of the child himself.

Future use

HOME is without doubt the most commonly used environmental assessment instrument in developmental research. Many years of research have demonstrated the important correlations it has with measures of cognitive and language development and its ability to independently predict such outcomes later in the child's life. Most importantly, however, research has proved the instrument's validity in describing the home environments of children at risk and revealing the effect of home experiences in developmental outcomes. The review of large-scale intervention programmes suggests that HOME has been used mainly as a measure of environmental change and not as a guide for designing the actual content of the intervention.

We suggest that the individualised assessments conducted by the staff in health or social services departments are likely to benefit most from the capacity of HOME to identify strengths and weaknesses in the family environment. The Department of Health places the analysis of parenting capacity in the core assessment procedure and emphasises an assessment approach that is ecological in nature, allowing for an understanding of the child within the context of the family (Department of Health, 2000). HOME allows a detailed screening and the structure of the subscales has proven very successful in meaningfully tapping all the important dimensions of a family functioning, which are related to children's developmental progress. The total HOME score is an index of the overall quality of the home environment and the subscale scores can be used to guide the development of intervention programmes designed to meet the individualised needs of children and their families. The subscales that have the higher scores indicate the areas where the strengths of the family lie most noticeably, giving the practitioner a starting point to base the intervention, as a change in the family's functioning can be brought about if we start by focusing on the family's strengths and not on the problematic aspects.

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