

The Social-Emotional Ramifications of Universal Newborn Hearing Screening, Early Identification and Intervention of Children who are Deaf or Hard of Hearing

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Introduction

Universal newborn hearing screening (UNHS) was begun in the United States in several geographic locations, the states of Rhode Island, Hawaii, and Colorado in the early 1990s. Since that time, evidence-based research indicates that universal newborn hearing screening results in earlier identification of congenital hearing loss leading to the provision of earlier intervention. Outcome data of children identified early indicates significantly higher language development when compared to children with later-identified hearing loss. Children identified with hearing loss within the first few months of life maintain language development within the low average range of typical development for the first five years of life.

A frequently posed question regarding the establishment of universal newborn hearing screening is whether such early screening may cause parental harm both 1) to parents of children who are referred for further testing as a result of the newborn screening but whose children ultimately pass the hearing screening and 2) to parents of children who are diagnosed with congenital sensori-neural hearing loss because of injury to parental bonding.

This article addresses the issue of UNHS programs and the impact on social-emotional characteristics of the parent and child with hearing loss and the parent of children with normal hearing referred for additional testing after initial newborn hearing screening. Several indices of parental harm have been used in a variety of research.

Parental Harm and False Positive Results from Universal Newborn Hearing Screening Programs

Bess and Paradise (1994) expressed concern that the “vulnerable child syndrome”, parental fear, anxiety, stress and frustration may result from a “negative” hearing screening result and referral for additional testing. Sorenson, Levy, Mangione and Sepe (1984) reported that 36% of parents involved in genetic newborn screening programs had concerns about their child’s health. Cadman, Chambers, Feldman and Sackett (1984) expressed concerns that a false positive test result in the newborn period, even if only for a short time, could disrupt the evolving parent-child relationships with long-term adverse after-effects for the child.

Studies of newborn genetic screening for phenylketonuria, hypothyroidism, Duchenne muscular dystrophy, and cystic fibrosis indicate the possibility of prolonged parent anxiety from false positive results. Rothenberg and Sills (1968) reported a “PKU anxiety syndrome” characterized by acute or chronic parental anxiety concerning test results and their child’s health. Fyro and Bodegard (1987) reported negative responses to false positive hypothyroidism test results such as shock, sleep disturbances, maternal crying and infant feeding problems. Sixteen of 32 families had persistent anxiety 6–12 months after the screening and 13 of 32 showed anxiety after a four-year period. Twelve of the 32 children showed disturbed behavior, with ten of those being from families that reported still feeling anxious after four years.

Smith (1990) reported that participants in a

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survey of post-partum women indicated that they wanted to know whether their infants had handicapping conditions. They would want their infants tested for Duchenne muscular dystrophy even though they knew that the only use for such information was in planning future pregnancies. Tluczek et al. (1992) reported on a study of parents' knowledge of neonatal screening and response to false-positive cystic fibrosis testing. In this study there were long-lasting negative effects in response to the false-positive results from neonatal screening for cystic fibrosis.

Screening for hearing loss in the newborn period has several differences to the traditional newborn genetic screening. First, the prevalence of hearing loss is much higher than the prevalence of phenylketonuria, hypothyroidism, hemoglobinopathy or cystic fibrosis. Second, severe cognitive, neurological degeneration is not an outcome of congenital hearing loss, nor is infant mortality. Third, there is evidence that educational intervention exists that can ameliorate or in some cases overcome the negative developmental impact of congenital hearing loss. Fourth, false positive rates can be low. Positive predictive value is strong and identification of hearing loss is possible within weeks after the screening.

The United Kingdom's Wessex universal neonatal hearing screening trial (Kennedy 1999) found that parents of children who were screened and parents of children with false positive results did not have significantly different levels of anxiety and stress. Weichbold and Welzl-Mueller (2001) reported that 86% of the families with positive results reported either "no concern" or only "a little concern." indicating only 14% of the families reported some concern. Clemens, Davis and Bailey (2000), Watkin, Baldwin, Dixon and Beckwith (1998), and Barringer and Mauk (1997) reported that 3 to 13% had residual negative effects of false-positive screening. Tharpe (1999) reported no significant differences (in parental stress) between a control group of families whose children passed newborn hearing screening and families whose children were referred for additional testing as a result of newborn hearing screening. Abidin (1995) reports that approximately 10% of the general population report clinical levels of parental stress. Thus, the 3 to 13% rates of parental concern do not appear to be different from what would be found in the general public.

Parental Stress and Children with Identified Congenital Hearing Loss

Pipp-Siegel, Sedey and Yoshinaga-Itano (2001) studied the parental stress of 184 mothers of children who are deaf or hard of hearing. Three domains of parental stress, Parental Distress, Dysfunctional Parent/Child Interaction and Difficult Child, were measured through the Parental Stress Index (Abidin 1995). Parents of children who are deaf or hard of hearing had significantly less stress than the normative sample on the Parental Distress subscale. No significant differences were found on either Difficult Child or Dysfunctional Parent/Child Interaction when comparing the parents of children who are deaf or hard of hearing and the normative sample. Mother's perception of increased intensity of daily hassles (Crnic and Greenberg 1987) results in higher stress levels on all three subscales. Predictors of Parental Distress were frequency of hassles, reduced social support, and annual family income. Predictors of Dysfunctional Parent/Child Interaction were children with disabilities in addition to hearing loss, more delayed language in proportion to chronological age, and less severe levels of hearing loss. No additional predictors were found for the Difficult Child subtest. When all measured variables were controlled for, the following variables did not predict level of parental stress on any of the three subscales: child's gender, ethnicity, age of identification, mode of communication used, months between age of identification, age at measurement of parental stress, and maternal education.

Thus, with appropriate intervention the parental stress reported by 184 mothers of children who are deaf or hard of hearing was not significantly higher than the normative sample. The children ranged in age from below 6 months to 72 months of age. Sixty-two point five percent had hearing loss only and 37.5% had multiple disabilities. Age of identification ranged from 46.7 percent identified in the first six months of life to 43.3% with age of identification between 7 and 54 months of age.

Early-Identification of Hearing Loss as a Result of UNHS Does Not Result in Increased Parental Stress

Parents of early-identified children with significant hearing loss indicated stress levels similar to the normative sample on the Parental Stress Index. Thus, identifying children within the first six months of life as a result of UNHS did not result in significantly higher levels of parental stress in the Colorado sample. In this sample, 13% (overall stress), 8.6% (Parental Distress), 12.4% (Dysfunctional Child), and 16.2% (Difficult Child) of the mothers scored at or above the clinical cut-off.

Families in the Colorado Home Intervention Program are immediately referred to intervention services after the identification of hearing loss, often before the fitting and receipt of amplification. The average age of identification of hearing loss of children born in hospitals with newborn screening programs is two months of age. Intervention providers have significant experience in parent counseling and most providers have between 10 and 30 years of experience in parent-infant intervention. They provide services from 1 to 1.5 hours per week in the home.

Two studies, Golbach and Lederberg (1999) (3, 4 year olds, $N=23$) and Meadow-Orlans (1994) (9 month olds) reported no significant difference in maternal stress when comparing mothers of children with significant hearing loss and mothers of children with normal hearing. Quittner (1991) in a study of 96 mothers of children with hearing loss and 118 mothers of children who were normally hearing, aged two through five, found that the parents of children with hearing loss were significantly more stressed. Age of identification and the type of intervention that the families received was not reported.

Parenting Daily Hassles

The Parenting Daily Hassles scale (PDH; Crnic and Greenberg 1987) consists of 20 statements regarding aspects of events that routinely occur in families, such as “being nagged, whined at, complained to,” “the kids are continually under foot, interfering with other chores,” or “difficulties getting privacy (like in the bathroom).” Parents indicated how frequently each statement occurred on a 4-point scale

from “rarely” to “constantly.” Additionally, they rated whether each item was “no hassle” to a “big hassle” on a 5-point scale. Two scores, one for frequency of hassles and one for intensity of hassles, were calculated based on the parents’ ratings. From a clinical perspective, the Parenting Daily Hassles scale provides a clinical tool that can support intervention services. Although there is not a one-to-one correspondence between the Parental Stress Index and the Parenting Daily Hassles, in general the greater the intensity of the hassles, the more likely that the mother may experience clinical levels of stress.

Family Support

The Family Support Scale (Dunst, Jenkins and Trivette 1984) consists of 18 sources of family support, including parents, friends, spouse, co-workers, church, professional agencies, etc. Parents are also invited to rate “Others” if a source of support is not included in the questionnaire. Parents rated whether each source of support was not available, or from a scale of 0 to 4, whether the source was “not at all helpful” to “extremely helpful.” The final score was obtained by adding together the ratings on each of the items. The Family Support Scale provides information to the intervention provider to assist the family in establishing a broader base of support. The greater the family perceives that they have external support, the less likely that they will experience clinical levels of parental stress.

In summary, parents of children with early-identified hearing loss, in the first six months of life, can demonstrate parental stress levels at or lower than parents of the norming sample of the Parental Stress Index (Abidin 1995), particularly when immediate and appropriate intervention services are provided. The lower stress levels are related to better language levels of the children.

Social-Emotional Factors that Predict Better Language Development

Yoshinaga-Itano, Sedey, Coulter and Mehl (1998) found that non-verbal cognitive development and the identification of hearing loss by six months of age were significantly related to better language development of children who are deaf or hard of hearing. Once early-identification of hearing loss has been

accomplished, the focus will be directed towards the characteristics of intervention. Several social-emotional factors have been found to be highly related to better language development. These studies have found that 1) the extent to which a family is involved in intervention, 2) the resolution of grieving, and 3) attachment as measured through emotional availability of the mother to the child and the child to the mother are highly related to the successful language outcomes of the child.

Family Involvement

Calderon and Greenberg (1993) and Calderon, Greenberg and Kusche (1991) found that maternal functioning and coping factors were significantly related to child functioning. Children of mothers who indicated more positive adjustment showed lower impulsivity, greater cognitive flexibility, and higher social understanding. Calderon (2000), in a study of 28 children, found that parent involvement in children's school-aged education programs is a significant positive predictor to early reading skills and shares considerable variance with maternal communication skill.

In a study of 112 5-year old participants with significant hearing loss, Moeller (2000) reported that 55.5% of the variance in children's vocabulary scores at age five was accounted for by two variables, family involvement and age of enrollment. Twenty-four of the participants were enrolled in intervention between birth and 11 months of age. Participants were evaluated with the Peabody Picture Vocabulary Test and the Preschool Language Assessment Instrument. Children who were enrolled earliest demonstrated significantly better vocabulary and verbal reasoning skills at age 5 than later-enrolled children. Early-enrolled children, regardless of degree of hearing loss, achieved scores that were similar to hearing peers.

Family involvement was measured by the Family Participation Rating Scale with ratings of 1 through 5. A rating of "1" represented "limited involvement" and a rating of "5" represented "ideal involvement." The higher the family involvement and the earlier the age of enrollment in intervention, the higher the language outcome of the child was.

For a rating of 5 (ideal participation), the family appeared to have made a good adjustment to the child's deafness. The family actively engaged in sessions. They attended sessions and meetings regularly

and pursued information on their own. They served as effective advocates for their child with professionals/school districts, etc. Family members became highly effective conversational partners with the child and served as strong and constant language models. Family members became fluent/effective users of the mode of communication. They were capable in applying techniques of language expression. Extended family members were involved and supportive.

For a rating of 1 (limited participation), the family faced significant life stresses that may have taken precedence over the child's needs (e.g., domestic abuse, homelessness). Family had limited understanding of deafness and its consequences for the child. Participation may have been sporadic or less than effective. Parent/child communication was limited to very basic needs.

We do not know from this study what characteristics contribute to a provider's rating of parent involvement. Parent involvement may be related to factors such as culture, race, ethnicity, income levels or educational levels of the family, parental levels of stress, parental attachment or grieving. Thus, intervention techniques that can support the development of "family involvement" have not yet been thoroughly examined.

Resolution of Grief

Pianta and Marvin (1993) developed the RDI, Reaction to Diagnosis Intervention, that probes for episodic recall of events and experiences at the time of diagnosis. Parents are asked to relate the emotions associated with that experience, the change in these emotions since the time of diagnosis, and their search for reasons for this experience.

Resolved Grief

A determination of resolution of grief can be made if one or more of the following characteristics are found. These families report changes in their emotions since the diagnosis of the hearing loss. They indicate that they are able to move on in life and have suspended the search for a reason. Families with resolved grieving are able to provide accurate representations of their child's abilities and provide balanced statements regarding the benefits to self. The resolution of grief can be evidenced through feelings, actions or thoughts. Although a family may have

resolved their grief of the diagnosis of the hearing loss, other events in life could result in renewed grief. However, once a family has resolved grief at least once, the intensity and duration of their grief is significantly reduced.

Unresolved Grief

Those families with unresolved grieving indicate one or several of the following characteristics: 1) emotionally overwhelmed, 2) angrily preoccupied, 3) neutralizing their emotions, 4) feelings of depression or passivity, 5) cognitive distortions that include unrealistic beliefs, denial or pursuit of wished-for realities such as a different diagnosis and 6) disorganization or confusion. Families with unresolved grieving actively search for reasons.

When families have unresolved grief, intervention is focused on providing the necessary support to assist the family. When the emotional needs of the family are high, the intervention provider needs to possess counseling skills. It is important to listen to the family's needs and to provide non-judgmental support.

When a family's grief is unresolved, attention to the reality of the child's needs is displaced on the need to find a reason. This need for a reason is often so strong that it distracts the parent from attending to painful emotions. The search for a reason often continues even when told repeatedly by professionals that no reason will be found and that cause won't change the diagnosis or prognosis.

Sometimes families who are unable to resolve their grief may be stuck in the past or cut-off from the experience of the diagnosis, indicating no emotion at the time. Their story about the diagnosis may be confused and disorganized making it difficult to understand the story. Emotionally overwhelmed families have strong expressions of sadness and/or pain. There may be an enlistment of sympathy and a feeling that the crisis continues in the present. Families who are angrily preoccupied express active and thematic anger and enlist endorsement of this anger from the professional. Families who have neutralized their emotions report no perception of negative emotion associated with the diagnosis. Some families have clear distortion of the expectations regarding their child's condition and future. They may express unbalanced perceptions regarding the benefits versus cons of the experience either idealizing the experience or painting a picture of no hope. Families may express

confusion or incoherence through indications of contradiction in content of their presentation of the story about their experiences. Some families lose their train of thought and need to be re-oriented by the professional. They may ramble or oscillate between polarized perceptions, i.e. all good or all bad, all painful or all beneficial.

In a pilot study of 16 families, conducted by Pipp-Siegel (2000) there was a strong trend toward a significant finding based upon the age of identification. Of these 16 families, 10 had resolved their grieving, while 6 had not. The average age of identification for the resolved group was 8.1 months and for the unresolved group was 16 months of age. The interview was conducted at a mean of 37.72 months since the identification of hearing loss for the resolved group and 39 months since the identification of hearing loss for the unresolved group. No differences by caregiver education, gender or degree of hearing loss were evident. The families who had resolved their grieving had children with expressive language skills that were 6 months better than the families with unresolved grieving.

Although there is a need for significantly more research data, there is strong indication that resolution of grief may be highly related to language development of the child. Other studies indicate a strong relationship between maternal bonding and language development. It is reasonable to hypothesize that appropriate counseling skills of providers can improve maternal-child interaction, which can then impact better language development and a quicker resolution of parental grieving. Since these studies are not studies of causal relationships, it is also possible that improved techniques which will facilitate better language development could improve parental bonding and resolution of grief or that counseling strategies to help parents resolve grief could impact better maternal bonding and better language development of the child. In any of these scenarios, emphasis upon improved counseling skills is warranted.

Mothers of early-identified children with hearing loss may experience post-partum depression. In addition, the family has not had any time to suspect a hearing loss and the initial shock is significant. Immediate support through the initiation of appropriate intervention services is critically important. If provided by a professional with appropriate counseling skills and expert knowledge about hearing loss, the resolution of grieving can occur quickly in

comparison to families of later-identified children. Counseling instruction in the Colorado Home Intervention Program consists of training in family systems theory and strategies to interact with families with unbalanced family systems, joining the families, grief counseling, information about when family characteristics are beyond the scope of practice of intervention providers and referrals for psychological services should be made and counseling strategies designed to help families change behavior when they have the desire and need to do so. Family support is also available through the Colorado Families for Hands and Voices, a state-wide regionally supported network of parents with children who are deaf or hard of hearing and Deaf Connections, a state-wide network of deaf and hard-of-hearing community members.

Maternal Attachment: Emotional Availability and Language Development

It has been hypothesized that the better the attachment of the mother to child the higher the language development of children who are deaf or hard of hearing. Additionally, some have proposed that early-identification of hearing loss within the first few months of life will disrupt the attachment of mother and child. To investigate these questions, several studies have been conducted.

Maternal bonding was evaluated through the Emotional Availability Scales developed by Biringen, Robinson and Emde (1993). This scale evaluates maternal dimensions, child dimensions and reciprocity in the relationship. Maternal dimensions include: 1) maternal sensitivity, 2) maternal structuring/intrusiveness and 3) maternal frustration/hostility. Child dimensions include: 1) child sensitivity, 2) child's responsiveness to his/her mother, 3) child's involvement with his/her mother and 4) child's frustration/hostility towards his/her mother.

Maternal sensitivity involves warmth and emotional connectedness to the child. Optimal sensitivity indicates positive, appropriate and creative emotional communication with the child. These mothers show genuine, authentic and congruent interest, pleasure and amusement. Optimal sensitivity is characterized by warm smiles, interested eye contact, comforting and playful physical contact, pleasant facial expres-

sions and tone of voice. The maternal behaviors are rhythmic, timely, flexible and adaptable to the demands or needs of the child. Maternal structuring and intrusiveness involves the ability of the mother to follow the child's lead during play, to set limits for appropriate behavior or misbehavior, and to provide a supportive frame within the context of allowing the child to maximize his/her autonomy.

Child responsiveness is reflected in the child's eagerness or willingness to engage with his/her mother following her suggestion or bid for exchange. Child responsiveness includes a display of clear signs of pleasure in the interaction. The degree to which the child attends to and engages his/her mother in play and the balance between the child's autonomy in play and the need to draw the mother into play are components of child responsiveness.

Pressman et al. (2000) in a longitudinal study of twenty-one toddlers who were deaf or hard of hearing and twenty-one toddlers with normal hearing, investigated whether mothers of children with hearing loss differed from mothers of children with normal hearing. In addition, the contribution of emotional availability to language gain was also investigated. No differences in the emotional availability of mothers with children who have normal hearing and those who are deaf or hard of hearing were found. Higher maternal sensitivity predicted faster language gain in both groups. The prediction of language gain was stronger among dyads with children who were deaf or hard of hearing, indicating that children with significant hearing loss may be more responsive to maternal sensitivity than those with normal hearing. Both child emotional availability and maternal emotional availability uniquely predicted language gain.

Maternal sensitivity predicted significant and positive expressive language gain (Pressman, Pipp-Siegel, Yoshinaga-Itano and Deas 1999). The more emotionally connected the mother was to the child, the greater the expressive language gain of the child when measured at two different ages. Strategies for teaching parents skills in improving emotional availability have had success with other populations of at-risk children. An emphasis in counseling skills to improve sensitivity, scaffolding, and ability to deal with frustration in interactions would be beneficial for early intervention providers working with families of young deaf and hard-of-hearing infants and toddlers.

Interactions between parents and their children

who are deaf or hard of hearing are rated as more sensitive after these families participate in an intervention that includes psychological counseling for parents when compared to parent/child interactions in families who participate in similar interventions without such services (Greenberg 1983). When mothers are happy with their social support, hearing mothers can look as sensitive with their deaf infants as they do with their hearing infants (Meadow-Orlans and Steinberg 1993). These findings suggest that a focus on counseling and social-emotional factors in early childhood intervention may support more positive parent/child interaction.

Quality of Life and Quality of Family Life

While early-identification of hearing loss can result in lower parental stress, better parental attachment, and faster resolution of grief, an alternate scenario is also possible. When families are not satisfied with the follow-through intervention after the identification of the hearing loss, they can experience lasting negative effects. Hind and Davis (2000) conducted a study of 609 parents of children with permanent childhood hearing impairment (PCHI) and had a 65% response rate. These families lived in the Trent Regional Health Authority (RHA) with a total population of 4.7 million. Eighteen percent of the children were diagnosed within 6 months of life but only 8.7% received amplification within the first six months of life. Children were within the age range of 3 to 11 years. There was a significant negative relationship between age at diagnosis and quality of life, suggesting that children and their families may not benefit as greatly as they could from early diagnosis. When families were not satisfied with services and their children were aided early, there was a significant negative relationship, but with families who were satisfied and the children were aided early, no significant relationship was found. The authors concluded that if early hearing aid fitting is not handled well there are continuing negative effects on the quality of family life and the quality of life of the child.

Social-Emotional Characteristics of the Child and Language Development

The early-identification of hearing loss has been found not only to be related to the language develop-

ment of children who are deaf or hard of hearing, but also to the social-emotional development of the child. The social-emotional characteristics studied include the personal-social development of the child, the self-development of the child and mastery motivation of the child.

Personal-Social Development

The Minnesota Child Development Inventory includes a subtest that measures personal-social development (Ireton and Thwing 1974). These items include social skills, emotional and behavioral development. Many, but not all of these items, are language dependent. Over 70% of the variance in personal-social skill development is accounted for by the symbolic play development, expressive language development, and degree of hearing loss of the child.

Early-identified children had better personal-social quotients in the first three years of life than later-identified children. The social-emotional age of identification effect was found for each gender, each degree of hearing loss category, each mode of communication and at each testing age. Symbolic play and expressive language do not account for all of the variance in personal-social development. Degree of hearing loss also contributes information. Interestingly, parents report that children with mild hearing loss have poorer personal-social skill development than children with moderate to profound hearing loss when they are later-identified. Thus, the relationship of early-identification/intervention to personal-social skill development is the strongest for children with mild hearing loss.

Some have argued that children with mild hearing loss do not demonstrate significant enough developmental delay to warrant newborn hearing screening. The personal-social skill difference appears to counter this argument. An implication for intervention for later-identified children is that a much greater emphasis needs to be placed upon remediation of delays in the social-emotional developmental area.

Development of Self

The development of self, believed to be a foundation for the development of strong self-esteem and self-concept, have both a language, social-emotional and/or non-verbal component. Language development, as found with other aspects of social-emotional

development, is highly related to the development of self.

Studies of the development of self-concept in early childhood have focused on self-recognition (Lewis and Brooks-Gunn 1979), self-evaluation (Stipek 1983) or self-regulation (Kopp 1982). Stipek, Gralinski and Kopp (1990) developed a parent-report questionnaire about self-concept development. Self-description/evaluation and self-regulation are two factors examined through this Self-Concept Questionnaire. Pressman (2000), in a study on the early self-development of children with hearing loss, found that both self-recognition and self-description/evaluation developed with age between 14 and 40 months of age. Deaf and hard-of-hearing children always passed the self-recognition items prior to the self-description/evaluation items, similar to the development of children with normal hearing. Self-recognition scores increased significantly from 14 to 40 months when children were deaf or hard of hearing. The linear development between self-recognition and age was completely mediated by expressive language. Self-description/evaluation also increased significantly with age and decreased significantly as the age at which hearing loss was identified increased, even when child and family characteristics were controlled. Expressive language partially, but not completely mediated the relation between self-description/evaluation and both age and age of identification. Thus, age of identification even beyond the effects of improvement of language had a significant relationship with the development of self. Expressive language is the most powerful predictor of self-development but even when language is similar, children who are early-identified have significantly higher developed self description and evaluation.

Mastery Motivation

Pipp-Siegel, Sedey, Van Leeuwen and Yoshinaga-Itano (in review) studied the relation between mastery motivation and expressive language in 200 young children with hearing loss. Hearing mothers assessed their children's expressive language using the Minnesota Child Development Inventory (Ireton and Thwing 1974), and several aspects of mastery motivation including mastery pleasure and three components of mastery persistence (gross motor,

object oriented, and social/symbolic) using the Dimensions of Mastery Motivation Questionnaire (Morgan et al. 1992). Simple correlations revealed significant relations between expressive language and all mastery motivation scales. When demographic and hearing loss variables were entered into a regression equation, only increased social/symbolic persistence significantly predicted increases in expressive language quotients. Examples of social-symbolic persistent items are "Tries hard to get people to play with him or her;" and "Likes make-believe play and does it for a long time." Increased object-oriented persistence marginally predicted increases in expressive language quotients. Expressive language quotients also increased as child age, age of identification and degree of hearing loss decreased and as maternal ratings of her child's general competence increased.

A core component of mastery motivation is a "disposition to persistently attempt to attain a goal in the face of moderate uncertainty about whether the goal can be achieved" (McCall 1995, p. 227). Mastery motivation involves several types of persistence, including persistence when playing with objects, in the social and symbolic domain, and in mastering gross motor skills (Barrett, Morgan and Maslin-Cole 1993). Children who demonstrated high object-oriented persistence tend to examine and work with toys and other objects for extended periods of time in an attempt to use them successfully (e.g., putting a puzzle together properly). Those with high levels of social-symbolic persistence make repeated attempts at interacting with others and engaging in pretend play. High levels of gross-motor persistence are seen in children who will repeat motor tasks until they can do them well (e.g., throwing, climbing).

Studies addressing mastery motivation levels of children with hearing loss have produced mixed results. MacTurk (1993) examined infants at 9 and 12 months and reported no significant difference in levels of persistence or social smiles (an indication of "task pleasure") between children with and without hearing loss. In contrast, decreased motivation was reported in older, 8- to 12-year-old boys with hearing loss when compared to a group of hearing children the same age (Stinson 1974). Taken together, these studies suggest that decreases in mastery motivation in children with hearing loss may emerge later in development.

Dimensions of Mastery Motivation

Maternal report of her child's mastery motivation was obtained via the Dimensions of Mastery Motivation Questionnaire (DMQ; Morgan et al. 1992). The DMQ is a caregiver report instrument designed to assess parents' impressions of their child's mastery motivation. Each item was rated on a 4-point scale with "1" representing "not at all typical" and "4" representing "very typical." Three of the subscales represented maternal perception of her child's persistence, including object-oriented persistence, social-symbolic persistence, and gross-motor persistence. The DMQ has been used successfully for children as young as 8 months (Hupp and Abbeduto 1988) and for children as old as 6 years (see Morgan et al. 1992 for a review).

The total model accounted for 63% of the variance of expressive language quotients. All four blocks significantly predicted expressive language quotient. The demographic variables accounted for 21% of the variance, variables related to hearing loss accounted for 3% of the variance, general competence accounted for 32% of the variance and the mastery motivation variables accounted for an additional 7% of the variance of expressive language quotients. An examination of the individual predictors revealed that children's expressive language quotients were significantly higher for children who were younger, were identified earlier, had milder hearing loss, higher levels of general competence, higher levels of social symbolic persistence, and for boys.

Summary

Parental stress and anxiety reported as a result of universal newborn hearing screening programs indicate that there are very low levels of parents expressing concern, 3 to 13% of the population. These levels are similar to the stress levels reported in the general population. Parental stress of families with children who had early-identified hearing loss can be similar to families in the general population who do not have children with disabilities. Intervention services that are appropriate and immediately available to families are critical. Follow-through programs can result in families with good attachment, faster resolution of grief, and lower parental stress. Family involvement has been found to be highly predictive of better language development. Early-identifica-

tion of hearing loss is also related to better personal-social development, better self-description and self-evaluation. Better language development is also related to higher mastery motivation of the child.

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