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Assessment of the young child: preschool screening.

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ASSESSMENT OF THE YOUNG CHILD: PRESCHOOL SCREENING

A Dissertation Presented

By

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TO

My Husband

KENAN E. SAHIN

without his support this work would not have been possible

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Dr. Meier is the former director of the Office of Child Development and the Chief of the Childrens' Bureau, Department of Health, Education and Welfare. He has made valuable contributions to the field of preschool screening as a scholar, practitioner and a policy-maker. Dr. Meier has published a most extensive "state of the art review" of existing screening tools and programs in the country. This work has been very valuable to the author.

Dr. Crocker, Associate Professor at the Harvard Medical School, is the director of the Developmental Evaluation Clinic at the Boston Children's Hospital Medical Center. He has made a considerable impact on the assessment of special-needs children as well as in operationalizing health assessment data for educational and personal planning. The author has benefitted from Dr. Crocker's work.

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Dr. T. Berry Brazelton, Associate Professor at Harvard Medical School, is the director of the Child Development Unit at the Boston Children's Hospital Medical Center. He has made and continues to make substantial impact on the field of screening and assessment of young children at-risk. Dr. Brazelton is nationally known for his accomplishments in this realm - Brazelton Scales. The author has benefitted from Dr. Brazelton's works.

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ABSTRACT

Assessment of the Young Child:

Preschool Screening

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One of the two major purposes of this study is to develop a theoretical framework for large scale preschool screening. This screening has as its goal the identification of those children who might require special education services when they enter school. Such a preschool screening program consists of two equally important components: (1) the screening battery, and (2) the screening delivery. The theoretical framework encompasses a battery design and a delivery design which interactively affect one another. These two components are made compatible with each other and with the screening agency environs.

An important aspect of the battery design is its attempt to interface the seemingly disparate Medical Model and Educational Model approaches to screening. The Medical Model is generally causally oriented and seeks to diagnose and cure. The Educational Model, however, seeks a descriptive statement of the child's growth and developmental status in order to remediate deficiencies and enhance strengths. The battery is designed

to provide an interface between health and education. While the battery attempts to assure early identification of health oriented and physical development related special needs, it seeks to describe the child's growth and developmental status in ways that will lend themselves to ultimately devising an appropriate educational plan. The design of the battery seeks to make the assessment data operational for educational purposes while relieving school systems from the responsibility for dealing with special needs that are "not directly educational".

Delivery design suggests the following: a central site screening with multiple stations; a set routing pattern; a thirty minute total screening time per child; minimal waiting time and idle time; and parental participation. A useful heuristic was developed to aid in deciding the number of stations to have and the staff allocation at these stations.

The second major purpose of this study is to operationalize the proposed theoretical framework by implementing a model preschool screening program (PSSP). The PSSP was implemented in a Western Massachusetts school system and 268 three to five year olds were screened. The screening battery consisted of the following: The Denver Developmental Screening Test; The Observational Physical Screening Tool (developed by the author); Allen Cards and Stereo Fly for vision; and Height and Weight measurements.

The predictive capability of the screening battery was

evaluated in the following manner. The battery classifications of eighty-six children were compared to the actual school classification of the same children fourteen months after the preschool screening program and nine months after kindergarten entry of these children. Data analysis reflects that the composite battery predicts school categorization at a statistically significant level with a strong positive association. Furthermore, the composite battery which includes the Observational Physical Screening Tool developed by the author, predicts the Actual School categorization better than does the Denver Developmental Screening Test alone.

The screening delivery was designed to increase the acceptibility of the screening program by clients, screening agencies and by the governing agencies. Efficiency concern was balanced by concern for effectiveness and pleasantness.

The PSSP delivery was favorably evaluated by the parents. The actual cost per child screened was $5.00 and the imputed cost ranged from $7.00 - $9.00 per child screened. Compared with the $30.00 - $50.00 cost per child reported elsewhere, this is a low cost preschool screening program. The savings implied by such a figure is substantial, especially if one considers that even a dollar saved per child can represent millions of dollars saved at the national level.

Operationalizing the Theoretical Framework developed in this study provided an example of an effective and viable preschool screening program.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

LIST OF TABLES
(continued)

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION: THE PROBLEM

Statement of the Problem

One of the two major purposes of this study is to present a theoretical framework for large-scale preschool screening in order to identify those children who might later have educational problems.* The framework encompasses the design of the screening battery as well as the design of the delivery.** An important aspect of the proposed theoretical framework is its attempt to interface the educational and the health (medical) considerations. This is achieved through the inclusion of the Observational Physical Screening Tool developed by the author.

Another equally important aspect is the perspective the framework provides for making a screening program compatible with the constraints and characteristics of the delivery environment; in terms of: staffing, publicity and management of the actual screening. In the framework of preschool screening, consideration is given for interfacing the battery design and the delivery design. In other words, the screening battery design needs to be compatible with the delivery constraints while the

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*Such children are referred to as at-risk. See in Meier (1973), Nader (1974) and Zadig (1975).

**Wagner (1975) specifically identifies the delivery of screening as a distinct part worthy of critical attention. Independently of Wagner, a similar conclusion had been reached by this study

delivery design must reflect the battery constraints.

The main assertion of this study is that the implementation of the proposed framework will significantly improve the overall effectiveness and the efficiency of a preschool screening program.

"Effectiveness" is defined as the degree to which the purposes behind the screening program are achieved. The main purpose of the preschool screening program is to identify educationally at-risk children. Screening educationally at-risk children is operationally defined as screening out those preschool children who might require the alteration of standard school curricula in order to develop their maximum learning potential. In other words, these are the children who, when they enter school, might require special education services. The preschool screening battery then, must be able to identify those children who might be at-risk and refer them for evaluation to confirm or negate this. Therefore the battery must have predictive capability.

"Efficiency" is the quantity of resources consumed in obtaining a stated (desired) amount of output. Efficiency is measured in relation to stated indices such as cost per child screened, screening time per child, waiting time per parent-child pair, etc. The screening delivery then, must meet the efficiency constraint.

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and pursued to some detail in Chapter IV.

Accordingly the specific assertions of this study are that: (1) The screening battery will reasonably predict which preschool children might later have special needs when they become schoolers, (2) The particular screening battery proposed will predict the educationally at-risk children better than the Denver Developmental Screening Test* alone, (3) The implementation of the proposed delivery design will increase efficiency of the preschool screening program, (4) The delivery design will promote acceptability of the preschool screening program by the clients.

The second major purpose of this study** is to implement the proposed theoretical framework in an actual preschool screening program in order to:

1. evaluate the assertions
2. detail the description of the framework in an actual setting
3. gain more insight and to achieve a refinement of the proposed theoretical framework.

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*The DDST has been and is being extensively used for the developmental screening of young children by Headstart programs, Pediatricians, Public Health Nurses in Massachusetts, etc. See in Meier (1973), Frankenburg (1971) Werner (1973) and Moriarty (1973).

**This study is mainly exploratory in nature.

The Rationale

There are four reasons for this study: (1) the need for early identification of developmental delays, (2) the apparent lack, in the present literature, of interfacing Medical and Educational Model approaches to screening, (3) the increased amount of legislation mandating preschool screening programs, (4) the need for viable preschool screening programs.

Increased emphasis is now being placed on the early identification of preschool children with developmental delays or who are at-risk of later developing them.[1,2] This identification is necessary for possible prevention or alleviation of later learning difficulties through the appropriate intervention programs.[3,4,5] A screening battery with a predictive capability needs to be developed in order to help identify such at-risk preschool children.

In the literature the medical-model and the educational model approaches are often discussed as mutually exclusive.[6,7] Each approach has its limitations.[8] In order to assess the "whole" child and also because of the multiple nature of "special needs" presented, these seemingly disparate approchaes must be combined.[9] However, such an effort is not reported in the literature.[10] This study proposes such a scheme seeking to develop an interface between the medical model and the educational model.

There is an ever increasing amount of legislation in the

country which mandates preschool screening.[11] For example, the Economic Opportunity Act Amendment of 1972 requires that the secretary of H.E.W. should establish policies and procedures designed to assure that not less than 10% of the total number of enrollment opportunities in the nation in the Head Start Programs shall be available for handicapped children.[12] In order to accomplish this preschool screening must be provided for the eligible populations.

The 1967 Amendment to Title XIX (Medicaid) of the Social Security Act mandate that Medicaid-participating states provide Early and Periodic Screening, Diagnosis and Treatment (EPSDT) to their Medicaid-eligible population. By October, 1974, only 1.9 million of the 13 million eligible children had been screened.[13]

At the state levels there is increased emphasis on screening programs for young children further facilitated by laws such as the Pennsylvania Act 195, the Illinois Public Law No. 323, and the Massachusetts Public Law Chapter 766 and others.

The numbers of young children to be screened, mandated by such laws alone, are enormous. Effective and viable screening programs reported in the literature are scanty.[14]

In order to meet the objectives of early identification and amelioration of at-risk children a preschool screening program must be viable. Furthermore, a preschool screening program must be compatible with the screening agency constraints such as

finances, available experts, physical setting and time limitations.[15] The screening delivery system must be designed to facilitate this compatibility.

In screening programs aimed at large populations, any preventible inconveniences that are not eliminated will be suffered over and over again. This might possibly contribute to the reduction of validity of the screening process, especially when young children are involved.

Trimming costs by even one dollar per child screened, without any decrease in effectiveness, could well release millions of dollars for other purposes such as prevention and/or treatment. Also, even when the screening battery is well composed, it might have low acceptability unless it is compatible with the contraints of the screening agency. For all these reasons particular attention to the efficiency of a screening program is essential. Appropriately, the proposed theoretical framework includes efficiency considerations as well as effectiveness considerations.

The Importance

This study has the potential to fill apparent gaps in the literature in terms of providing a physical screening tool developed by the author and interfacing the conflicting medical and educational approaches to screening. This study also has the potential to fill some of the needs expressed by various agencies as a result of recent legislation mandating preschool screening programs. The theoretical framework developed provides design suggestions in terms of both the screening battery and the screening delivery. The battery design is geared towards the academician while the delivery design section addresses the practitioner. The proposed screening battery seeks to make the assessment data operational for educational purposes; at the same time it seeks to relieve the school systems from the responsibility of dealing with "not-directly educational" special needs. The Observational Physical Screening Tool (OPST), developed by the author, can facilitate this outcome while it assures the physical screening of the child. Furthermore, the OPST has the potential of bringing three and four year olds in contact with the health care delivery system. This age group is the segment of the population least in contact with the health care system in the country. The screening battery has a predictive capability.

While the effectiveness of a preschool screening program is largely determined by the screening battery, the screening delivery is the major determinant of its viability. The delivery proposed is designed to increase acceptibility by parents, children, school systems and the governing agencies. That is, it is designed to be pleasant to the clients; compatible with school system environs and efficient. A useful heuristic is developed to aid in the decision of the number of screening stations to have and the staff allocation to these stations. This heuristic aids in designing a screening delivery which is efficient and pleasant without compromising effectiveness.

The implementation of the proposed theoretical framework operationalizes the framework and, at the same time, provides information for its further refinement. The evaluation of the model preschool screening program suggests that the implementation of the proposed theoretical framework of preschool screening can provide an effective and viable screening program.

Definition of Terms

Preschool Screening is a simple quick procedure designed to identify those children who might require special education services when they enter schools. The main objective of a preschool screening is to identify preschoolers who need further, more extensive evaluation in order to ascertain their at-riskness.

Children At-Risk are those who either have or may later have developmental delays. Educationally at-risk children are those who, when they enterschool, might require alteration of standard school curricula (special education services) in order to develop to their maximum learning potential.

Special-Needs Children are those children who need to have the standard school curricula altered in order to function and develop their maximum learning potential.

Heuristic is a guideline which is valuable for empiric research but unproved or incapable of proof. A heuristic serves to guide, discover or reveal.

Operation is a doing or performing of something involving practical application of principles or processes.

Operational: the quality or state of being functional or operative. Efficacy, potency.

Amblyopia is a decrease in eyesight of one eye often due to disuse of that eye. Decrease in three dimensional vision. If unchecked, can result in complete loss of eyesight of the unused eye therefore causing irreversible loss of three dimensional vision.

Interface is a surface forming a common boundary of two bodies, spaces, or phases. The place at which independent systems meet and act upon or communicate with each other. The means by which interaction or communicating is effected at an interface. Interfacing: act of building an interface.

CHAPTER II

THE BACKGROUND: REVIEW OF THE LITERATURE

> Unfortunately, because this area of interest is relatively immature, the majority of the literature about it is to be found in obscure and unrefereed journals, unpublished reports, and practically unobtainable papers presented at conferences.[16]

Much effort has been made by the author to obtain literature relevant to screening of young children. These efforts included computer search, and the reviewing of numerous and variety of journals, pamphlets, proceedings and research grant reports and some current research proposals. Authors, academicians who have been involved in screening, as well as collaboratives and special education directors were contacted to secure more information. The Massachusetts Department of Education was contacted and the director of preschool programs was interviewed. Information so obtained was compiled and is presented in accordance with the following rationale.

The rationale for the format of the literature survey presentation

Preschool screening seeks to identify those children who might have learning difficulties at school with emphasis on prevention. An effective preschool screening program must provide simple but comprehensive screening of a child's growth and developmental status. It must utilize appropriate screening instruments and meet the needs and regulations of comprehensive

special education laws such as Massachusetts Public Law Chapter 766. Therefore, concepts and definitions of prevention, learning disabilities, special education legislation are pertinent to this study. In addition, available screening instruments and some examples of comprehensive screening programs need to be reviewed. For these reasons the literature review is presented in five sections: Prevention, Learning Disabilities, Massachusetts Public Law Chapter 766, Available Instruments and Comprehensive Screening Programs.

On Prevention

Since screening is part of preventive care, a review of most predominant concepts of prevention is in order. Nader[17] elaborates on the primary, secondary and tertiary preventive care in relation to school health. Primary preventive care is stated to seek to improve the school environment of all children or to seek to identify children at high risk. Nader gives the following examples of high risk children: those experiencing parental illness, death or separation; those having disorganized family lives; those having experienced academic or social failure. According to Nader primary preventive care services, then, should be designed to assist in coping with these stresses.

Nader goes on to say that early identification of learning difficulties for the purposes of early intervention is part of secondary preventive care. He discusses "prescreening" (preschool screening) as a major part of this phase of preventive

care and touches on the possible negative implications of such early "labeling". He proposes that such a prescreening should be tied to previous developmental evaluations and to a comprehensive health care delivery system. He further recommends that such a screening program be developmentally based so that an educational plan can be worked out and implemented to meet the child's developmental needs.

Nader defines tertiary preventive care as that care which attempt to return the child to a "normal" state insofar as that is possible and calls for a professional team effort in carrying out this long-term management phase.

Rogers[18] also discusses the levels of preventive care and places the screening programs in primary or secondary prevention levels. She warns against under and/or over-referral tendencies of screening tools as well as arbitrary designation of cut-off points in evaluating assessment data. Two other major limitations Rogers mentions are the lack of effective follow-up measures and low cost-effectiveness of screening programs. Like Bailey[19] Rogers also asserts that only curable conditions must be screened for and suggests further research into developing more knowledge about disease predictors through standardization of observations and efficient data storage and retrieval.

Many experts in cross-specialty areas agree that for preventive purposes early detection of at-risk children is crucial.

Hobbs[20] restates the importance of prevention and its economical advantages. Meier,[21] Owens,[22] Frankenburg,[23] Levy,[24] Zadig,[25] Brazelton,[26] and many others have commented on the values of early identification of at-risk children in order to prevent or ammeliorate impending developmental problems. This need for prevention is further highlighted by studies which demonstrate strong correlation between observable problems during preschool years and later schooling difficulties.

Stringer[27] reports that most disturbed children were disturbed before they entered school. Sapir[28] and Wilson state that there is strong correlation between poor adjustment to nursery school and later school-adjustment problems.

Denhoff, Hainsworth and Hainsworth[29] also stress the preventive aspects of early identification of and remedial efforts in alleviating later learning difficulties. They state that preventive point of view necessitates working with less stringent levels of confidence rather than requiring certainty of long-range diagnosis. As such one needs to provide maximum stimulation for a range of at-risk children.

On the Definition of Learning Difficulties (L.D.)

One of the major objectives of preschool screening is to identify those children who have a reasonable likelihood of experiencing learning difficulties at school. Therefore there exists a clear need to operationaly define learning difficulties in order to select those observable signals in children that

correlate with later educational difficulties. These signals can then be included in a screening instrument. However, an operational definition that reflects a consensus of experts in the field is lacking.

Owen et al[30] studied 304 children with educational handicaps with the initial hypothesis that these children could easily be classified into some clear-cut groups.

However, their findings reflected the lack of such clearly defined sub-categories due to a large extent of overlaps between these groups.

Cruikshank[31] finds the term "Learning Disability" too broad and suggests others such as "minimal cerebral dysfunction", "neurologically handicapped", "educationally handicapped", "perceptually handicapped", or "perceptual lag". He believes that whether so diagnosed or not most learning disabilities stem from neurological problems.

Wender[32] states that hyperactivity is one of the most prevelant concerns of referring school personnel. He strongly suggests drug therapy for such children. Wunderlich[33] also recommends drug therapy for the hyperactive child. Kershner and Kershner[34] report that asymmetry in the function of the two hemispheres of the brain is believed to be a cause for learning disorders.[35]

Divoky[36] comments that the nation's children are suffering from an epidemic of L.D.'s. She gives examples of school systems that have labeled most of their pupils as learning disabled,

and blames the professionals involved for vague definitions of the problem. She points out that definitions of L.D. are constructed in terms of what a L.D. child is not and yet, she contends, many school systems--including several in Illinois are involved in remediating on large scale because of a confused diagnosis. She charges that many school systems are trying to conform the child to the institutional needs, and they are doing this under the guise of special education services.

Kirk[37] replies to Divoky[38] by pointing out the exaggerations of her article, but at the same time he basically agrees with her. Kirk adds that in 1969 he had written that only 1-3% of the school population should be considered hard-core L.D.

After surveying 1,200 Kindergarteners Haring and Ridway[39] found that approximately 9% of the children could be classified as potential learning disability cases. Heckert and Webb[40] found that teachers referred 14% of the 853 children studied as "not responding to normal classroom instruction". McCarthy and McCarthy[41] report that approximately 1% of school age children are neurologically impaired, 5% are organoid, and 15-20% are educationally retarded and culturally disadvantaged (raising the total referral prevalence to 26%). Myklebust[42] reports that about 15% of school children are underachievers, and approximately half of these give evidence of the presence of learning disabilities.

McGlannan[43] reports that Dr. William Cruichshank discussed the issue of defining L.D. during a national meeting where Cruichshank mentioned that work is underway to define L.D., and that the new definition is to be one of inclusion rather than exclusion. Cruichshank said that the new definition will emphasize "what these children are rather than what they are not".

Dunn[44] offers the following operational definition for "exceptional children": they are those children who differ from the norm in physical and psychological characteristics to such a degree that school programs designed for the majority of children do not provide these children with the necessary opportunities for optimum adjustment and progress. These children are those who need special instruction or supportive services to achieve at a level commensurate with their potential. After discussing a classification of exceptional children and appropriate services, Dunn states that early screening, identification and placement in a special education program are generally necessary in order to promote maximum school progress for such children.[45]

Bijou[46] finds that the terminology "Learning Disorders" or "Disabilities", which lumps together various schooling difficulties, is not very useful from the point of view of treatment since treatment must deal with specific difficulties. He points out the inappropriate connotation of "disability" or "disorder". According to Bijou this sounds as if a child is having difficulties at school because his learning faculty is

disordered or his learning ability is disabled much like a stomach disorder or a writing disability. Bijou states that such a framework would not be useful to those responsible for devising and carrying out educational plans, especially because in reality there are no specific treatment programs for children in each diagnositc category. He calls for describing the child's behavior repertories in specific behavioral objective forms and for planning individualized educational programs based on these evaluations.

Adams[47] also acknowledges the controversies over the definition of Learning Disabilities and offers his own definitions for the purposes of discussion. Adams defines the children with "learning disorders" as the large group of children who fail to learn at the usual rate. He prefers to use the term the child with a "specific learning disability" to indicate those children who are intelligent enough to have achieved higher than they have, who have normal vision and hearing, and who have had adequate education in academic areas and who have adequate motivation to learn. Therefore, the "symptom" of a specific learning disability is a failure to achieve scholastically at a level commensurate with the child's own general abilities.

Another definition of Learning Disabilities at preschool level is afforded by Kirk and Elkins[48]. They equate Learning Disabilities to the extent of discrepancy between abilities and disabilities. The main part of the methodology used in their study was the testing of preschool children with the Illinois

Test of Psycholinguistic Abilities (ITPA), and measuring the extent of discrepancies between the child's abilities in various sections of psycholinguistic functions. This study was based on the premise that at preschool age a definition of learning difficulty would be based on discrepancies in growth in motor, cognitive, linguistic and perceptual abilities. Kirk and Elkin also report that discrepancies in verbal and nonverbal abilities measured by tests as the Weschler Preschool and Primary Scale of Intelligence (WPPSI), and the Detroi Tests of Learning Abilities have been used for such purposes. A main limitation of such an effort, as reported by the authors, is that of inadvertant over and/or under referrals. Therefore this procedure must be used with caution. Please note that they did not screen for physical development.

Many authorities seem to agree that one of the characteristics of a young child with special educational needs is the discrepancy between achievement and potential. Authorities also note the discrepancy among different aspects of the same child's development. According to Senf[49], the management of this child's special needs then can be met through various methods: through medical model geared towards diagnosis and cure; or through an educational model which seeks to describe the strengths and weaknesses of a child's developmental status. The latter method also works to remediate the weaknesses and enhance the strengths. Senf speaks to this point and reviews the historical background which led to promote "educational diagnosis"

instead of a medical approach. Senf acknowledges that the medically oriented diagnosis of children with school problems has not been successful in providing operational recommendations for educational remediation. While Senf reluctantly agrees that the educational model is more operational in an education system he still recommends a taxonomy of learning disabilities developed through a medical model approach which can be developed into a diagnostic system. Such a system could then be combined with the educator's need for detailed treatment planning.

Grossman[50], in discussing the inappropriateness of the medical model in the management of learning disorders, states that etiology is important only if it assists in prevention or remediation. He feels that while medical diagnosis could provide useful supportive information, it cannot replace effective educational management.

Chapter 766 of the Acts of 1972 of the Commonwealth of Massachusetts

Massachusetts Public Law Chapter 766 is a comprehensive special education law which was passed in 1972 and went into effect September 1, 1974 and mandates equal educational opportunities for all children in the Commonwealth three to twenty one years who have not earned a high school diploma.[51] The main thrust of the law is to assure appropriate public education for special needs children without "labeling" and with the goal of

"mainstreaming". It brings the special needs children into the mainstream of regular education programs within the local school systems whenever possible. Where that is not possible, the law provides for parentally approved, alternate arrangements that will best serve the child's educational needs. Chapter 766 embodies the principles of "mainstreaming", delabeling, parental involvement, and the inter-disciplinary evaluation of children. It is one of the few state sponsored special education laws enacted in this country--and the most comprehensive.[52,53]

Under the law the local education agencies (LEA) are responsible for identifying, evaluating, and serving the special needs children in their area. The LEA's may provide these services themselves, either through collaboratives with other LEA's, or on a contract basis with outside agencies. Educational programs are to implement the law through LEA's under the auspices of the Department of Education.

The State Plan[54] advocates local and state-wide campaigns to increase public awareness as to the availability of services for young children and to the need for identification (screening). The use of various media such as radio, newspapers, and pamphlets to reach parents of young children is suggested.

According to the State Plan the criteria to be considered in designing a screening and evaluation program should include the following: First, School systems should refrain from "over-evaluating". Complex screening procedures can be too time--consuming, causing excessive stress to the children and parents in-

volved. Over-evaluation is also expensive. The goal of screening must be to ascertain possible learning difficulties so that an appropriate educational plan can be developed for the individual child--it should not be designed to "tag" a diagnosis. Second, parents should be involved at each level of the process; their input is indispensible. Third, the screening and evaluative process should utilize different sources of information thereby minimizing misidentification or over-referral. A battery of tests designed to assess various aspects of the child's growth and development, parental input and developmental history should be viewed together in developing the educational plan.

Chapter 766 provides separately for three to five year old children: the preschool children are to be under the responsibility of the school system if they are found to have "substantia disabilities". This term is defined in regulation 116 as referring to those children who, a Core Evaluation Team decides, have a reasonable likelihood of being children with special needs and who require special education services upon kindergarten entry. The law provides the opportunity for preschoolers to be screened. All preschoolers whose parents request a preschool screening as well as all entering kindergarten children will be screened. The screening program should include health assessment and a "non-intensive" (developmental) "scan" to identify those children who should be referred for an evaluation.[55]

Those children identified through screening as needing referral and evaluation will go through a comprehensive evaluation by a Core Evaluation Team (C.E.T.) made up of a physician, a psychologist, a special educator, a nurse or social worker. The classroom teacher and the principal are usually to be included in these deliberations.

One point of major concern is the seemingly conflicting messages on the availability of preschool screening programs to all preschoolers. Regulation 304.6, which mandates that "all reasonable" efforts be made to identify all three and four year olds, leads one to believe that screening programs should be available for the total populations of preschoolers. However, Regulation 600.5 suggests that the screening program should be designed for children with a reasonable likelihood of having substantial disabilities.[56]

Although the spirit of the law would dictate that screening should be available for all preschoolers and the State Plan seems to accept this premise[57] , many school systems interpret the Regulations to mean that only parents who think that their children have special needs must, on their own initiative contact school systems and ask for screening.

In February, 1975, the Massachusetts Advocacy Center and the Coalition for Special Education released a report[58] on their evaluation of more than 150 towns in Massachusetts regarding the implementation of Chapter 766. The release reported that the overall implementation of 766 was far behind schedule,

violations were widespread, and no school system was fully implementing the law. It strongly recommended that required, planned, systematic steps be taken by the Department of Education to enforce the law.

One of the major obstacles to teacher-acceptance of Chapter 766 is the mandate for "mainstreaming". Senf[59] defines mainstreaming as the maintenance of the learning disabled child in the regular classroom. He explains that the emphasis in this approach is on the training of the regular classroom teacher in individualizing instruction in order to accommodate individual differences existent in his/her classroom. Of particular importance is the accommodation of the individual differences of the learning disabled children. Senf points out two major difficulties of this method: (1) how can one help the classroom teacher to manage a class with some disruptive children? (2) how can one aid the classroom teacher in meeting the special needs of the learning disabled children who might require special skills? One coping method Senf discusses is that of having a special educator as a consultant to the classroom teacher. While this professional may do some special work with the learning disabled children in regular classrooms, more frequently he/she will assist the classroom teacher in managing curriculum and behavior problems that the teacher has to deal with. According to Senf the advantages of this approach are: (1) the negative effects of labeling a child "learning disabled" is lessened by keeping him/her in the regular classroom, (2) the learning disabled child

has role-models in the regular classroom who he/she can emulate, (3) the regular classroom teacher who is expected to individualize instruction for the learning-disabled child begins to perceive all the pupils as individuals. Therefore, the special skills he/she learns from the consultant serves to benefit all the children in the classroom. (4) The presence of the consultant serves to break the isolation of the classroom teacher, and the teacher has a chance to share ideas with an outsider. The effect of such an approach has led to high teacher morale and to teacher involvement in the total educational process.

Some shortcomings of this approach still remain, especially in relation to the disruptive behavior of some learning-disabled children and the inability of the classroom teacher to deal with it. Another problem cited is that if the classroom teacher does not have the necessary knowledge and skills, the non-aggressive learning-disabled child may not receive adequate special education. Thus along with the concept of mainstreaming goes the need for effective in-service training sessions for classroom teachers.

Available Tools for the Assessment of Young Children

A very large number of available instruments were reviewed. As Meier[60] points out, these tools generally include only a limited domain of growth and development and exclude others so that none of them address the entire dimensions experienced by a developing child. For this reason these tools were found inappropriate

for use in a comprehensive and concise preschool screening program designed for mass screening. A compilation of selected tools can be found in the Appendix III.1. A discussion of the developmental tool chosen, the Denver Developmental Screening Test (DDST) will be provided below. None of the tools reviewed screened for physical development from head to toe, some screening programs included a limited review of physical well-being, such as urine and blood studies.

Psychological Testing of Children

Weiner[61] discusses the nature and objectives of psychological tests used on children, the validity of data obtained from them, and some ethical issues surrounding their use. The Stanford-Binet, The Wechsler Intelligence Scale for Children (WISC), The Wechsler Preschool and Primary Scale of Intelligence (WPPSI), the Bayley Infant Scales of Development, the Cattell Infant Intelligence Scale, the Columbia Test of Mental Maturity, the Gessell Developmental Schedule, the Peabody Picture Vocabulary Test (PPVT), the Illinois Test of Visual Perception, the Rorschach Test, Thematic Apperception Test (TAT), the Children's Apperception Test (CAT), the Bender-Gestalt Test, the Draw-a-Man Test, the House-Tree-Person (HTP) are reviewed.

Wiener points out that psychological test data can define a child's current status but are, at best, suggestive with regard to etiology and course. Wiener states that in the past decade too many children have been tested using tests of ques-

tionable validity. Also poorly employing various psychological tests resulted in undue and often inappropriate interventions.

He points to two main objections to the use of psychological tests a) it is discriminatory in practice b) it violates personal rights. The discriminatory nature of these tests is especially relevant in regards to ethnic background and undue "labeling" of a child that results in a self-fulfilling hypothesis. The violation of privacy aspect has gained much attention in recent years. School systems are required to seek parental permission for such a process and need to report findings to parents.

Allmond[62] in discussing the predictive validity of psychological tests asserts that tea leaves and palmistry are no worse than a WISC for predicting further intellectual attainment of a child. Wagner[63] and Meier[64] state that most such tests are inappropriate as a screening instrument.

The Denver Developmental Screening Test (DDST)

The DDST portrays a child's developmental status without stating an age level or a quotient score, therefore, is less prone to be used for obvious labeling. It is easy to administer, does not require much training and experience in test-giving, takes fifteen to twenty minutes per child, and covers developmental domains of personal-social, fine motor-adaptive, language and gross-motor functions.

The DDST was designed for the purpose of aiding in the case

finding of children at developmental risk from infancy to six years of age. As reported by Frankenburg[65] the 105 test items were standardized on 1,036 Denver children between the ages of two weeks to 6.4 years. There were slightly more boys than girls in the sample, and slightly more fathers in the professional, managerial and sales occupations were in the sample as compared to the Denver populations as a whole. However the authors' data analysis led them to believe that their sample was quite representative of the total population as reported in the 1960 census.

The test format is developed so that the score sheet provides the tester with the opportunity to see all the normative data for the total sample, making it an easy matter to compare an individual child's performance level with it.

The normative data portrays the ages at which 25, 50, 75 and 90 per cent of sample children passed the tasks. The age appropriate tasks to be given to a child are approximately twenty in number and represent the four areas of development.

Frankenburg further reports that the test-retest reliability of 95.8% was ascertained by having twenty children tested by the same examiner a week apart. A subsequent such study involving 186 children tested-retested by the same two examiners a week apart is reported by Frankenburg, et, al, where the agreement rate was 97 per cent.[66] The reliability among examiners was tested and yielded a resultant average agreement of 90 per cent.

Frankenburg reports the validation studies that DDST was exposed to. A preliminary validation study compared DDST results of eighteen children to Revised Yale Developmental Schedule with a Pearson Product moment correlation of r97. In another study, 237 children who were given DDST were tested by a psychologist or a psychometrician approximately one to three weeks afterwards. Bayley Infant Scale or the Stanford-Binet form LM was used depending on the age of the children. The results showed 11% over referrals and 3% under referrals. In a cross-validation study, 246 children were validated with Stanford-Binet and Bayley Scale tests. The over referral rate here was 3.2% and the under referral was 0.4%.

Meier[67] concludes that most of the validation as well as most of the experimental studies conducted in relation to DDST are generally supportive of the test. However, he warns that Black[68] in 1970, while screening 1629 preschoolers found that DDST under-referral rate was high and questioned its validity in testing relatively disadvantaged rural children.

Moriarty[69] questions the original Denver sample upon which DDST was built as well as DDST capabilities in assessing minority children. Werner[70] discusses strengths and weaknesses of DDST and mainly challenges the originator's contention that almost any adult can administer DDST. Both Moriarty and Werner conclude that when used with caution DDST can be an effective screening tool.

Comprehensive Developmental Screening Programs

Realizing that many screening and assessment tools limit themselves to certain aspects of growth and development some early identification and intervention programs have tried to utilize a relatively balanced battery of tests. Meier[71] reviews and discusses some of these. The Kansas Multiphasic Screening Program referred to by Meier and reported by Bellevile and Green[72] employs screening procedures for vision and hearing, speech, tuberculosis testing, blood testing for hemoglobin and urine testing (urinalysis) for assessing some parts of physical well-being but does not include a simple head-to-toe physical screening procedure so necessary for a comprehensive physical screening. The screening staff for this program were mainly nursing students and were found to be very effective. Kansas screening program utilized DDST for developmental screening and referred 10% of children for some kind of follow up on the basis on DDST alone.

Another comprehensive assessment, screening and early intervention program Meier[73] reports on is the LaJunta Parent-Child Center Program. This program combines screening and intervention stages in an organized, well planned fashion, and it also employs DDST as the developmental screening tool. In addition, it uses parent interviews, psychological tests (for referred children) as well as vision and hearing screening. (A comprehensive physical screening is not included, but referrals of

positive cases to physicians are made.)

(SCREEN)

Illinois' Project SCREEN [74] included both direct child assessment by teachers and a service delivery system that provided data analysis and operational information to teachers in order to aid them in devising appropriate educational plans for children with extra educational needs. The screening battery employed was designed to measure more accurately at the levels of substantial developmental impairments with the belief that early identification of high risk children was better realized in this fashion.

The author's goal was both to accurately forecast potential school problems and to efficiently provide operational results to the classroom teacher.

SCREEN test battery consists of four fifteen minute test sessions and a teacher rating scale of child behavior. Each test module contains five subtests--a self-concept and school adjustment index, Visual Skills, (not vision screening), Auditory Skills (not hearing screening), Figure Copying and Basic Knowledge. (This battery does not, again include comprehensive screening for physical development.) Having completed these tests the teacher then rates the child's behavior on forty items. Scoring and analysis of SCREEN data as well as production of reports are done by an outside agency through the use of the computer. The report provided to the teacher includes

a pupil profile, a listing areas of significant weakness, child's intra-individual differences, and a summary which points out which behaviors the teacher should look for. In some instances the report recommends referrals. It is expected that the teacher can put this data into use in designing the child's educational plan.

Bailey[75] describes the desirable characteristics of a screening program as simple, low in cost, acceptable to clients, reliable and accurate, sensitive and specific. He also states that screening programs should aim to identify remedial conditions and like Nader[76] calls for linking screening program with on-going health care services.

Allen and Schinefield[77] report on the Pediatric Multiphasic Program for children of four years and over by the Permanente Medical group at the Kaiser Foundation Hospital in San Francisco. The Pediatric Multiphasic assessment takes one and one half hours per child and covers many specific areas through various tests but a simple head-to-toe physical development assessment guide is not mentioned.

In order to accommodate the increasing need for mass screening in the country, automation efforts which utilize computers are reported. Collen and Cooper[78] expand on the need for clear-cut criteria for such endeavors. They point out the limitations of such efforts and recommend the development of more adequate computer programs.

The Brookline Early Education Program[79] is a comprehensive one which follows and guides the educational development of children from birth to four and one half years. This pilot program serves to assess the infant's needs at birth and seeks to provide appropriate early intervention. The diagnostic screening program is multiphasic and multilevel. The physical assessment is done primarily by the Pediatrician.

Swedish Findings

Probably the most comprehensive preschool screening reported in literature is that of the Swedish findings by Wagner.[80]

In 1969 Sweden launched a program screening all four year olds in the country. After five years of experience with extensive screening with various methods and procedures and by various professionals, the Swedish findings and the resultant recommendations provide us with most valuable information.

The Swedish screening battery screens in somatic, mental, emotional and hearing domains. Speech screening is not a part of this program, but if a child is observed to be experiencing such difficulty, he is referred. Vision and hearing screening is also employed. Urinalysis and blood pressure screening proved to be of little use and were discontinued. After experimenting with a physical screening through medical examinations by a pediatrician for a long period of time and comparing results to a nurse-delivered physical screening, the decision was made in favor of the nurse's screening. The pediatrician is no longer required to see all the children, only a few referred

by the nurse must see the physician.

The nurse and the dentist are the only professional screening staff who see all the children. The dentist's screening domain, of course, is limited. The nurse, however, carries out the bulk of the comprehensive screening process. This decision was reached after extensive experience and experimentation which resulted in the conclusions that the nurse's role in major screening was not only cost-effective but also very reliable. Therefore, the use of the psychologist and the pediatrician is limited to a very few cases.

One of the rather surprising findings of the Swedish findings was that the function of the nurse in screening for mental health was very successful. It was decided that the validity of so many psychological tests was so poor that the more informal observation made by the experienced nurse was the best mental health screening. Therefore, observation items on the child's behavior during screening, such as response to tester and to tasks, cooperativeness, contactability, and distractability were added to the nurse's list. Speech observation and counting were among other items found useful.[81]

The Somatic Health Screening (Physical Screening) included measurements of height and weight and head circumference. Observational physical screening of skin, eyes, ear, nose, musculoskeletal system (especially in relation to gait, coordination, position of extremities and the spine) were other important items screened for. Wagner does not report a head-to-toe

simple physical screening tool which combines these observations. Parent counseling by the nurse was found to be very useful but for economic reasons was limited to few necessary cases.

The Swedish screening experiments resulted in Swedes considering the activities of the nurse in screening as the "heart" of the whole program. They also found the nurse-administered physical screening and interview combinations indispensible. The unavailability of comprehensive screening tools appropriate for mass screening purposes is disconcerting. Many researchers have felt the need for a single comprehensive screening tool.[82,83,84] Such an instrument is not reported in the literature. The Northeast Regional Resource Center has reviewed screening instruments and found very few which were comprehensive. Mardell and Goldenberg's review in Illinois, Nuttal and Gomes's survey in Massachusetts and the report of the President's Committee on Mental Retardation share this concern and elucidate the great need for comprehensive but concise screening tools for preschool screening.

> It can be readily determined from the material presented in this review and in more detailed treatises (Meier, 1973b) that there are very few, if any, adequate single instruments for primary or subsequent screening and assessment of young children at developmental risk. A careful selection of empirically validated items from such instruments and a prudent combination of the selected items for appropriate developmental stages and chronological ages promise to comprise a satisfactory comprehensive identification system. However, any such new combination will have to be subjected to further empirical validation.[85]

C H A P T E R III

THE DESIGN OF THE SCREENING BATTERY

In general screening must consist of quick simple procedures and seek to identify those children in need of a more definitive study.[86] When screening is for educational purposes this definition needs to be further specified.

In this chapter, the critical considerations in designing a potentially effective preschool screening battery are indicated, III.1. A specific instrument composite is then proposed, III.2. Finally the validation approach is discussed, III.3.

While the effectiveness of a preschool screening program is mainly determined by the screening battery, the screening delivery is the main determinant of its viability. As such the design of screening delivery gains importance. In this chapter critical delivery constraints will be briefly discussed. A separate section on Delivery Design will be provided in order to give the reader some insight into the various issues which need to be considered in the design of the total preschool screening program.

III.1: The Design Considerations

The Major Purpose of Preschool Screening

The major aim of preschool screening is ultimately to provide information for the preparation of an appropriate educational

plan which will promote the child's maximum potential. The child's deficiencies and strengths should be identified in order to match with an effective educational plan. Through this educational model approach, the child's deficiencies can be remediated and strengths can be enhanced.

A preschool screening program, then, must be designed to identify those children who might need the alteration of standard school curricula in order to provide for their educational needs. An objective of a preschool screening program is to identify those children who might have developmental delays or who might be at-risk of later experiencing them.[87,88,89] The screening battery must be designed to achieve this end. The resultant action would be to refer such children for further evaluation.

The Need for Interfacing the Medical and Educational Models

An overriding concern should be utilizing an educational model rather than a medical model frame of reference. Medical model is causal in nature and is treatment oriented and calls for diagnosis. Educational model is descriptive of a child's needs and seeks to remediate deficiencies and enhance strengths. The educations model can yield more gains in providing appropriate education to special-needs children.[90,91,92]

However, some of the characteristics a special-needs child displays are physical in nature and lend themselves to interven-

tion through a medical model i.e., vision and hearing problems, orthopedic problems, etc. Such needs constitute those that are not directly educational and thus should be sorted out by a screening battery for specific referral to appropriate professionals for evaluation and treatment or alleviation. For this reason a physical screening tool must be included in the screening instrument battery. The fact that 3-5 year olds are least in contact with the health care delivery system highlights the importance of this assertion.[93]

The Need for Comprehensiveness

The screening battery must be sufficiently comprehensive to cover the various aspects of a child's growth and developmental status[94] and must compare the results with age-appropriate data.[95,96] This comparison with normative data is necessary in order to identify at-risk children and refer them for further evaluation for early intervention.[97] This presupposes a reliable and valid instrument appropriately standardized.

With the increased emphasis on providing education for each and every child an additional constraint has to be taken into account: refraining from "labeling" the child as a result of screening.[98] In operational terms this means that the screening should be sufficiently comprehensive to allow one to describe the child's growth and developmental status in various aspects such as the physical, motor, psychosocial and cognitive domains.[99,100]

Most screening instruments reported in the literature include a limited domain of growth and development and generally exclude the others.[101,102,103] The inclusion is generally representative of the author's specialty. However, a screening instrument designed for primary screening that is to be used for mass screening purposes must of necessity, be comprehensive. In order to operationalize this, one possible strategy has been designing a battery of tests representative of specialty instruments. One has to extract most valid portions from these instruments and devise a composite.[104] None of the available screening instruments allow for a head-to-toe screening for physical development.

The Need for Forecasting Capability

Since the major objective of a preschool screening program is to identify special needs of children with the aim of providing an effective educational plan, forecasting capability of the screening battery (its predictive validity) gains crucial dimensions.

Most screening instruments reported in the literature describe a child's growth and development in limited domains and at the time of screening. Thus, these instruments are now oriented. However, preschool screening aims to predict how these children will perform in the future--at school. Many available instruments have not been validated (Meier) those few which have been (DDST) were validated against other tests.[105] This is not

true validation, it is more of a calibration. The predictive validity of such instruments have been questioned.

Because of the stated definition of the preschool screening, the screening program needs to have a predictive capability. In other words, identifying 'at-risk' children by definition implies forecasting. Those characteristics that a special-needs child presents and those which will persist until after school entry are the ones the screening program needs to identify. The characteristics referred to here are those which will require special education measures at schooling in order to promote the child's full potential.Coupled with the philosophy and legal expectations that necessitate the provision of equal educational opportunities to each and every child this prediction becomes necessary. This prediction can help facilitate the early identification of at-risk children so crucial for alleviation or prevention of[106] possible later educational problems.

The Need for Pretesting

It would be very useful to pretest the screening battery during a pilot project conducted in a neighboring nursery school. This procedure can serve to provide additional training for the screening staff. It can also facilitate staff agreement on the wordage of the screening tasks and scoring of the screening results. Both of these considerations can help to decrease the error rate.

The Need for Compatibility with the Screening Delivery Design

The screening delivery gains much importance in mass screening programs because it significantly contributes to the viability of the program.* The major delivery constraints are time, finances, available expertise and legal stipulations. The major objective of the screening delivery is to increase the acceptability of the preschool screening program by: (1) parents and children, (2) school systems, (3) other governing and/or funding agencies--state and federal.

The screening battery design should be compatible with the screening delivery design. In operational terms, the screening battery should be: (1) non-intrusive, (2) compatible with school system environments, (3) must not require expertise not readily available tc the school systems, (4) must take short time to administer, and (5) must be low in cost.

The Need for Wait and Watch Categorization

One of the major objectives of screening which at once becomes problematic is prediction. The problem arises partly because many of the screening tools are now oriented and assess the child's growth and developmental status at the time of screening. Thus the maturational factors, so substantial at the preschool ages are not fully considered.

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*For details on this refer to Chapter IV.

Over-referrals (false positives) and under-referrals (false negatives) should be minimized.[107] Warning signals of especially those conditions that have a deadline for amelioration such as amblyopia, must not be overlooked. At the same time over referral and thus undue "labeling" at a very young age has its problems of high cost both from monetary and psychosocial aspects. In "predictive" screening one should allow for maturation to remove some of the problems. In other words, the developmental problems identified which probably will not persist until school-age should be watched for but not referred. This wait and watch category will allow for retest procedures and will minimize the dangers of labeling.

The Need for a Categorization that will Allow Specific Referral

Those developmental problems identified which will persist until school age but will not necessarily directly contribute to possible educational and schooling problems, (such as scoliosis, eczema, allergies) should be pointed out to parents and if necessary referred to other agencies.

In order to differentiate between the needs that can be referred to other agencies and substantial educational needs a category for specific referral is suggested. This category is to include those children with identifiable specific needs such as vision, speech and specific physical handicaps and who should be referred to appropriate professionals first. That is, further evaluation by specialist is sought for before considering the

need's implications for educational planning. This is to decrease Core Evaluation Team (CET)* efforts which clearly are a very expensive procedure both from monetary and psychosocial points of view. While screening should not be construed as a diagnostic tool it can be so constructed as to classify "Fail" into specific categories so as to facilitate Specific Referral. This category can help provide an interface between the medical model and the educational model.

The considerations discussed in this part of Chapter III point to a screening battery which uses comprehensive, standardized screening instruments which can identify preschool children at risk while shunning labeling. The battery must have the capabilities of allowing for wait and watch and Specific Referral categorizations. It must serve to provide for an interface between the medical model and the educational model while sorting out not-directly-educational special needs. Also, the battery must have a forecasting capability. It must be subjected to pretesting and be made compatible with delivery design.

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*Please refer to literature review for details on C.E.T.

III.2: The Proposed Screening Battery

Section I

Tests appropriate for preschool screening are very few in number. A vast number of available tools were reviewed in order to identify those which met the criteria stated in III.1. A useful compilation of 94 tests for prekindergarten high risk children was made by Mardell and Goldenberg. With some minor modifications their compilation is adapted as Appendix III.1. Additional nineteen tests which were critically reviewed are presented in Appendix III.2 as adapted from Reinherz.[108] Information on the Denver Developmental Screening Test is repeated in detail. Names of eleven additional tests reviewed appear in Appendix III.3.

Different school systems were contact for any tests which might have been developed "in-house". Several such tests were identified. Since these were not standardized nor checked for reliability and validity they were eliminated from further consideration. Finally the files of the Massachusetts Department of Education were examined for further identification of tests, some of which have been included in Appendix III.3.

The long array of tests thus generated were then critically examined with respect to the considerations described in III.1 of this chapter and the delivery criteria to be described in Chapter IV. The conclusion is that the Denver Developmental

Screening Test (DDST) can serve as the major component of the battery.*

The DDST meets some of the recommended criteria in that it is standardized, has been tested for reliability and validity with acceptable results.[109,110,111] Its results can be compared to normative data partly required by the Medical Model. It describes the child's growth and developmental status in personal-social, fine motor-adaptive, language and gross-motor domains partly required by the Educational Model. The DDST results are not presented in a final numerical score partly recommended by the constraint on delabeling. However, it needs to be supplemented by a physical screening tool since it does not screen for physical development except in motor areas. It also lacks the capability to sort out not-directly-educational special needs, and does not lend itself to Wait and Watch and Specific Referral categorizations. Although it has been tested for validity its forecasting capability needs to be re-examined.[112,113] DDST also meets some of the delivery constraints of brevity, requires limited expertise from the tester and is low in cost.

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*Please see the Review of the Literature for details on DDST and Appendix V.5 for a DDST score sheet.

The Physical Component of the Battery

The component of the battery which is to screen for physical developmental risks must include vision screening, height and weight measurements and an observational physical screening tool designed to provide a quick head-to-toe assessment.

Hearing Screening would be desirable if delivery constraints allow this. Pure-tone audiometry often used for this purpose requires a very quiet room, preferably a sound-treated one. The ordinary school noises, fans, heaters provide a masking effect that makes the test results unreliable, such a situation often results in a large number of false positives.[114] Due to such delivery constraints, a hearing screening with pure-tone audiometry is not included in the design of this battery. This exclusion can be compensated for by careful observation of the child's speech and responses to verbal instructions[115] during the physical screening. Also the criteria for the categorization of the screening battery results are so constructed that the DDST Language section results will weigh heavily. This is particularly true in relation to the Specific Referral for speech and hearing evaluation.

Vision screening is necessary because some vision problems which manifest themselves during preschool years must be attended to without time loss.[116,117] The tools utilized must be appropri-

ate for the three and four-year-old group who might have difficulty with directionality required in testing with some common instruments, such as the Illiterate E charts.[118]

Vision screening tools suggested are Allen Cards for acuity and Stereo Fly Test for stereoscopic vision assessment.[119] The latter is not required by the Massachusetts Department of Public Health. It must, however, be included in a preschool screening battery because early identification of a child with developing amblyopia might save his 3-D vision. If undetected until approximately six or seven years of age, this condition will be irreversible, resulting in permanent sight loss of one eye. Clearly the multifacetted implications of three dimensional vision loss include legal, social, educational and medical considerations.

The rationale for including height and weight measurements is that this simple procedure can provide pertinent information about a child's growth and development and nutritional status.[120]

The Observational Physical Screening Tool (OPST) is recommended as a part of the battery.* The rationale behind this is that DDST does not take physical growth and development into account in a comprehensive manner. Also the three and four year olds constitute the age group least in contact with health care agencies at the national level. One of the positive results

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*The OPST is discussed in detail in Section II of this chapter.

expected from the implementation of Chapter 766 preschool screening regulations is that of bringing this age group in contact with the health care delivery system.[121] Same is true for the EPSDT [122] and the Economic Opportunity Act.[123]

The inclusion of OPST in the battery then will supplement the DDST's comprehensiveness in screening preschoolers for developmental risks.

Other crucial characteristics of a preschool screening battery which need to be provided for are: one, helping to provide for an interface between the educational model and the medical model; two, sorting out the not-directly-educational special needs; three, allowing for Wait and Watch and Specific Referral categorizations; and four, having a forecasting capability.

As discussed earlier, because the DDST describes the child's growth and developmental status in comparison to normative data, it promotes the acceptance of the proponents of both the medical and educational models. However, the interface between these models must cover those developmental characteristics which are considered important by each of these models and its associated professionals. What may not constitute a "referrable" observation for a health professional may be perceived as otherwise by the educator.* Some areas of mutual concern need to be covered

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*For instance lack of competency in cutting with scissors or toeing-in at age five may be reason for concern to the educa-

but the screening must not be limited to these. Therefore, the need for a comprehensive physical screening tool is clear since the other developmental screening tools such as the DDST do not cover this area.

However, the comprehensiveness of a physical screening tool which satisfies both the health professional and the educator, is not sufficient in itself. In order to facilitate and help operationalize a working interface between the two models, the screening battery must be able to sort out the not-directly-educational special needs.

The use of an OPST such as the one developed here, can allow for specific referral and insure putting these children in contact with the health care delivery system. It can sort out not-directly-educational at-risk characteristics, some of which can be dealt with by the medical model and its associated professionals. Pertinent evaluative results then can be operationalized by the educator in devising appropriate educational plans.

Compatibility with Delivery Constraints*

The proposed battery meets the delivery constraints mentioned earlier. The battery is designed to: (1) take a total of thirty minutes per child for screening time; (2) be low in

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tor but not the health professional. A small leg length discrepancy may concern the health professional and not the educator. Vision problems may concern both.

*Refer to Chapter IV for more details.

cost; (3) require minimal amount of equipment; (4) utilize readily available expertise; (5) meet the legal stipulations; and (6) be acceptible to parents, children and school systems as well as related funding agencies.

The acceptibility of the screening program is assured by both the battery and the delivery design. The fact that the battery is non-intrusive, non-interfering and easily administered by available expertise, contributes to its acceptability. The complementary delivery characteristics are: brevity, simplicity, convenience, low cost, appropriate site, efficient screening strategy and competent but readily available screening staff. A detailed discussion of these characteristics is provided in the section on the Delivery Design. The two major aspects critical to the proposed battery are staffing and the screening strategy.

Staffing decisions are crucial both to the battery and to the delivery design. Employing competent and readily available expertise is necessary for assuring low error rate and high accuracy as well as providing a financially feasible screening program. It must also meet the legal requirements.

Because of her diverse background the nurse is an appropriate professional.[124,125,126] She can administer the DDST and the physical component of the battery and is state certified for vision and hearing screening in Massachusetts. Two possible alternatives include: (1) school nurses from two or

more school systems form a team and screen for each school system, (2) import an outside team. Due to delivery constraints, the second alternative is proposed here. Such a screening team can consist of senior nursing students and their instructor.

The Screening Strategy design includes considerations of: time, finances, means of data collection for categorization as well as for the evaluation of the screening program, routing procedures, physical set-up, and staff allocation. A multiple station approach is proposed with five developmental screening stations (DDST and OPST), two vision screening stations and one height and weight station. The heuristic suggested is to keep the screening time to screener ratio constant. The recommended set pattern of routing is from Developmental to Vision and then to Height and Weight. Screening results should be compiled centrally by the use of a Face Sheet.* Parent involvement is recommended.

Additional staff recommendations include: a receptionist who collects family history through a brief parent interview, and a facilitator who guides parent-child pairs through the routing procedure. The receptionist is to orient the parent to the screening procedures in the beginning and collect the Face Sheet at the completion of the screening. The proposed screening strategy is designed to decrease time and cost of the process while promoting a pleasant experience from the parent-child

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*See Appendix to Chapter V for a sample Face Sheet

pairs. Since this design is to alleviate congestion, it is expected to decrease the error rate and to increase child co-operation.

A screening battery designed with the above considerations in mind can yield assessment data operational for educational purposes, while relieving the school systems from the responsibility of dealing with the not-directly-educational special needs.

In summary then the proposed screening battery includes the Denver Developmental Screening Test (DDST), The Observational Physical Screening Tool, the Allen Cards and the Stereo-Fly tests for vision and height and weight measurements. The categorization proposal is that the children screened be classified into four groups: (1) All O.K. Now, Category I; (2) Wait and Watch, Category II; (3) Specific Referral, Category III; and (4) Substantial Needs Referral, Category IV.

III.2: Section II

The Observational Physical Screening Tool (OPST)

The OPST was developed and pretested by the author to be used in a preschool screening program.

The Purpose of the OPST

The OPST is designed to identify those children who might be at developmental risk, particularly in relation to their physical development. The child's physical make-up is observed in relation to the age-appropriate characteristics that the majority of children display.* Substantial differences from the age-appropriate characteristics may constitute reason for referral.** The referral is usually to an appropriate specialist*** for further evaluation to:

1. confirm "at-riskness"
2. ascertain if any prognosis and/or diagnosis can be reached.
3. explore treatment, cure or alleviation possibilities.

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*This is commonly referred to as the "norm"

**See section on categorization criteria for details

***Some specialists referred to could be an orthopedist, pediatrician, speech pathologist, opthalmologist, etc. Neurological and psychological referrals must be through the pediatrician.

4. determine if any limitations must be imposed on the child's school activities because of his/her physical characteristics.
5. obtain expert opinion on the child's growth and developmental status as it might relate to his educational needs.

(This is to provide input for the educator who has the ultimate responsibility for the child's educational plan).

The major characteristics of the OPST

In essence the OPST is designed to sort out not-directly-educational special needs. It seeks to screen out those unusual characteristics which might point to special needs (conditions, diseases, imbalances) which are amenable to treatment or alleviation through the medical model. This is the Specific Referral categorization. Some examples of this categorization are orthopedic, hormonal, hearing, vision, speech and allergic problems.

The remaining children with questionable results need to be managed through the application of the educational model. This group includes those children who are: (1) not classified as being at-risk by the specialists, (2) diagnosed as having certain traits and/or conditions which need not and/or cannot be treated, and (3) those children who need to have supportive services in order to function. The school system, then, can devise appropriate educational plans for these children. Thus,

the educator can have the benefit of receiving input from medical-model professionals and yet exercise his/her autonomy.* In this way, the OPST can serve to decrease the burden on the school systems while providing for an interface between the medical and educational models. The medical model associated professionals can have their share of the responsibility in the management of the special needs child. The education agencies can retain their autonomy in dealing with the children because their own means and expertise are not disturbed.

The referral types of OPST

The OPST results lend themselves to Wait and Watch and Specific Referral categorizations. If the child's unusual characteristics center around clearly orthopedic concerns, he/she can be referred to an orthopedist for evaluation. If these characteristics are so much distributed that they don't seem to cluster around specific areas, the child should be referred to a pediatrician. Clearly vision problems should be referred to an ophthalmologist and speech problems to a speech pathologist. This specific referral capability and procedure is not commonly expected from a screening tool. For instance, Chapter 766 expects the screening battery to "red flag" a child who might be at-risk. The child then has to be evaluated by a team of ex-

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*According to Chapter 766, a binary type tool such as the DDST would necessitate a full scale evaluation by an interdisciplinary team, then referrals would be made to different specialists followed by another interdisciplinary evaluation (CET).

perts (C.E.T.), and then referred to the appropriate specialists. After specialist input, the C.E.T. makes recommendations for further referral to aid the educational plan. The Specific Referral capability of the OPST however shortens this procedure without compromising comprehensive evaluation. If the child's observable difficulties are clearly orthopedic, it would be unnecessary to subject this child and the family to the unnecessary trauma of going through a series of evaluations.

A step by step approach can be possible with Cat III. For example, the child can go to the orthopedist and be evaluated. The results then can be reviewed and if necessary further referrals can be made.

The objective of Specific Referral is not diagnostic. It provides rather a Finer-Sifting[127] capability which can lessen undue trauma to parent and child, and decrease cost for the school system.

How the OPST was developed

The author has had twelve years of experience in the assessment of young children of various backgrounds and with various needs. As a pediatric nurse and a member of a clinical faculty, she has employed various tools and developed heuristics in the needs assessment of children. Although the needs identified covered different domains of a child's growth and development,

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The educator has limited autonomy in such a process.

the physical assessment aspect has been a priority. This, of course, is due to the role and responsibilities expected of a nurse-faculty.

With this background as a base, various medical and nursing texts, journals, periodicals, conference notes were reviewed. An appropriate physical screening tool was not found. It was therefore decided to develop such a tool. The literature was surveyed in order to determine the types of diseases, conditions, anomalies, disorders that commonly ocurred among the three to five-year-old group. The easily observable signals of such conditions were listed in a head-to-toe fashion. The assessment actions for each were identified.*

The screening delivery constraints were then superimposed on this list. Some of these were: (1) cannot undress the children, (2) cannot look into throat, nose, ear extensively, (3) the procedure needs to be short (4)expertise required must be minimal, (5) cannot have painful procedures--i.e. injections, blood samples. As such, the assessment actions which necessitated the above procedures were eliminated from the list.

Next, the list was examined for redundancies and these were eliminated. The remaining items were clustered under the

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*Such an approach, going from "Outcomes" to "predictors" is discussed in relation to school attendance and achievement by Stringer. See Lorene A. Stringer "About Screening" Heath Care Screening and Developmental Assessment, National Institute of Mental Health, 1973, p. 53.

categories of general observations and different bodily parts. This last step not only cuts the time requirements but makes the tool consistent with the definition of a screening tool. In other words, a screening tool should not be viewed as diagnostic. The signals observed for in OPST were derived from a thought process which included causality. However, the OPST presentation does not display this characteristic. This was purposefully done.

What needs to be included in a screening instrument are the correlates of conditions to be screened and not necessarily causal factors. (The causality is to be sought during the evaluation process by the specialist). For instance, if most children with osteogenesis imperfecta have blue sclera this should be looked for in screening children. Whether the blue sclera is caused by osteogenesis imperfecta or osteogenesis imperfecta is caused by blue sclera need not concern a screener. The scope of a screening tool is geared to the objective of deciding which children need further evaluation and by which professionals.

For this reason, an effort was made to present the OPST in such a way that a diagnostic approach could not be attributed to it. In other words, the possible signals correlates or specific physical conditions were not matched to the conditions in mind. Rather, these were arranged under specific bodily parts to be observed. The major aim is to identify those characteristics that differ from age-appropriate ones. In order to

do this knowledge of what is age-appropriate (norm) is necessary. The experienced school nurse is expected to have this knowledge. With minimal additional training she can be proficient in it.

However, in order not to overlook some significant deviant characteristics, a short list of these signals are provided in the OPST. These are expected to serve as reminders to the nurse that the child's physical development might not be "just right". As Stringer[128] aptly points out, a screening tool should help us take an educated look at a child. The OPST provides such a possibility.

The Staff requirements of the OPST

The physical screening tool is designed to be administered by a professional nurse. The school nurse is a very good candidate. She can use the tool during her regular kindergarten screening or during her other contacts with children of different ages. This tool was developed to be used during a preschool screening program, but it can be used for other ages as well. The nurse's education, training and knowledge of growth and development can aid her in assessing what are age-appropriate.[129] A review of growth and development is encouraged before the nurse employs this tool. This can be accomplished by the school nurse with minimal effort.

Many school systems have multiple school nurses employed. Some towns in Massachusetts employ a number of public health

nurses in their Board of Health agency. These nurses also act as school nurses. This pool of professional nurses can plan to participate in a school system preschool screening program where they can employ the OPST. Presently, these nurses are mainly engaged in vision and hearing screenings only. However, they have much to offer to the total screening process. The use of OPST can help systematize their already present assessment skills, and facilitate their fuller contribution to identifying young children at-risk.

The scope of the OPST mainly concentrates on a head-to-toe observation of physical development. Because many developmental screening tools and the DDST in particular, have limited capabilities for assessing social behavior, the OPST has a section on social interaction. When the OPST is used in addition to the DDST, this section provides additional information on the child's social-emotional behavior. Also the OPST provides for observing and recording the child's speech characteristics. This gains importance when the screening battery does not include separate speech and hearing screenings. The Swedish Findings corraborate this and report on the value of the nurses' observations in this realm.[130]

The Components of the OPST include general areas such as body-build, posture, gait, coordination and skin. A more detailed observation of bodily parts is also provided in a head-to-toe pattern. Speech is separately observed. The behavioral obser-

vations are recorded separately as well. Thus the OPST consists of three main sections: (1) general (2) bodily parts (3) behavioral observations. The speech observation can be considered under "general".

The Bodybuild portion of the physical screening tool helps the tester (observer) observe and record the child's status on his bodily stature. This can give an indication of the child's growth pattern and physical make-up. To the experienced eye, such as the nurse's, such a test may indicate deviations from the norm, possibly due to malnutrition, hormonal problems and abnormal and/or uneven bone growth. This information can be of great value for early intervention. The bodybuild portion looks for age appropriate proportions and strength. Spine curvature, unusual body positioning such as unnecessary squatting are observed under posture.

Gait observations of a child is very significant in that it can point to uneven bone growth, joint problems, and neurological immaturity or problems as well as muscular problems. Here the child's limpness, walking problems, tension while walking, and waddling are looked for.

In observing for coordination the screener looks for tremors, twitching and overall difficulties in coordination of child's body in carrying out daily routine activities. This also points out to possible neuro-muscular difficulties which might be pre-cursors of later and more serious difficulties. Some of these might result in perceptual difficulties which can

make the child's learning and schooling difficult.

Skin is a good indicator of various health problems. In this section of the physical screening skin is observed for color, (as opposed to paleness), texture, tonus and lesions. Unusual characteristics of the skin may indicate some nutritional, hormonal or metabolic imbalances which may effect learning later on.

Since verbal communication is very important in social learning situations such as schools, speech is included in the physical screening. Unusual speech, immature speech, unusual voice (tone, volume, pitch, etc.), unusual responses or no responses to verbal communication attempts are observed.

Under the category of head, unusual characteristics in hair, face, eyes, nose, ears, lips, mouth and neck are screened. The shape, color, texture, position, symmetry, size, motion and lesions of these bodily parts are screened. Possible signs and symptoms of genetic, hormonal, infectious and environmental problems might be reflected in the "unusualness" of these bodily parts.

While screening the trunk area for unusual characteristics, the shoulders, chest, spine and hips are carefully observed for position, symmetry, size, shape, motion, unusual curve, and for functionality. Unusual characteristics observed in these dimensions might be signs of conditions which can later affect body integrity and neuro-muscular development. Or, they can

point to the presence of other problems.

In screening extremities legs, arms, feet and fingers are observed to detect unusual characteristics. The size, shape, position, tonality, symmetry, motion, functionality, color of these parts are observed. Unusual characteristics observed in these aspects might point to potential musculo-skeletal or neuro-muscular problems.

Shape and color of the palm, fingers and finger nails can provide clues on congenital or genetic defects such as Downs Syndrome associated with mental retardation or heart defects such as Tetralogy of Fallot, to name a few.

The behavioral observations are in relation to the child's social interaction, separation from parent, attitude towards the tasks and the professional, as well as his/her response to difficult tasks. Some guidelines are provided for the observer but these are not intended to be limiting.

The characteristics observed under social interaction provide information on whether the child is perceived as: shy, aggressive, hostile, pleasant or sociable. The observer's perceptions on whether the child: clings to the parent, separates easily but acknowledges the parent, and completely ignores the parent are recorded under separation from parent.

The behavior characteristics observed for under attitude toward tasks and the professional include the observer's perceptions whether the child is: cooperative, non-cooperative, and easily distractible. The child's response to difficult tasks

is observed in terms of the observer's perceptions whether the child is: persistent, tense, miserable, easily frustrated, and gives-up easily.

The experienced professional nurse's observations of the child's behavior can provide some information about the child's socio-emotional development.* This can supplement the developmental screening. The DDST personal-social sector relies only on parental reporting of the child's social behaviors.

The administration of the OPST takes approximately five minutes for the experienced nurse. If the child is observed during active play or during the administrationof the DDST this time can be shortened. The reason for this is that many of the DDST tasks the child is asked to perform provide the opportunity for observing the child's physical development, i.e. coordination, gait and functionality of various bodily parts. Clearly the OPST can be used in various situations and requires minimal contact with the child.

Scoring the OPST. An effort was made to decrease subjective judgement and systematize referral in designing the OPST scoring system. Unusual characteristics** of the observed bodily parts

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*After at least five years of large scale screening experience the Swedish Findings report that the nurse's observations were found to be more reliable than those of many psychological tests. See Wagner, 1975.

**Those characteristics that are not age-appropriate and not usual.

as well as the general observations of physical development are scored as (F). Multiple such observations distributed in different sections constitute reason for referral.*

A major consideration in devising criteria for referral is its compatibility with Chapter 766-like laws. Under Chapter 766, only those preschooler with multiple special needs are to be referred.[131] The problem arises in the following circumstance: if a child has substantial needs in one domain of physical development should he/she be referred? Although this need might require early intervention, he/she might not be referred because of "multiple needs" criteria. This is a shortcoming of the DDST. If a child displays major language difficulties but is scored as developing normally in other sectors, he/she will not be referred by the DDST.

A screening tool needs to counteract this dilemna and also needs to have consistent referral criteria. For this reason, the OPST sections in this study were so designed so that certain observations of common preschool problems could be viewed from different angles. Therefore, they could be scored at different sections. For instance, signals of some orthopedic difficulties can be observed in different sections of the OPST in the following fashion:

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*Please refer to the section on Categorization Criteria, Chapter V.

coordination	
gait	
body-build	observed for in the general section
posture	
hip asymmetry	
spine curvature	observed for in the trunk section
asymmetry of legs	
unusual motion of feet	
equinus (tip-toe) of feet	observed for in the extremities section
unusual position of feet	

Three F's distributed in two sections constitute reason for Specific Referral. So, if a child has leg-length discrepancy he/she can be referred to an orthopedist for evaluation because: he/she will receive an F in gait and probably in posture as well; hip asymmetry will result in an F in the trunk section; and asymmetry of legs will result in an F in extremities. Therefore there will be at least three F's in two different sections, thus the need for Specific Referral.

Similarly, a child with equinus (tip-toe position) can be referred for orthopedic evaluation because: the child will probably score an F on gait in general section; unusual motion and/or position of feet as well as equinus will result in at least two F's in the extremities section. However, if the child's equinus is only habitual and therefore periodic or temporary, the child's gait will not be scored with an F. Thus, the child will be categorized as Wait and Watch. These categorization

results correspond to what would generally be recommended by professionals in the field.

The OPST and Delabeling Concern. The results of the OPST do not label the child. The negative results mean everything O.K. right now. The positive results mean the child needs further evaluation. The referrals are mainly to physicians. This is not an unusual occurrence in a family's life. In fact, even the "Cat IV Substantial Referral" child is referred to a pediatrician.

The need for Pretesting of OPST. This observational physical Screening Tool (OPST) was developed by the author and refined by screening 135 preschoolers in a Western Massachusetts school system preschool screening program. Five pairs of senior nursing students observed approximately thirty children each and compared their results. Some of these results also were checked against the author's results. (See Appendix III.5 for text of OPST.) Another pretesting during a pilot project would add further refinement to the tool.

OPST and the Battery Constraints. The OPST is a comprehensive tool which screens the child's physical development in a head-to-toe fashion. (The literature survey did not reveal a similar one.) It serves to provide an interface between the medical and educational models. OPST results lend themselves to Wait and Watch and Specific Referral categories. It is not a diag-

nostic tool but has a finer sifting capability. The OPST meets the battery constraints.

The OPST meets the delivery constraints of time, finance, and expertise. The OPST takes only 3-5 additional minutes to administer, requires only readily available expertise (the nurse) and is very low in cost.

The OPST is non-intrusive, non-interfering, and compatible with school system environs. These characteristics make it readily acceptible by parents, children and the school systems.

In summary, then, the OPST meets the battery design constraints as well as the delivery constraints. It provides a concise but comprehensive procedure in physical screening, does not label children, can provide for an interface between the medical and educational models and allows for Wait and Watch and Specific Referral categorizations. The OPST requires readily available expertise, takes short-time, is low in cost, does not require equipment and is non-intrusive in nature. As such, it is readily acceptible to parents, children, and school systems as well as to other governing agencies.

Furthermore, the OPST is readily acceptable to the testers. This characteristic of a screening instrument is very important in assuring the instrument's proper use.[132] The OPST systematizes what a good nurse usually does anyway. It assures comprehensiveness by reminding the nurse of what has been observed, and what needs to be observed. This is not a foreign task for the

nurse. It does not require a change of pattern or new learnings on the tester's part. The observations necessitated by the OPST are quite common. Only a minimal review of growth and development and the OPST terminology is recommended. The school nurse, then, can easily use the OPST effectively and without resistence.

III.3: The Validation Proposal

Validity

The validity of a screening battery is determined by its ability to measure what it is supposed to measure.[133] The purpose of a preschool screening program is to identify those children who might require alteration of standard school curricula in order to provide for their educational needs. Therefore, the preschool screening program and its screening battery are supposed to identify such children before they become schoolers. Thus educationally at-risk preschool children need to be identified by the screening battery. The validity of the battery can then be determined by the extent to which this purpose is met. In other words, a valid preschool screening battery is one which identifies most of the educationally at-risk children.*

A preschool screening program and its battery can be validated by contrasting screening categorization with the actual school classifications of the same children when they become schoolers. In operational terms, the predictive capability of a screening battery is the extent to which the screening results forecast the kindergarten teacher's classification of the same children. The evaluation of this predictive capability is the

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*Screening by definition implies that its results need not be accurate but should identify most of the subjects with a

validation process.

This predictive validity appears to have been ignored in the design of most of the screening instruments available today. On reason for this is that prediction is difficult. Another reason is that many of the instruments were designed for describing the child's deficiencies now for intervention now. Trying to do the same for preschool screening programs would convert them into health screening programs. While this latter is also important, it is not the major purpose of preschool screening.

The Validation Proposal

The proposal here is that preschool screening tools be validated with respect to their ability to forecast the later educational problems of the children screened. Implementation of the proposed battery (indicated in III.2 of this chapter) is recommended as a part of a preschool screening program. The screening data obtained as a result of this preschool screening program should be categorized. This categorization should not be made available to the kindergarten teachers.

Approximately fourteen months after the preschool screening and nine months after kindergarten entry of the eligible children, the kindergarten teachers can be asked to categorize these children. The teachers should be asked to categorize these

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certain condition. See Moskovitz, 1976.

children into the four categories the screening program had used. In this way, the kindergarten teachers can categorize the children in the absence of screening data. The teacher's categorization will be based on his/her experience with the child for approximately nine months. This school categorization will also reflect input and possible evaluation results from other school personnel and as such will constitute the actual value.

Then, the comparison of the screening categorization with the teacher classification can describe the forecasting ability of the preschool screening program while testing the battery for validity. This predictive validity can be analyzed by the use of statistical measures of association, such as Chi Square Test, Cramer's V and Gamma. This validation study can serve to evaluate the effectiveness of the overall battery design as well as its various parts.

CHAPTER IV

THE DESIGN OF THE SCREENING DELIVERY

A well-designed screening battery can fail to meet its objectives in the absence of a well-designed delivery system. Especially in mass screening programs, the delivery gains as much importance as the instrument battery. The main components of the delivery design include: staffing, physical set-up, screening delivery procedures, pre-test through a pilot project, publicity, evaluation, and feed-back to the screening agency as well as to the parents of the children screened. Each of these components is subject to the constraints of the screening agency environments.

Accordingly, in IV.1 of this chapter the identification of the constraints is discussed first. This is followed by a section on the various components of the delivery design. IV.2 describes a proposal for screening delivery built on the considerations discussed in IV.1. A proposed evaluation procedure for delivery design is presented in IV.3.

IV.1: The Design Considerations

The screening delivery system is the major determinant of a viable screening program. The preschool screening delivery then must be designed with much care. To this end the factors that influence the success of a preschool screening delivery must be identified.

Identifying the Constraints

The identification of available resources is a must in designing a viable preschool screening program compatible with the screening agency environs and acceptable to the clients. This step must precede the actual design of the delivery. The more important constraints are: finances, time, expertise, and legal. Also, there are constraints imposed by the screening battery design.

Financial Constraints need to be defined. The amount of money available for the total effort must be determined so that it can be allocated to various stages of the preschool screening program. In the absence of such budgeting too much spending on one stage can easily occur. The danger of this result is that not enough money would be left for the subsequent stages. This can in turn negatively influence the overall effectiveness of the screening program.

In building the budget and allocating the financial resources the cost of the following stages of a screening program

must be considered: planning, pretesting, implementation, data processing, publicity, staffing and obtaining equipment and site. In estimating the cost of a screening program, released-time approved for school personnel should be included. This is particularly important in relation to estimating the total cost of screening programs designed for centralizedmass screening. The viability of such programs are very sensitive to cost factors.

The total cost of the proposed screening program so computed and the amount of money the screening agency is prepared to allocate to screening program must be made compatible. Although this sounds like a very logical and common conclusion, a surprising number of screening programs fail to do this.

Time Constraints of the screening staff, the children and parents, the available screening site should be defined and accommodated. The number of days a screening program should be made available to children and parents is an important decision. Some factors that need to be considered in reaching such a decision are: the approximate number of children to be screened, the availability of the screening staff, and the availability of the screening site.

People involved in the screening who have different schedules have to be accommodated. It is desirable to have the screening program to be available during a reasonable stretch of time, and at least once during a week-end so that a maximum number of parents can find a suitable time to participate in the program.

Thus the screening program should be available at least for five different dates.

Screening time per child is an important consideration because it can effect the child's willingness to cooperate with the procedure thereby influencing the screening results. Similarly, screening time per screening staff per day can effect staff performance and can influence the screening results. This time constraint is further affected by moneys available. Therefore an optimal screening time must be defined for the child, for the screening staff and for the screening agency.

Available Expertise Constraints must be kept in mind. The screening program must be designed so that expertise readily available to the screening agency can be effective. The type of screening battery selected must be such that the testers can effectively administer these instruments as well as interpret their results with minimal additional training.

Legal Constraints which will effect the design of the screening program must be identified in order to facilitate compliance. Laws regulating such programs are geared towards assuring quality control usually through the stipulation of minimum requirements. A decision has to be made defining both the agency's objectives for the screening program and the legal stipulations. In other words, it has to be decided whether the screening program is to be designed to meet the letter of the laws or the spirit of the laws. Also any legal stipulations on certification of

screeners need to be complied with.

The Screening Battery Constraints must also be considered. Assessment tools that meet the battery constraints must be reviewed in view of delivery constraints. Those instruments which have the indispensible characteristics from the battery design point of view should be prioritized. A major effort must be made to design the delivery in order to accommodate this.

The Components of the Delivery Design

Staffing Available expertise must be considered because this can influence the acceptability of the screening program. Readily available expertise must be reviewed in the selection of the screening staff. A major decision that needs to be made is whether to utilize school personnel for screening or to import an outside team. Having a consistent screening staff is desirable in order to minimize error in scoring and to capitalize on the economy of specialization.

Freeing personnel from their regular duties in order to staff a screening program has actual costs associated with it. This might necessitate finding substitutes and paying for them. There would be non-monetary costs associated with such a scheme as well because the pupils would be deprived of their regular teachers and counselors for about a week.

A major problem that arises from using school personnel is that of accommodating different schedules of various professionals. Many times, although released-time is approved for

such professionals, they are unwilling to be away from their regular duties for such a long period of time. Therefore having a consistent screening staff becomes very difficult even though this is desirable in order to obtain intertester reliability. For these reasons importing a screening team should be considered. The decisions on the number and allocation of staff are constrained by the battery design as well as the screening procedures employed.

The Physical Set-Up

The Screening Site. A major consideration in relation to the physical set-up is the screening site. The two major alternatives are: one, the use of central site; two, the use of a natural site. The natural site would be where the preschoolers usually are--homes, nursery schools, day-care centers, neighborhood health centers, play groups, etc. This strategy would provide the chance to assess the child without introducing the effects of a strange environment. Therefore, the likelihood of eliciting the child's best performance is greater. However, this approach would require teams of screeners to travel to various sites and at different times. This might be economical in the long run--especially for on-going screening programs as implied by EPSDT (Early and Periodic Screening, Diagnosis and Treatment) regulations. However, this natural-site screening is not economically feasible for intermittent screening programs such as the kind of preschool screening programs ad-

ministered by school systems.

The central-site screening has economic advantages in both time and money. A disadvantageous outcome of this strategy might be the young child's association of possible negative screening experience with formal schooling. In order to alleviate this, much attention must be given to the providing a pleasant site as well as a pleasant screening experience.

Available resources, screening battery constraints, and time constraints must also be taken into account in choosing the screening site.

Equipment and supplies to be procured are mainly determined by the screening battery. However, delivery constraints in time and money can alter these somewhat. A thorough list of these must be made and their provision planned.

The Screening Procedures

In order to provide an efficient yet pleasant screening delivery, a screening procedure must be worked out.

Single versus Multiple Stations. One method is to have one screener carry out the total screening battery with a particular child. The advantage of this procedure is the chance of developing a one-to-one relationship between screener and child. Also, the child would not have to go from person to person and room to room; traffic would therefore be decreased. However, the child may get bored after a while and cease to co-

operate. Also, if there is a personality conflict between a tester and the child, it would be difficult to elicit the child's best performance. Time and financial considerations both play a role in the decision as to the feasibility of one-to-one screening as well. In order for each tester to employ the total battery in a single station during a mass screening program many sets of necessary equipment need to be procured. This will increase the expense of the screening. The testing rooms need to be larger in this case. Another temporal and financial consideration is the fact that the tester would require a longer period of time to become proficient in screening procedures.

The other possible screening procedure that needs to be considered is that of establishing multiple screening stations where different components of the screening battery are employed by different members of the staff. This will require an effective routing system for the child. An advantage of this procedure is that it provides a variety of testers for the child, giving him/her a chance to establish relationships with several different people. This factor gains importance because the type of cooperation required by various components of the battery are different.

While the developmental screening requires the child to perform some tasks, these tend to be type of activities familiar to the child in his daily living, i.d., building block towers, drawing, jumping, etc. However, the demands placed on him/her during vision screening are very specific and are less familiar

to the child, i.e. covering one eye, putting glasses on, etc. The vision screening procedure requires the child's full cooperation in a prescribed manner. A young child has difficulty with changing rules and roles of the same person. Therefore, it would be simpler for the child to follow certain rules and procedures with one person, and others with another person.

Other advantages of the multiple station type screening procedure are: the decreased amount of equipment is necessary; the ability to capitalize on the economy of specialization; and the consequent decrease in the error rate. Major equipment can be centralized in this type of screening procedure thus cutting down on the amount required. The economy of specialization can facilitate the testers' proficiency in the task at a faster rate. Since these are important considerations, a multiple station approach to screening delivery appears more appropriate for mass preschool screening.

Routing Procedures must be worked out thoroughly in the screening delivery design. The desired number of screening stations and their contents need to be determined before a routing pattern can be defined. During this process major consideration should be given to the screening staff, the design of the battery, the screening site, and the number of children to be screened.

After the screening stations are determined and appropriate staff allocations made, routing schemes can be explored. Two major alternatives would be either having a "set-

pattern" or a "next-available" pattern. The set-pattern would mean that a child is routed from station to station in a predetermined manner, i.e. the child goes to vision first, developmental second, height and weight third, etc. The next-available pattern would require the Router to guide the child to the next-available station, whichever one that might be. The success of this latter routing procedure would be too dependent on the Router's capabilities. Also, because the screening stations would probably take varying amounts of time, congestion in front of some stations seems highly probable. A well-planned set-pattern can help alleviate this problem.

Since time is an overriding delivery constraint, screening time and idle time* have to be minimized. While the 'next-available' pattern would substantially minimize idle-time, it is also likely to increase the parent-child waiting time. The set pattern can easily minimize waiting time but probably would create some idle time, especially at the beginning. Some idle time is acceptible in order to assure minimal waiting time. A set pattern of routing is recommended.

The routing pattern in a multiple station screening procedure necessitates careful record keeping of screening data.

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*idle time refers to the amount of time a tester has "nothing to do".

Record Keeping is particularly important to assure proper data collection during a screening procedure. In order to minimize error in, and loss of, screening data, an efficient and effective protocol has to be devised.

Further delivery design considerations in relation to screening delivery procedures include: the identification of additional personnel requirements and their job specifications; and, the extent of desired parent involvement. In order to determine these factors and finalize the screening delivery procedures discussed earlier, pretesting through a pilot project would be very useful.

Publicity is a crucial component of the delivery, especially in relation to mass preschool screening programs. In order to reach a large population of three to five year olds publicity must be planned with care.

The Evaluation of the Screening Delivery is very important because it can provide the input necessary for future refinement of the process for the future. Parental input should be obtained in regards to parent and child reaction to the screening delivery.

Feedback to Parent and Professionals about the screening results must be planned. The appropriate professionals who should have access to the screening data must be selected. Parents must receive adequate information about screening results.

IV.2: The Proposed Screening Delivery

The viability of a screening program is largely determined by its acceptability to the clients and to the screening agencies.[134] A preschool screening delivery then must be designed to increase this acceptability by the parents and children, the school systems and the governing agencies which supply financial support. Delivery is crucial to the viability because the delivery characteristics are easily observable and subject to critical evaluation by the parents, the school systems and the interested state and federal agencies.

A well-designed screening battery can easily be rejected by such parties if there isn't a well designed delivery. If a preschool screening program is not acceptable to parents and children, they simply may not participate in it. If a school system does not find a screening program acceptable, it may not engage in it. If governing agencies do not find it acceptable, they may not fund it. Any of the three cases can make a screening program inoperable.

Increasing the Acceptibility

A preschool screening program must be; convenient and non-intrusive, (pleasantness); non-interfering with school system environments, (compatibility); and economically feasible and efficient (efficiency). The delivery design then must

attempt to assure the acceptibility of the preschool screening program by facilitating pleasantness, compatibility and efficiency aspects.

Assuring Pleasantness. The conditions proposed which can increase convenience are: (1) a choice of screening days and times including a day during a week-end; (2) an easy appointment making process by having a special telephone and secretary allocated for this purpose for three weeks prior to the screening program; (3) a minimal waiting-time during the screening and; (4) a simple and smooth routing pattern and staff guidance during the screening process.

Actions proposed in order to assure non-intrusiveness are refraining from: (1) asking anxiety provoking questions to parents; (2) inflicting pain on the child such as through giving injections or taking blood samples; (3) undressing; looking into bodily cavities such as throat, ears, nose.

In addition to these considerations, facilitating parental involvement during the screening, having a congenial staff, giving a reward to the child at the completion and giving feedback to the parents can increase the overall "pleasantness" of the screening process. These should be incorporated into the delivery design.

Assuring Compatibility is proposed to be achieved by minimizing the impact of the screening program on the school system environments and routines. Some actions which can facilitate this are:

(1) using an outside screening site so that the usual utilization of physical resources (i.e. rooms) need not be altered, (2) using an outside screening team so that very complicated schedule matching and substitute teacher hiring processes are not necessitated, (3) decreasing the possibility of major changes in the school system's roles and responsibilities by separating out the not-directly educational special needs and thus providing for specific referral to other agencies, (4) using readily available resources and expertise, and by (5) minimizing cost so that concern for delayed re-imbursement and budgetary difficulties are alleviated.

Also, providing input from appropriate school personnel through open communications with a representative multidisciplinary committee can contribute to the overall compatibility of the screening program. In addition, the consultant type role of the screening program coordinator who provides recommendations for follow up without conflict of interest can be very useful. This lack of conflict of interest on the part of the screening program coordinator can help decrease power struggle among school system specialists. The outside coordinator's lack of enforcing power can give flexibility to the school system in relation to follow-up recommendations. This, in turn, can alleviate the feelings of "helplessness" and being "imposed upon" by the school system which often decreases their compliance.

Compatibility with Existing Programs must be considered, but the needs identified should not be limited to these. Two major and conflicting philosophies are apparent in the literature: (1) unless there are existing programs to take care of the various special needs identified, there is no reason for screening.[135] In other words, one should screen out those children with certain special needs only if the needs can be treated or prevented.[136,137] (2) All children need to be screened to identify their special needs[138] so that effective educational plans can be worked out to promote their full potential. The screening actions implied by the first perspective is to design the preschool screening programs such that they screen out only those children who can be treated with readily available means. It also would limit screening results to the identification of those children who could be placed in various educational programs which are available at the time. Accordingly, if a school system or locality has speech programs but no motor programs, then the screening should overlook children with motor problems.

This type of strategy and attitude however would not facilitate the future development of some necessary programs. If the need is not demonstrated, the motor program for instance would not be developed in the hypothetical school system mentioned above. Also, perhaps the child's critical special need may not be met by other public or private agencies because early identification did not occur.

Identifying children with certain special needs which cannot be easily matched with available resources would cause unnecessary frustration to the educator or health professional and be traumatic to the parent and the child. However, ignoring such observable unusual traits may be hindrance to progress. Answers will not be sought for those questions that are not framed. In other words, if certain amount of concern is not stated about a prevalent special need, then the system would not respond to it by investing energy into seeking possible solutions.

Clearly an interface between these conflicing approaches must be provided. Some actions that can facilitate this while increasing acceptability are:

1. to design the screening battery so that it sorts out not-directly educational special needs to be referred to outside agencies.
2. to consider possible (existing) referral sources during the initial planning phases of the screening program.[139]
3. to make an effort to match referral rates to available resources by employing different "mesh" screening at different localities when planning is done at the national level. This should be regulated by encouraging an increase in available facilities.[140]
4. to link research efforts to such programs so that

emerging needs are not overlooked.

Efficiency is operationally defined as the amount of output in relation to resources consumed. "Resources" include financial considerations as well as expertise and time. Various indices have to be defined and their output maximized--i.e., screening time per child, screening cost per child, etc. Efficiency measures should be employed only in so far as they contribute to better quality service to the parents and children. Efficiency should not sacrifice a humanistic approach. In other words, efficiency measures should facilitate "pleasant" screening process while also keeping the cost down. For instance, efficiency measures should promote minimal screening time but not compromise comprehensiveness of the screening program. Similarly, it should minimize idle time for staff and equipment but not exceed a minimal waiting time for parents and children. Some actions which can facilitate efficiency within this frame of reference are: (1) defining an optimal number of screening stations, (2) assuring appropriate staff allocation, (3) devising an appropriate routing scheme, (4) balancing and streamlining stations, (5) centralizing some overlapping screening tasks, and (6) centralizing record keeping.

Identifying the Constraints

In order to achieve pleasantness, compatibility and efficiency, aspects of a viable screening program the operating constraints need to be identified. This need has been elaborated

in IV.1 of this chapter. The overall success of a screening program is interactively determined by the battery and the delivery. The design of one component places certain constraints on the other. The two major components of a preschool screening program--battery and delivery--need to be made compatible in order to assure overall effectiveness.

Battery constraints on Delivery include the amount of time screening process might take, the numbers and expertise of screening staff, the desired characteristics of screening site--rooms, furniture, privacy, the numbers and content of screening stations, staff allocation to these stations (due to required expertise) and the necessary equipment and supplies. In addition, parental presence during the entire screening process might be necessitated by the battery design.* This in turn can effect delivery design in relation to the following: the physical set-up of screening rooms, staff job descriptions, and/or staff allocation. The screening rooms must be set up to accommodate a parent. Staff must be allocated to the task of explaining the procedure to the parent and defining the desired limits of parental involvement. This task might be added to the job description of a particular screener.

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*The battery design proposed in Chapter III suggests this. The DDST Personal-Social section necessitates parental reporting and the vision screening requires help in covering one eye.

Delivery constraints on Battery include the pleasantness, compatibility and efficiency considerations. The battery design is also affected by time, finances, available expertise and legal stipulations. In the absence of such delivery constraints an effective (reliable and valid) battery could ostensibly be one that requires high level expertise, a large amount of equipment and supplies, and several hours to administer. It may even require testing the child in his/her natural environment.

When the delivery constraints are superimposed upon the battery constraints, the battery design needs to be re-adjusted. For instance, delivery constraints limit the physical screening process to observation only because of the non-intrusiveness criteria. Similarly, hearing screening with pure-tone audiometry needs to be eliminated because of site requirements. The total battery and its parts need to: be brief, require limited expertise, necessitate a small amount of equipment, be easily procurable, and be low in cost.

The total screening time constraint necessitates a multiple station approach to screening at a central site. In making the battery and the delivery designs compatible, the indispensible characteristics of each should be identified and interfaced. Thus, effectiveness and efficiency should co-exist.

The Major Components of the Proposed Screening Delivery

Staffing

The screening staff needs to be consistent in order to decrease error rate and increase ease of coordination. Qualifications of the screening staff required by the battery constraints have to be identified. A comprehensive screening tool can be administered by a school psychologist, but a physical screening tool cannot. Some screening tools such as DDST have been administered by trained nonprofessionals at the suggestion of the developers.[141] However, the value of such an endeavor has been questioned.[142] Therefore a professional screening staff is recommended. Due to the battery constraints the screeners must be able to administer a developmental screening tool such as the DDST as well as a physical screening tool. The screeners must be readily available to school systems at low cost. The nurse is such a professional. She is, or can easily be, certified to conduct vision and hearing screenings.

> "...We need good screeners. We need people who understand clearly what screening can do and what it cannot do, who can comfortably accept its limitations, and conscientiously conform to its rules, and who are steadily warm and friendly and supportive--caring kinds of people.[143]

The nurse's professional role demands such characteristics on a day to day basis. She is used to screening, although she may not call it that. She is accustomed to defining her limits and following rules conscientiously. She is used to the

supportive and caring role. The professional nurse combines sciences with caring.[144]

The school nurse's background includes child growth and development, health education, counseling and learning theory. She generally can relate to and is easily accepted by families. She can counsel parents in parenting, caring and seeking services for their children. She has knowledge of available community resources for possible referrals. As such the professional nurse (pediatric nurse or school nurse) is the natural candidate for the preschool screening.[145]

School nurses from two or three neighboring school systems could form a screening team and conduct the preschool screening for each school system during a set period of time. However, during the first year of such mass screening, prior committments could make this an unfeasible strategy. Also, an example has to be provided in order to prove that nurses can do this screening well. These considerations, coupled with the constraint of non-interference with school system routines, necessitate the use of an outside team. Therefore, the proposed screening team is to consist of ten senior nursing students and their pediatric nursing instructor.

The Physical Set-Up

The physical set-up must also be non-interfering with school system routines and convenient for parents. Therefore, a low cost outside site amenable to the battery constraints

should be used. It should provide numerous rooms or reasonably private sectioning possibilities. A centrally located church Sunday School facility with parking spaces would be appropriate. The screening areas should be separated so that children do not see each other, and the screening areas should be free from distracting paraphernelia. Figure 1 provides an example, Appendix V.2.

Equipment and supplies as well as the necessary furniture should be planned for and placed in these areas. The screening areas should be planned to decrease the screener's movement. This is to increase the child's concentration as well as the tester's efficiency.

The Screening Procedures

The Screening stations must be decided upon. Based on considerations discussed in IV.1, a multiple station approach is proposed. This issue is also discussed in relation to the interactive constraints of the battery and the delivery design.

In order to increase the advantages of the multiple station screening procedure, the following considerations must be dealt with: one, an optimal number of screening stations should be planned for; two, an optimal routing pattern should be worked out; three, the total screening time per child should be minimized; four, staff allocation to screening stations should be so planned so as to facilitate an efficient and yet pleasant screening delivery procedure; and five, an effort should be made to decrease error rate in the administration of the screening

battery.

In deciding on the optimal number of screening stations and the station contents the considerations to keep in mind are: the screening staff time, the design of the battery, the screening site, and the number of children to be screened.

The available number of screening staff, the total amount of screening time available to the staff, and the expertise of the various staff members are important factors. The components of the screening battery and their contents can help determine the desirable station contents by combining compatible components. This in turn can help determine the optimum number of stations. Clearly the developmental screening should be in a different station than the vision screening since they require such differing equipment, technique, and child-cooperation styles. The height and weight station has to be separate also for similar reasons. The physical screening can be administered by an observer at any of these stations. However, many of the DDST tasks elicit certain behaviors and physical maneuvers from the child. This behavior can provide the screener with a chance to observe the OPST items--i.e., coordination, motion of bodily parts, walking, etc. Therefore, it would be efficient to add the OPST to the DDST station.

Staff allocation to the stations is very important. The expertise and qualifications of the screeners must be considered. For example, only those who are certified in vision screening, should be allocated to the vision screening station. The deci-

sions on the number of stations to have as well as the staff allocation is dependent upon expected screening time.

In deciding about staff allocation to screening stations the rule of thumb that can be utilized is that of the amount of time each procedure takes divided by the number of screeners should be more or less constant. This constant screening rate (throughput) can be adjusted to the number of staff, total staff time available and to the expected number of children to be screened.

The screening stations can be balanced and streamlined by taking advantage of overlapping screening tasks. The short overlapping tasks can be added to the job specifications of another screener so that these tasks can be taken care of centrally.

Efficiency and the Routing Procedure

Efficiency in a screening program is a necessary condition not only because of cost-effectiveness but also because it contributes to obtaining more reliable results. Given the time constraints of screeners, parents and children, screening site and cost per child screened thirty minutes total seems to be a good figure to aim at. Time constraint is just as important for parents and children as it is for the personnel. In fact perhaps more so because parents who wait for a long time for their child to be tested get very anxious and the children get tired. Anxious parents and tired children contribute to increase

in error rate in the screening results. Therefore the aim is to limit the waiting period to a maximum of five minutes and the total testing period to 30 minutes per child. To this end each screening process can be timed and the process observed to determine if there are certain steps that can be eliminated or centrally applied in order to decrease total screening time without compromising quality and non-rushed atmosphere. Concern for efficiency should always be congruent with what can be easiest and most pleasant for the child.

Efficiency measures are to be employed only in so far as they contribute to better quality service for the parent-child pair. A humanistic approach should not be sacrificed. In order to achieve this goal, an optimal routing procedure should be sought for through experimentation with various combinations and timing of them. Using some ideas from Queueing Theory an optimal routing procedure should be found. However, decreasing waiting-time should have priority over decreasing idle-time since the former can affect screening results. The minimal waiting time can aid in sustaining parent-child cooperation. It is also expected to contribute to the "pleasantness" of the screening program. Waiting time can be further shortened by carefully planned and sequenced appointments.

One decision item of major importance is whether to have a set pattern of routing through various screening stations (i.e. child goes to vision station first, height and weight second and developmental station last), or to send the child in

line to the next available screener whichever station it is. A set pattern is suggested based on considerations discussed in IV.1 of this chapter.

Timing the duration of each section of the PSSP per child can provide data on which to base personnel allocation decision. This allocation decision coupled with the routing decision are to be crucial determinants of a smooth running, pleasant, and efficient PSSP. The routing procedure proposed is to start with the Developmental Station (DDST and OPST). This will be the longest as well as the more "fun and games" portion; both these qualities make it a good candidate to be first. If the child and/or parent start getting tired or anxious they can be assured that the largest part of the PSSP would be over at the end of this portion. Vision screening would take much less time, and height and weight would take the least amount of time. Also the tasks within the Developmental station are those familiar to the child and do not require constant attention as does the vision screening. Therefore, developmental to vision to height and weight stations seems like a reasonable route to follow.

In essence a multichannel--multistage queueing network can be formed and the PSSP flow planned as such. Figure 2 represents the routing flow proposed, Appendix V.3.

Parent-Participation is suggested. This is partly required by the battery design and partly by the "pleasantness" constraint of the delivery. The DDST personal-social sector and the vision

screening need parental help. After the initial explanation of the screening procedures to the parent a concise history taking is recommended. This information is to be used for further refinement of the battery.

Record-Keeping of the screening data is crucial for categorization purposes. It is suggested to be done centrally through the use of a Face Sheet* carried by the parent from station to station.

Policy for non-cooperative child and Retest needs to be defined. A policy for handling "non-cooperative" children can be worked out so that lines will not start building up and jeopardize the smooth flow of the PSSP. If a child does not cooperate with the first screening station (developmental) after five minutes of friendly coaxing, he should be sent to the vision screening and then back to the developmental screening station staffed with a different screener. If the child refuses screening procedure for fifteen minutes, he should be asked for a retest at a later date.

If the child is older than three years and ten months and has questionable screening results, the child should be asked for a retest.

A Pilot Project conducted in a neighboring nursery school can serve to pretest the delivery design. During the pilot project,

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*A copy of the Face Sheet is provided in the Appendix to Chapter V.

delivery design considerations can be tried out in relation to: screening stations, staff allocation to these stations, timing of various separate procedures, physical set-up, and the routing procedures. Evaluation of the results can help balance and streamline the stations and develop job specifications for the screening staff. The pilot project--a dry run--can provide additional staff training and contribute to consistency in administration and scoring of the screening battery. During the pilot project, potential delivery problems can be identified and preventive measures can be worked out.

The Publicity

In order to reach as many members of the total population of three to five year olds, the publicity must be planned with care. Multiple advertisements should be placed in a variety of news media such as radio, newspapers and television. In addition, announcements can be placed in localities accessible to parents of preschool children--i.e. nursery schools, day care centers, neighborhood health centers, well-child clinics, etc. Information about the preschool screening must be announced at varying intervals both before and during the first part of the screening program.

The salient points of the publicity should include: (1) information on the rights of parents and children and the responsibilities of the screening agency, (2) definition of screening and its goals, (3) the procedure should be described in sim-

ple terms with emphasis on pleasantness, (4) parents or substitutes should be encouraged to accompany children, (4) parents should be discouraged from bringing siblings, (5) screening dates and hours and site should be announced, (6) parents should be instructed to call a special telephone number to make appointments, (7) parents should be instructed to postpone appointment if the child is sick that day.

A telephone number should be available and reserved for this task alone during this period. Also a secretary should be assigned for this task during this period in order to decrease the risk of multiple booking.

Feedback to the School System and the the Parents

The coordinator is to categorize the screening results and report to the appropriate school official. The prospective kindergarten teachers are not to have the results of Wait and Watch and Specific Referral groups. Each participating parent should be sent a letter explaining the screening results. For this purpose, prototype letters for each category needs to be developed.

Summary of the Delivery Design Proposal

The planning stage efforts must include making decisions on publicity, tools, staffing, screening stations, timing, routing, physical set-up, a means of data collection, and devising a means for evaluation. During the month prior to the screening various news media must be employed for publicity purposes,

newspaper, radio, T.V.--as well as sending flyers home with school children.

The staff must be selected by the coordinator from among senior nursing students who had had prior experience with assessment of young children. The coordinator should review with them knowledge and skills necessary for the preschool screening.

In order to provide further staff training, and decide on screening stations, staff allocation to these screening stations, timing of various screening procedures, job sepcifications for each screener, physical set-up and the routing procedure going through a Pilot Project is necessary. During the Pilot Project to be held in a local nursery school various procedures can be experimented with and a final decision about the above mentioned issues can be reached.

In deciding about staff allocation to screening stations the rule of thumb recommended is that of the amount of time procedure takes divided by number of screeners to be more or less constant. Thus there are to be five developmental screeners, two vision screeners and one height and weight screener. Overlapping screening tasks can be identified in order to balance and streamline the stations and in order to add the short overlapping tasks to the job specification of the receptionist to take care of these tasks centrally. In essence, one can form a multichannel sequential queueing network and plan for the

screening flow as such.

A Face Sheet should be developed to record screening data centrally; this is to be taken by parent to various stations for recording screening results and brought back to the receptionist at the end. The screening results are to be categorized by the coordinator (author) and reported to the appropriate parties.

IV.3: The Evaluation Proposal

The evaluation of the screening delivery is very important because this can help refine the process for the future. The parental input into the evaluative process is very important in order to partially assess the acceptability of the delivery design. For this purpose a concise but comprehensive evaluative questionnaire is to be added to the Face Sheet. The parent must be reminded to fill the questionnaire before leaving the screening program.

The evaluative questionnaire to be filled by the parent must include questions on: (1) the comprehensiveness of the screening, (2) the adequacy of the physical set-up, (3) the length of the screening time, (4) the child's reaction to screening (for "pleasantness"), (5) the parent's reaction to screening, and (6) the screening staff.

In addition, the delivery parameters should be evaluated in relation to the desired indices--i.e. total screening time per child, screening cost per child, idle time per hour, total waiting-time for parents and children, screening-time per station. The results of these indices can be compared with those of a comparable school system and another reported in the literature.

The cost factor gains much importance in mass screening practices and must be computed and evaluated with care. The total cost reported must include the imputed cost of released-

time provided for school personnel as well as that of the volunteers' time. These two factors do not represent out-of-pocket cash cost to the school system. Nonetheless, they are part of the total cost, and must be treated as such.

C H A P T E R V

THE IMPLEMENTATION AND THE PROCEDURES

The proposed battery and delivery designs discussed in Chapter III and IV respectively were operationalized through a model preschool screening program (PSSP). The PSSP was implemented in order to provide an actual working example of the theoretical framework developed. The proposed battery and delivery designs were implemented. The implementation of a PSSP so designed can serve to develop, refine, validate, and further refine the battery and the delivery characteristics.

The Screening Battery

The Population

The Model Preschool Screening Program (PSSP) was designed and implemented in a Western Massachusetts school district with a middle to low income population. The PSSP was made available to all three to five year olds in the school district and 268 such children were screened.

The Instruments

The tools employed in the screening program were: the Denver Developmental Screening Test (DDST) for personal-social, fine-motor, language and gross-motor development; Allen Cards and Stereo-Fly Test for vision screening; the Observational Physical Screening Tool and Height and Weight measurements for

physical development screening. Information on the child's developmental and health history was obtained through a concise parent interview.

The Testers

The screening staff consisted of ten experienced senior University Nursing students and their instructor of Pediatric Nursing (author). The screening students had practiced the administration of the DDST, Vision screening, and the Observational Physical Screening Tool (OPST) in the October 1974 neighboring town screening program. They also repeated this battery during the Pilot Project in a nearby nursery school four months after the first practice and a month prior to the actual (model) preschool screening program.

The Sources of Data

The information obtained on children screened by the PSSP battery provided the data base for this study and consisted of the following sub-categories:

1. Screening data obtained from the 268 children screened between the ages of three and five years as well as additional historical information obtained from their parents,
2. Information obtained from 268 parents who evaluated the PSSP through a concise questionnaire.
3. Categorization information obtained from kindergarten teachers and school nurses on the 86 children who were

screened by the PSSP and who later entered Kindergarten.

The Data Collection Procedure

A Face Sheet was developed to record screening data centrally; this was taken by the parent to various stations for recording screening results and brought back to the receptionist at the end. Parent evaluation of the PSSP as well as the questionnaire on the developmental and health history were included on the Face Sheet.*

The Data Analysis Screening Results

Of the 268 children screened, 265 cases were included in the data analysis for categorization purposes and the description of the population parameters was utilized for this purpose.

The general information in relation to the population included developmental and health history and the parent's perception of the child's special needs.

The parent evaluation of the total screening program included the comprehensiveness issue of the battery.

For future battery refinement additional items on colors, counting and handedness were included.

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*A sample Face Sheet can be found in appendix V.1

The Categorization Procedures for the Screening Battery

The categorization criteria were developed based on the considerations elaborated in Chapter III. The children screened were categorized into four groups: Category I, All O.K. Now; Category II, Wait and Watch; Category III, Specific Referral; Category IV, Substantial Needs--General Referral.

The Categorization

Category IV (Substantial Needs Referral). The children in this category are to be referred to a team of experts for full scale evaluation. For instance, these would be the children to have a Core Evaluation Team (C.E.T.) assessment when screening is for Chapter 766 requirements.*

The criteria indicated by the DDST can be retained intact. The following criteria were utilized for the total battery.

Refer for total assessment if:

1. The DDST results require referral by the DDST criteria. (Since DDST is the standardized screening test, it was decided to accept its criteria for this category.)
2. The DDST Language section has two delays and the OPST has two or more F's.

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*Acts 1972, Chapter 766. Also refer to the Literature Review.

3. The vision acuity and/or stereo-vision test results are F and two sections of the OPST has one or more F's each.
4. If the OPST has three or more F's distributed in at least two main sections.

Category III (Specific Referral) The criteria for this category were developed so as to allow referral of the children identified to specific specialists. The rationale for this category is the alleviation of the trauma that might result from an unnecessary full scale evaluation. Further, it is hoped to facilitate the interface of the medical and educational approaches to screening. The specific criteria are the following. Suggest Specific Referral if:

1. The vision test results in acuity and/or stereo-vision are F and the child is 4.0 years or older.
2. The OPST has two F's distributed in two sections.
3. The DDST has two delays in any one section. (The child is suggested to be referred for that domain of development.)
4. DDST Language has one Delay and Two F's.

Category II (Wait and Watch). The children in this category become candidates for the next scheduled preschool screening program. However, the kindergarten teachers should not be informed of the names of these children in this category in order to prevent any possible bias and "stigmatizing" effect. Also, by the time of kindergarten entry many children in this category

might move into the all O.K. category by virtue of the maturation process alone. In this case, undue alarm can be prevented. This group however should be watched for possible developmental risks which might later become observable. The proposed criteria are detailed below. Place in Wait and Watch Category if:

1. There are any delays in the DDST scores.
2. If the DDST Language sector has two F's and the OPST speech is unusual.
3. There are two or more F's in OPST.
4. Vision acuity and/or stereo-vision test results are F for a child younger than 4 years.
5. The child refuses testing and retest is not possible.

Category I (All O.K. Now). Children whose screening results do not meet the categorization criteria above are to be placed in this category.

Categorization Criteria for Different Parts of the Battery

The criteria indicated above were for the total battery. The criteria used for vision screening and the DDST are those recommended by the tools themselves and are reported below. In addition, criteria were developed for categorization based on the Observational Physical Screening Tool (OPST) alone, and for OPST and Vision Screening combined. The rationale behind these was to seek refinement of the OPST as a preschool screening tool.

The DDST Alone: This instrument comes with its own criteria which were adopted for this portion of the battery for comparative analysis. Although a distinction is made between Abnormal and Questionable by its developers, the categorization recommended by them is the same--Referral. There is no Wait-and-Watch or Specific Referral categories. The results would be categorized as Abnormal and the child referred to his doctor if:

1. Two sectors each have two or more delays, or
2. One sector has two or more delays and one other sector has one delay and in the same sector the age line does not go through an item that is passed.

The screening results would be classified as Questionable and the child again referred to his doctor if:

1. There are two or more delays in one sector
2. One or more sectors have one delay and in the same sector the age line does not go through an item which is passed.

All others are classified as normal and no referral.

Vision Screening Alone: The norms set by Allen Cards for acuity are:[146]

Age 3.0	12-15/30
Age 4.0	13-16/30
Age 5.0	16-20/30

If the child cannot identify the pictures on the cards with one or the other eye at age-appropriate distances, his result will be F. Also if there are at least five feet difference be-

tween the acuity of two eyes the result will also be F.

The Stereo vision test is scored F if the child cannot identify the three dimensionality of the stereo-fly.[147]

The Observational Physical Screening Tool Alone: The criteria for the OPST alone are as follows:

Specific Referral (Category III) If there are three or more F's* distributed in at least two sections

Wait and Watch (Category II): If there are two or more F's and a specific referral is not indicated

All O.K. Now (Category I) All others are to be in this category

OPST and Vision Screening Together. The proposed criteria when the OPST is used together with the vision test are as follows:

Substantial Needs Referral (Category IV) If acuity and/or stereo-vision results are F and physical has three F's distributed in two sections;

Specific Referral (Category III) If the child is 4.0 years or older and the physical has two F's and vision acuity and/or stereo-vision results are F's;

Wait and Watch (Category II) If the child is younger than 4.0 years of age and vision acuity and/or stereo-vision results are F and the physical has two F's.

All O.K. Now (Category I) All the other children.

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*Please refer to the OPST in Appendix III.5. Each section has "good" to mean age-appropriate. Any other state circled will be interpreted as an F.

These categorization schemes were designed to help in refining the preschool screening battery design for the future. The actual categorization of children screened during the first implementation of the proposed battery design was based on the categorization criteria outlined for the total battery. The other categorization schemes were obtained by data manipulation for comparative analysis. In order to facilitate further refinements of the battery design such tasks as color identification, counting, handedness were added. Further information was gathered from the parents on the child's health and developmental history and the parent's appraisal of the child's educational needs.

The Data Analysis--Validation

Purpose: The forecasting capability of the screening battery is very important since a major objective of a PSSP is to be able to predict how these children will be classified in school, in the absence of screening data. The school classification in turn will determine if in fact these children are viewed as having special needs requiring alteration of the regular school curriculum and/or needing special education measures. If a PSSP battery can predict this school classification prior to school entrance valuable lead time can be gained for: (1) devising appropriate educational plans for the entering kindergarteners, and (2) preparing appropriate pre-kindergarten remediation and enhancement programs (early intervention) for the three and four year olds.

The Validation Procedure took place nine months after kindergarten entry and fourteen months after the PSSP. The names of children screened during the PSSP who later entered kindergarten were identified. There were 86 such children. Their kindergarten teachers were asked to classify these children into the four categories the PSSP used. The school nurses who evaluated these children for specific referral in relation to physical, vision and hearing difficulties were asked to classify them in this respect.

The school classification was labeled (SCHCAT) and compared with the screening classification (CAT) in order to evaluate the forecasting capability of the screening battery. As explained earlier our original categorization was not available to these professionals.

Thus, when the school personnel (kindergarten teachers and the nurses) classified the children they were basing their judgment on approximately nine months experience with these children at school. Therefore, comparison of the screening categorizations obtained from the PSSP with this data (SCHCAT) could describe the forecasting ability of the PSSP while at the same time, testing the PSSP battery for validity. This comparison can test for validity because validity is measured by how well results correlate with the actual value. The actual value in our case was the SCHCAT.

Statistical Tests Used: The data was further analyzed through the use of some statistical measures of association, namely, Chi Square, Cramer's V, and Gamma. These statistical measures were employed in order to study the relationship between various values obtained from the PSSP categorizations and the actual or school categorization.

The Chi Square Test was used to determine if there was a systematic relationship between the actual and the observed as well as to determine statistical significance of the relationship. Chi Square results can tell us whether there is a systematic relationship between two variables. The likelihood of this relationship not being explained by chance can be ascertained from the significance level. The greater the Chi Square score value the greater the discrepancy the larger is the relationship. Smaller the significance level value, greater is the relationship. This is because we are trying to reject the nul hypothesis that the relationship can be explained by chance alone. For instance, in a table a Chi-Square of 57.42 was found. The probability of obtaining a value this large or larger by chance alone with three degree of freedom is .0001. Therefore, this Chi Square value is statistically very significant and a systematic relationship does exist. Such a table with as large a discrepancy could occur by chance in only one sample out of 10,000. In this case, the Chi-Square is statistically significant at the .0001 level. In social science

research the convention is to accept as statistically significant those relationships which have a probability of occurring by chance five percent of the time or less, i.e. five out of 100 samples.

Cramer's V: Chi Square values alone can aid in deciding whether the variables are independent or related, but cannot give information on how strongly they are related. Because statistical significance does not provide information in regards to the strength of the relationship Cramer's V was employed in order to adjust for this and obtain more strength information. Cramer's V is a modified version of phi and corrects for the number of cases, its value ranges from zero to one, one meaning perfect relationship. Thus Cramer's V results can give information as to the strength of the relationship but cannot show directionality of the relationship.

Gamma was used to supplement the statistical analysis. Gamma can give information on the directionality of the relationship--whether there is positive or negative relationship. Gamma ranges from minus one to plus one in value: (1) minus one means that discordant pairs dominate, (2) zero means that discordant and concordant pairs are equal, (3) and plus one indicates that concordant pairs dominate.

Clearly use of Chi Square analysis and statistical significance, Cramer's V and Gamma can help evaluate the forecasting ability of the PSSP and its portions thereof.

Testing the Assertions

The two major assertions of the screening battery were: (1) the total screening battery can predict later school classification of children, (2) the total battery (CAT) has greater predictive capability than does the DDST alone.

In order to evaluate the above assertions the screening results of the 86 children were categorized by the various components of the battery. Then, these component categorizations were compared to the actual value (SCHCAT), and the strength of the relationships was studied.

The Screening Delivery

The viability of a screening program is largely determined by the extent of its acceptibility to the clients and to the screening agencies. The pleasantness, compatibility and efficiency aspects of a screening program contribute to its acceptability. The requirements of these aspects were met in accordance with the recommendations of the proposed delivery design.

The Screening Period

The screening program was conducted in six half-day sessions and one full day session. The full day session was on a Saturday. The half day sessions were equally divided between mornings and afternoons. Announcing the screening days a month ahead of time and including a week-end session served two main purposes: (1) convenience for parent participation, (2) not overloading screeners and thus minimizing fatigue effect.

The Major Delivery Design Procedure

Two main decisions of the delivery design were: (1) how long each part of the battery should take, (2) how many stations are necessary for each separate component of the battery.
Decision I: In order to determine how long each part of the battery should take the following procedure was followed:
Starting point: the desired overall screening completion time for a child was defined. (e.g., the total amount of time the

parent-child pair would spend in the screening program is recommended to be approximately thirty minutes)

Allocation of time: the total desired time was allocated to the different delivery components. (e.g., the Receptionist, two minutes; the Developmental Station, eighteen minutes; The Vision Station, Six minutes; The Height and Weight Station, three minutes, and The Parent Evaluation, one minute.)*

Decision II: In order to determine the number of stations for each separate component of the battery, the following procedure was followed:

Starting point: The number of children to be screened and the time period over which they should be screened was defined (e.g. 450 children to be screened in 30 hours.)

Desired Throughput was obtained by dividing the population by the time period. (e.g. 450/30=15 children per hour)

Necessary Condition is thateach station cluster must have about the same throughput for balance.

Heuristic formulated was that: Throughput X Screening time at that station cluster per child (in hours)=number of stations necessary. or, $T_p \times S_t = N_x$. This is the Screening Delivery Heuristic.

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*The times allocated per station was reached after the Pilot Project dry-run and actual timing.

For instance, in deciding about the number of stations the Developmental Screening cluster (DDST and OPST) must have: (1) determined the time allocated to this station through decision I, and then, (2) applied the heuristic formulated. The screening time allocated to the Developmental Station in hours is 18/60, and the desired Throughput formulated is 15. Therefore: $15 \times \frac{18}{60} = 4.5$ stations. Clearly one would choose to have five Developmental Stations, since some idle time is acceptable in order to achieve minimal waiting time.

Similarly for the vision screening: the time allocated is six minutes and the throughput is 15 children per hour. Therefore, $15 \times \frac{6}{60} = 1.5$ stations. The desired number of vision stations would be two.

For Height and Weight, then $15 \times \frac{3}{60} = 0.75$ stations. The desired number of Height and Weight stations then would be one.

The screening delivery design then included five Developmental Screening Stations, two Vision Screening Stations, and one Height and Weight Station. There was of course one Receptionist for information giving and history taking. Each screening station was assigned one screener.

Note. Although the PSSP was designed for a throughput of 15 children per hour, the implementation was with a Throughput of 10 children per hour. The main reason for this was that the area census report was not available during the planning stages. When the census report was available, the appointments were made for 10 children per hour. The decision was made that some idle time was acceptable in order to minimize waiting time to assure plea-

santness of the PSSP.

The Delivery Components

Staffing

To minimize the impact of the preschool screening program on the school system routines, an outside screening team was utilized. (Ten senior nursing students and their pediatric nursing instructor) The nurse as the screener is also necessitated by the battery constraints. The vision screeners were state-certified.

The Physical Set-Up

An appropriate, inexpensive and convenient outside site was selected for central site screening. (See Figure 1 for a plan) Equipment, and supplies and appropriate furniture were set up in advance for each of the screening areas. The physical set-up was so designed as to provide privacy and induce both tester efficiency and child cooperation.

Pretesting the Delivery Design

A Pilot Project was conducted in a neighboring nursery school in order to increase the pleasantness, compatibility, and efficiency of the PSSP. This pretesting of the screening delivery design provided further staff training and helped us decide on: screening stations, staff allocation to these screening stations, timing of various screening procedures, job specifications for each screener, physical set-up and the routing procedure.

Efficiency in a screening program is a necessary condition, not only because of cost-effectiveness, but also because it contributes to the obtaining of more reliable results. Based on theoretical input and past experience a desirable duration for the total PSSP was decided to be approximately thirty minutes. Parents who wait from a long time for their child to be tested get very anxious and the children get tired. Anxious parents and tired children contribute to a decrease in both the reliability and validity of the screening results. Therefore the aim was to limit the waiting period to a maximum of five minutes and the total testing period to 30 minutes per child. To this end, each screening process was timed and the process was observed to determine if there were certain steps that could be eliminated or centralized in order to decrease total screening time without compromising quality and the non-rushed atmosphere.

Efficiency measures were to be employed only in so far as it contributed to better quality service to the parent-child pair and would not sacrifice a humanistic approach. In order to achieve this goal an optimal routing procedure was sought for through experimentation with various combinations and timing them. This process helped to determine which part of the total screening battery should be implemented in which stations. This in turn helped in the development of job specifications for each screener.

The timing of the duration of each section of the PSSP per

child provided data on which to base personnel allocation decision. This allocation decision coupled with the routing decision were crucial determinants of a smooth running, pleasant, and efficient PSSP.

The Pilot Project was a worthwhile endeavor. It helped the screening staff agree upon wording of questions directed at children and parents. It also helped in the achievement of a reasonable scoring consistency. It provided opportunity to identify potential problem areas and devise preventive measures. It helped determine what exactly was needed in terms of rooms, dividers, equipment, supplies, lighting, and furniture. It facilitated the development of a job description for each member of the screening staff while providing an opportunity for testing certain schemes in set-up and routing. Furthermore, going through a dry run such as this, decreased anxiety on the part of the screening staff while assuring a certain level of skill-competence. The Pilot Project was itself efficient and cost-effective; and in about three hours we were able to draw up a blue-print for a potentially successful PSSP.

The Screening Procedures

The major decisions made regarding the delivery procedures were on: the number of screening stations, station content, staff allocation to the screening stations, developing job specifications for the screening staff and the routing process.

The Screening Stations and their Contents

A multiple station strategy to screening was implemented as proposed in Chapter IV. There were three major screening stations: (1) The Developmental Screening Station (DDST and OPST), (2) The Vision Screening Station (Allen Cards and Stereo Fly), and (3) Height and Weight Station.

Staff Allocation and Job Descriptions were made based on screening staff available, their qualifications, the station numbers and contents as well as the number of children expected. The Screening Delivery Heuristic formula was developed and utilized for this purpose. During the Pilot Project the need to have someone to guide the parent-child pair to the right station in the right sequence was evident in order to insure that the program would run smoothly. A facilitator could carry out this responsibility.

Remaining important tasks to be performed were orienting the parent-child pair to the PSSP and obtaining brief developmental and health history. One staff member could perform these tasks--a Receptionist. While streamlining the screening stations some overlapping tasks of short duration were identified. These were to be taken care of centrally for time-saving purposes. The receptionist could perform these tasks to take up her slack time and thereby increase her efficiency. Such tasks included figuring out the exact age of each child, collecting the screening results, filing them, and giving children their reward. The

model preschool screening program staff consisted of a coordinator (author), a receptionist, a facilitator, five developmental screeners, and one height and weight screener.

The Receptionist was to greet the parent-child pair and establish a rapport with them. She was to have five tasks: information dissemination, information gathering, starting screening routing, collecting the screening summary and parent evaluation from parent-child pairs and giving the child his reward of raisins.

The Facilitator was responsible for seeing to it that screening routing ran smoothly by decreasing idle time in screening stations as well as decreasing waiting time for parent-child pairs. She was to guide the parent-child pair from the receptionist's desk to appropriate screening stations and to subsequent stations whenever this was warranted.

The Developmental Screeners were to screen the child's acuity and 3-D vision with the help of the parent, score and write in the findings on the Face Sheet the parent was carrying and guide the parent-child pair to the height and weight station. There the person in charge measured the child, wrote in the findings on Face Sheet, and asked the parent to fill in the evaluative questionnaire using the designated table. The parent then returned the Face Sheet to the receptionist.

The Coordinator (author) was responsible for the overall program and available at all times during the screening for consultation by the staff and by parents. Coordinator categorized

the screening results.

The Routing Procedure was the following: the parent-child pair started with the receptionist, went to the developmental screening station, then to vision and finally to the height and weight station. The parent completed the evaluation questionnaire, then they went back to the receptionist and then left the screening site. The routing process was altered for the non-cooperative child as proposed in Chapter IV.

The Legal Considerations

Chapter 766 regulations were discussed, especially in relation to the Hearing Screening. The regulations are not very clear as to the necessity of using pure tone audiometers with three and four year olds. Past experience with the type of equipment, confirmed the author's survey of the literature: unless the hearing screening is done in a sound treated room the results are questionable. Finding a large enough screening site with numerous rooms for various screening stations as well as a sound insulated facility was not possible. The speech clinician of the School system had discussed this matter with the Regional Office specialist and understood that only very serious and substantial hearing difficulties were to be screened out for three and four year olds. He also understood that just talking to the children would provide this information. Thus, it was decided that the language section of DDST would satisfy this regulation for three and four year olds. Five year olds would be

screened with pure tone audiometers by the school nurse in the Fall. Therefore, we did not need to use audiometry during the PSSP.

Publicity for the PSSP

As was mentionted before the aim was to reach a large population of three to five year olds for this PSSP. Effort was made to ensure that parents brought their pre-schoolers regardless of whether they thought their children had special needs or not. For this purpose three paid ads, one week apart, were placed in the local newspaper starting approximately four weeks prior to PSSP. Two weeks prior to the PSSP a comprehensive but concise news article was sent to and printed by the newspaper. Four radio announcements were made about the PSSP once a week for four weeks; fliers were sent home with school children in order to alert parents who had younger children. Salient points of the publicity were:

1. PSSP is in accordance with Chapter 766 and is optional to parents, but the school system urges parents of three to five year olds to take advantage of this free screening.
2. The screening staff and their qualifications were announced.
3. Dates and hours were announced.
4. Screening was defined as a descriptive statement of the child's growth and developmental status in rela-

tion to a large number of other children his age.

5. It was then made clear that the screening results could be used to identify those children who have special needs. Screening it was said will point out which children might later on need further evaluation for special needs services.
6. The spirit behind 766 was reiterated, namely, the desire to stop labeling children and isolating them and welcoming them into mainstreams of schools.
7. That children would "play" with screening professionals who could then approximately describe how the child is growing. It was explained that the process would take approximately 30-40 minutes.
8. Parents were asked to call the school system to make appointments.

The secretary who was assigned to set up appointments gave the parent directions as to site and urged parents not to bring siblings. If possible, a parent or a guardian was asked to come with the child. Parents were also asked to postpone their appointment if the child was sick that day.

The second screening day a newspaper reporter visited the screening site, took pictures, and wrote a brief article as a final call for people to register. The news of the screening was also on local T.V.

Feedback to the School System and the Parents

The screening results were analyzed, the children categorized by the coordinator (author) and the results were reported to the school system. Sample letters to the parents of children in various categories were also written by the coordinator and sent to the appropriate parents by the school system.

The Evaluation of the Delivery

The evaluation procedure of the Delivery consisted of: (1) parent evaluation, (2) comparative analysis of the PSSP and others in relation to desired indices, such as screening time per child, waiting time, cost per child screened. Also, the parents were asked where they had heard about the PSSP in order to obtain information on the types of publicity which were most effective.

The Summary of Implementation Procedures

The model preschool screening program (PSSP) was designed and implemented to provide an operational example for the Theoretical Framework. The screening battery included: The Denver Developmental Screening Test, The Observational Physical Screening Tool (developed by the Author), Allen Cards and the Stereo Fly for vision screening and Height and Weight measurements. Some information on developmental and health history was obtained from a concise parent interview. Some additional items were included in the battery for further refinement in the future.

The screening staff consisted of ten senior nursing students and their instructor (author) for Pediatric Nursing. The staff had had previous experience in preschool screening.

The screening delivery system was designed and implemented in such a way that it met the battery constraints as well as being acceptable to various interested parties. Both the battery design and the delivery design was pretested in a neighboring nursery school--the Pilot Project.

During the PSSP 268 three to five year olds were screened in a Western Massachusetts school system. Evaluation of the battery was through validation. The procedure followed was the comparison of the PSSP screening results with the actual teacher classification of same children in the absence of screening data.

For this purpose 86 children screened by the PSSP who later extered kindergarten were identified. The kindergarten Teachers were asked to classify these children into the four groups nine months after school entry. The comparison of the two classifications provided an evaluation of the screening battery's forecasting capability.

Evaluative information was obtained through a parent questionnaire in relation to the Screening Delivery. The delivery design and implementation was further evaluated through a comparative analysis of its desired indices.

CHAPTER VI

THE RESULTS AND DISCUSSION

This chapter reports on the analysis of screening data collected during the model preschool screening program (PSSP). The results are presented and interpreted in three major sections: (I) population characteristics, (II) evaluation of the assertions, (III) further refinement considerations.

I. The Population Characteristics

General Information

Most of the children were brought to the screening program by their moters--95.8%. Only 2.6% were accompanied by their fathers. The remaining 1.6% were accompanied by a parent substitute. Seventy percent of mothers were housewives and 29.3% were working.

Parents of 20.4% children thought that their children had special needs. Thus, 79.6% of parents brought their children for PSSP even though they thought that the child was developing normally. (This might indicate that a reasonable cross-section of children were represented in the population).*

Of the special needs perceived by parents speech was mentioned most often. The table below summarizes the parent's perceptions.

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*According to the PSSP battery categorization the percentage of children developing within the normal range was 65.3%.

TABLE 1 -- SPECIAL NEED TYPES AS PERCEIVED BY PARENTS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	ADJUSTED FREQ
NONE		210	79.2
HRG	1.	3	1.1
SPCH	2.	31	11.7
SOCIAL	3.	12	4.5
MENTAL	6.	1	.4
NEURAL	8.	4	1.5
VISION	9.	4	1.5
	TOTAL	265	100.0

An 11.7% of the parents believed that their child had special needs in speech and language area.* Thus, 57% of parents who thought their child had special needs identified it to be speech.

Only 4.5% of the population had been screened previously at a different agency and 1.9% of the population were diagnosed as having speech difficulties. Absolute frequencies were 12:265 and 5:265 respectively. Thus, 42% of previously screened were told that they had speech problems.

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*The PSSP battery referred 3.7% of the children for immediate speech evaluations and categorized another 12.4% as Wait and Watch for speech. Thus 16.1% of children were observed to have unusual speech development by (CAT). The school system classification (SCHCAT) nine months after kindergarten entry of the eighty six eligible children was: 15.1% for Specific Referral and 2.3% Wait and Watch. Thus SCHCAT identified 17.4% children with unusual speech development.

Health conditions that run in the family asked about. This was done in order to obtain information on possible hereditary or pre-disposing factors. A 12.8% the population said that they had some sort of familial health conditions. Absolute frequency was 34:265. The table below summarizes the conditions that were present in the families as reported by parents.

TABLE 2-- HEALTH CONDITIONS THAT RUN IN THE FAMILIES

CATEGORY LABEL	CODE	ABSOLUTE FREQ	ADJUSTED FREQ (PCT)
NON		231	87.2
SPCH	2.	1	.4
ALLRGY	5.	14	5.3
METAB	7.	14	5.3
NEURAL	8.	4	1.5
VISION	9.	1	.4
	TOTAL	265	100.0

Allergies and metabolic disorders were cited as the most common conditions that run in families, 5.3% each. Speech problems accounted for only 0.4%.

Parents were also asked about unusual developmental history to find out about problems with milestones. The table below summarizes the types of unusual milestones mentioned by parents.

TABLE 3-- UNUSUAL MILESTONES MENTIONED BY PARENTS

CATEGORY LABEL	CODE	ABSOLUTE FREQ	ADJUSTED FREQ (PCT)
NON	0	208	78.5
HRG	1.	14	5.3
SPCH	2.	2	.8
SOCIAL	3.	5	1.9
MOTOR	4.	3	1.1
ALLRGY	5.	16	6.0
METAB	7.	4	1.5
NEURAL	8.	6	2.3
VISION	9.	7	2.6
	TOTAL	265	100.0

A 21.5% of children had unusual milestones. Absolute frequency was 57:265. Among the problem types of unusual milestones, allergies were cited to be the highest occurrence at 6.0% followed closely by hearing problems at 5.3%.

Parents were asked about their source of information on the preschool screening program. The tablebelow summarizes their responses.

TABLE 4--THE PUBLICITY TYPES AND THE PARTICIPANT SOURCE

CATEGORY LABEL	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)
	0	1	.4	.4
PPR	1.	126	47.5	47.5
RADIO	2.	20	7.5	7.5
FLYER	3.	66	24.9	24.9
NGHBR	4.	23	8.7	8.7
OTHR	5.	28	10.6	10.6
	9.	1	.4	.4
	TOTAL	265	100.0	100.0

The results of frequency count of those people who heard about the PSSP from various types of news media show that 47.5% of parents heard about it from the newspaper while 24.9% heard about it from the flyer sent home by the school system. Radio accounts for only 7.5% of people acquiring this information through this media. In planning for future PSSP's in this locality, information gained from the above table might prove useful.

Screening Results

Of the 265 children screened during Spring 1975 and included in the data analysis 143 or 54.0% were males and 122 or 46.% were females. Age distribution of children screened is

summarized below.

TABLE 5-- AGE DISTRIBUTION OF PRESCHOOLERS SCREENED

No. of Children	Kindergarten Entry Expected	Age Years/ Months
151	Fall 75	4^3 to 5^6
99	Fall 76	3^3 to 4^3
15	Fall 77	3^0 to 3^3

Handedness was recorded--230 or 90.2% of the children were observed to be right-handed; 22 or 8.6% were left-handed and three to 1.2% were ambidexterous.

The Total Battery Categorization (CAT)

The 265 children screened were categorized by the total battery criteria (CAT) for the school system's use. The table below depicts this categorization.

TABLE 6-- CATEGORIZATION OF CHILDREN BY TOTAL BATTERY CRITERIA (CAT)

CATEGORY LABEL	Code	Absolute Freq.	Adjusted Pct.
All O.K. Now	1	173	65.3
Wait and Watch	2	57	21.3
Specific Referral	3	28	10.6
Substantial/C.E.T.	4	7	2.6
Total	265	100.0	100.0

According to (CAT) classification 173 or 65.3% of children screened were categorized as developing within normal range; fifty-

seven or 21.5% were categorized as questionable in relation to their growth and development, therefore were put into Wait and Watch group. Twenty-eight children or 10.6% were categorized as having specific special needs that needed further evaluation; seven or 2.6% were categorized as having multiple unusual characteristics in their growth and development which were sufficiently deviated from normal range that these children required formal and multifacetted evaluation by a Core Evaluation Team. This is the group that Chapter 766 refers to as those who have a reasonable likelihood of developing substantial disabilities such that they might require special education services when at school.

Vision Screening Categorization (VCAT)

Vision screening results showed 18:265 or 6.7% had acuity problems and 8:265 or 5.8% had 3-D vision problems. Thus 5.8% of the children screened might have been developing amblyopia which can be prevented in this age group.

The Observational Physical Screening Categorization (PHCAT)

Body build portion of the OPST looks for age appropriate proportions, strength, posture and spine curvature. In our population 93.5% were observed to be growing apparently within normal range and 6.5% to be deviated from normal.

Gait portion of the OPST results show that 256 or 97.7% of children screened were observed to be having no difficulty with gait at the time and six or 2.3% were observed to have unusual

gait.

Coordination portion of the OPST looks for the overall difficulties in coordination of child's body in carrying out daily routine activities. In coordination 250 children or 95.4% were observed to have no apparent difficulties and 12 or 4.6% displayed unusual coordination.

Skin. In screening for unusual skin status, 255 or 97.3% of children were found to have no apparent unusual skin manifestations while seven or 2.7% were observed to have unusual skin manifestations.

Speech observations of the population show that 214 of the children screened or 81.7% were observed to display no unusual speech characteristics while 51 or 19.5% were observed to display some unusual characteristic in their speech.

Head area was observed for unusual characteristics of the hair, face, eyes, nose, ears, lips, mouth and the neck. Of the children screened 245 or 93.5% were observed to exhibit no apparent unusual characteristics while seventeen or 6.5% were observed to have unusual characteristics of the parts outlined under head.

Trunk area was observed for unusual characteristics of the shoulders, chest, spine and hips. Of the 265 children screened 259 or 98.9% were not observed to have any apparent unusual characteristics in their trunk while three or 1.1% displayed some unusual characteristics.

Extremities portion of the OPST included observations on legs, arms, feet and fingers. Of the children screened 250 or 95.4%

did not display apparent unusual characteristics while twelve of 4.6% exhibited some unusual traits. The table below summarizes the OPST results in different sections.

TABLE 7-- CATEGORIZATION OF OBSERVATIONAL PHYSICAL SCREENING RESULTS

Section of Physical	Adjusted Percentage O.K.	Not O.K.
Bodybuild	93.5	6.5
Gait	97.7	2.3
Coordination	95.4	4.6
Skin	97.3	2.7
Speech	80.0	20
Head	93.5	6.5
Trunk	98.9	1.1
Extremities	95.4	4.8

Table 7 represents physical screening data: OK stands for Age-Appropriate, Not OK stands for presence of unusual characteristics in relation to area screened.

The Denver Developmental Screening (DDST) Results

The Denver Developmental Screening Test used is comprised of four major sections: personal-social, fine motor, language and gross motor. Failures and delays of tasks in each section were of some interest as the final scoring od DDST does not reflect this. The table below summarizes these.

TABLE 8--THE TASK FAILURES AND DELAYS IN THE DDST SECTORS

DDST Sections	3 or more Failures	2 or more Delays
Personal-Social	8	1
Fine motor	9	4
Language	16	4
Gross motor	18	1

The task failures and delays in the four sections of DDST of 265 children screened.

Of the 265 children screened four children had two or more delays in the fine-motor and the language sector. The three or more task failures were more frequently experienced in the language and gross-motor sectors. The language and the motor sectors had more failures and delays than the personal social sector.

Retested Children

Children who were older than 3^{10} and who either refused the screening or found it very difficult were asked for a retest. Those who were retested were 2.8% or the total population screened. Retesting was constrained by the availability of space, time, school system and parental interest as well as by the child's age.

II. The Evaluation of the Assertions

In order to evaluate the assertions on predictive capability of the screening battery the battery categorizations were compared to the actual school classifications nine months after school entry of the 86 children. These children were classified by their kindergarten teachers in the absence of screening data. (The kindergarten teachers did not have access to the screening results.) This data was labeled "school categorization" (SCHCAT) and was compared to the PSSP categorization in effort to evaluate the predictive capability of the PSSP.

Assertion 1

The screening total battery will predict which children will be classified by the school system as needing special services when at school.

The screening battery results (CAT) and the actual school classifications (SCHCAT) of the 86 eligible children are depicted in the table below for comparison.

TABLE 9--CATEGORIZATION OF 86 CHILDREN BY (CAT) AND BY (SCHCAT)

CATEGORY LABEL	Absolute Frequency		Percentage	
	CAT	SCHCAT	CAT	SCHCAT
I. All OK Now	65	66	75.6	76.7
II. Wait & Watch	11	6	12.8	7.0
III. Specific Referral	9	14	10.5	16.3
IV. Substantial Referral	1	0	1.2	0

This table summarizes the comparison of the total screening battery categorization (CAT) with the actual school categorization (SCHCAT) of the 86 children fourteen months after the screening program and nine months after school entry.

The relationship between PSSP categorization of screened children based on total PSSP battery (CAT) and the actual categorization of such children by the school system (SCHCAT) fourteen months later was analyzed in order to evaluate predictive capabilities of the PSSP battery.

The statistical measures of association employed were: Chi Square and statistical significance for existence of a relationship; Cramer's V for the strength of the relationship; and Gamma for directionality of the association. The table below depicts the relationship of CAT and SCHCAT.

TABLE 10-THE RELATIONSHIP BETWEEN CAT AND SCHCAT

Relationship	X^2	Sig.	Cramer's V	Gamma
CAT BY SCHCAT	68.2695	.0001	.63001	.88966

This table summarizes the predictive capability of the composite battery

The results of statistical measures of association employed to study CAT and SCHCAT are encouraging. The relationship is significant at at least .0001 level i.e. there is less than 1:10,000 chance that one could be wrong at each sampling. This value is statistically significant. Cramer's V of .63001 points to a strong relationship while Gamma of .8896 depicts a high positive relationship. Thus we can say that the categorization of screening battery results (CAT) can predict how these children would be classified by a school system (SCHCAT) towards the end of their first school year. Therefore Assertion 1 is substantiated.

More detailed information in regard to the predictive capability of the total composite battery (CAT) is provided in the table below.

TABLE 11--PREDICTIVE CAPABILITY OF THE TOTAL BATTERY

CAT	SCHCAT 1.	2.	3.	ROW TOTAL
1.	62	0	3	65
	95.4	0	4.6	75.6
	93.9	0	21.4	
	72.1	0	3.5	
2.	2	4	5	11
	18.2	36.4	45.5	12.8
	3.0	66.7	35.7	
	2.3	4.7	5.8	
3.	2	1	6	9
	22.2	11.1	66.7	10.5
	3.0	16.7	42.9	
	2.3	1.2	7.0	
4.	0	1	0	1
	0	100.0	0	1.2
	0	16.7	0	
	0	1.2	0	
COLUMN TOTAL	66	6	14	86
	76.7	7.0	16.3	100.0

COUNT
ROW PCT
COL PCT
TOT PCT

RAW CHI SQUARE = 68.26959 WITH 6 DEGREES OF FREEDOM.

SIGNIFICANCE = .0001

CRAMER'S V = .63001

GAMMA = .88966

A close study of the above table reveals that of the sixty-five children in CAT I, sixty-two or 95.4% were placed in SCHCAT I; of the eleven children in CAT II, four or 36.4% were placed in SCHCAT II; of the nine children in CAT III, six or 66.7% were placed in SCHCAT III; the one child in CAT IV was placed in SCHCAT II. This last occurrance is expected because the CAT IV child had gone through an extensive evaluation by a team of experts (C.E.T.) and probably no specific special needs were isolated. However, since the child had educational needs different from what the standard school curricula provides, he was put in Wait and Watch category. The fact that the CAT IV child was not put in CAT III after C.E.T. is encouraging. This might indicate strength in screening battery capability of "finer sifting" for specific referral of the "not-directly educational needs". In other words CAT IV possibly did refer those children who have generalized special educational needs that need to be managed through an Educational Model approach. The school system then can facilitate an appropriate educational plan for this child while watching him for any future changes. If the child later develops specific special needs that require specific referral to and intervention in by the Medical Model this also can be facilitated. In the meantime, however, the child's nonspecific special needs can be met from educational model. It is not unlikely that this child's special needs will not even in the future be translated into diagnosis treatment--

prevention or cure process which is necessitated by the Medical Model. The non-specific special needs of an educationally at-risk child then will be met by the educational model.

It is not surprising that the CAT II children distributed themselves into the three SCHCAT categories. CAT II was designed to include children with questionable screening results whose special needs might not persist until school entry. It was to assure not overlooking some early signals of at-riskness while preventing undue labeling. It was expected that some of these children would move into CAT I, All OK Now category, by school entry. In fact, 18.8% of the CAT II children did move into the CAT I category as deduced from their placement in SCHCAT I by the school system. A 36.4% of CAT II children were placed in SCHCAT II for Wait and Watch. The 45.5% of CAT II children were placed in SCHCAT III.

The fact that 54.5% of the CAT II children were found by the school system <u>not</u> to have special educational needs supports the contention that such a categorization is necessary in order to prevent undue labeling. Also, the fact that 45.5% of these children <u>were</u> found to have some special education needs justified having such a Wait and Watch category while protecting most of the children from undue labeling. Therefore, through CAT II, 54.5% children were saved from undue labeling and 45.5% children's future special needs were not overlooked.

The fact that SCHCAT did not have any CAT IV is also in-

teresting but not surprising since most of the children with perceived learning difficulties were categorized as to their specific needs after formal or informal evaluation by the school system. If specific special needs cannot be isolated, the child is placed in SCHCAT II as explained earlier. This fact also supports the contention that a PSSP should have a CAT III "specific referral" category to cut down on unnecessary large scale evaluation by a complex team of experts at a considerable monetary and psychological cost. If there were no CAT III category there would have been 11.2% substantial referral as opposed to 1.2%. This would have meant ten C.E.T. evaluation procedures (with all its ramifications) rather than one only. Furthermore, if there were no CAT II, the children with questionable screening results would have been referred, raising the substantial referral rate to 24.5% and the C.E.T. number to twenty one.

Assertion 2

The total screening battery categorization will predict the educationally at-risk children better than the DDST does alone.

Assertion 2 can be evaluated through the following three steps: (1) the screening results categorized by the DDST criteria alone (DCAT) can be compared to (SCHCAT) values; (2) the predictive capability of the DDST so obtained then can be compared to the total battery's predictive capability, (3) the

results of this comparison can then indicate if Assertion 2 were substantiated or not.

Step 1 The table below depicts the comparison between DCAT and SCHCAT values.

TABLE 12-- CATEGORIZATION OF 86 CHILDREN BY (DCAT) AND BY (SCHCAT)

CATEGORY LABEL	Absolute Freq.		Percentage	
	DCAT	SCHCAT	DCAT	SCHCAT
I. All OK Now	83	65	96.5	76.7
II. Wait & Watch	0	6	0	7.0
III.Specific Referral	0	14	0	16.3
IV. Substantial Referral	3	0	3.5	0

This table summarizes the comparison of the Denver Developmental Screening Test categorization (DCAT) with the actual school categorization (SCHCAT) of the 86 children fourteen months after the screening program and nine months after the school entry.

Step 2. The association between the categorization based on the DDST criteria only (DCAT) and the actual categorization of the same children by the school system fourteen months later (SCHCAT) was analyzed. The purpose for this was to determine the predictive capability of the DDST alone. The statistical measures of association used were Chi Square and statistical significance, Cramer's V and Gamma. The table below depicts the relationship between the DDST results (DCAT) and the actual school categoriza-

tion (SCHCAT).

TABLE 13-- THE RELATIONSHIP BETWEEN DCAT AND SCHCAT

Relationship	X^2	Sig.	Cramer's V	Gamma
DCAT BY CAT	4.4137	.1100	.2265	.6265

This table summarizes the predictive capability of the DDST.

Clearly the relationship between DCAT and CAT is not statistically significant. The analysis of statistical measures of association point to a weak relationship. This data suggest poor predictive capability of the DDST alone. In the table below further detail is provided in regards to the relationship of DCAT by SCHCAT.

TABLE 14--THE PREDICTIVE CAPABILITY OF THE DDST

COUNT / ROW PCT / COL PCT / TOT PCT	SCHCAT 1.	2.	3.	ROW TOTAL
1.	65	5	13	83
	78.3	6.0	15.7	96.5
	98.5	83.3	92.9	
	75.6	5.8	15.1	
4.	1	1	1	3
	33.3	33.3	33.3	3.5
	1.5	16.7	7.1	
	1.2	1.2	1.2	
COLUMN TOTAL	66	6	14	86
	76.7	7.0	16.3	100.0

RAW CHI SQUARE = 4.41371 WITH 2 DEGREES OF FREEDOM.

SIGNIFICANCE = .1100

CRAMER'S V = .22654

GAMMA = .62651

A close study of the above table shows that of the 83 children in DCAT I, 65 or 78.3% were placed in SCHCAT I, five or 6.0% were placed in SCHCAT II and thirteen or 15.7% were placed in SCHCAT III.*

Of the three children in DCAT IV one or 33.3% was placed in SCHCAT I, another one or 33.3% was placed in SCHCAT II, and yet another one or 33.3% was placed in SCHCAT III. The only three children DDST has referred distributed themselves evenly through the three categories of school system. Furthermore, it has missed thirteen out of fourteen Actual Specific Special needs cases--92.8%. It has predicted only 7.2% of the specific special needs cases. It has missed 83.3% of the Wait and Watch children of five out of six, and has predicted only 16% of these cases. It has falsely referred one out of sixty-six or 1.6%.

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*Since the DDST is a binary tool, it does not lend itself to categories II and III; its results were categorized into DCAT I and IV. The "questionable" DDST results were added to DCAT IV.

A comparison of the number of children placed in the four categories by SCHCAT, CAT and DCAT shows that the total battery (CAT) can predict school classification decidedly better than does the Denver Developmental Test alone. The table below depicts this observation.

TABLE 15--PERCENTAGE OF CHILDREN PLACED IN EACH CATEGORY BY SCHCAT, CAT AND DCAT

CATEGORY LABEL	Percentage of Children Placed in each category		
	SCHCAT	CAT	DCAT
I. All OK Now	76.6	75.6	96.5
II. Wait & Watch	7.0	12.8	0
III. Specific Referral	16.3	10.5	0
IV. Substantial Referral	0	1.2	3.5

The actual school classification placed 76.7% percent of the children in Category I; the total battery placed 75.6% and the Denver Developmental Test placed 96.5%. The school classification of 7.0% in Category II was compared with 12.8% so classified by CAT and zero percent by DCAT. The actual classification of Category III was 16.3%, CAT placed 10.5% and the DCAT placed zero percent in this category. The school classification had no children in Category IV, CAT had 1.2% and DCAT

had 3.5%. Clearly the total battery has predicted actual school classification better than the Denver Developmental Screening Test did.

The review of the statistical analysis of association between DCAT and SCHCAT further identifies the pedictive capabilities of CAT and DCAT. Table below summarizes the comparative statistical analysis of the predictive capabilities of DCAT and CAT.

TABLE 16--COMPARISON OF PREDICTIVE CAPABILITIES OF DCAT AND CAT

Relationship	X^2	Sig.	Cramer's V	Gamma
CAT by SCHCAT	68.26959	.0001	.63001	.88966
DCAT by SCHCAT	4.41371	.1100	.22654	.62551

Clearly CAT predicts SCHCAT better than does DCAT. Therefore Assertion 2 is substantiated. The difference between the predictive capabilities of the DDST (DCAT) and the composite battery (CAT) becomes more obvious when the Screening Efficiency is considered.* The screening rates of the DDST and the composite battery are compared in the table below.

*It should be noted that the main additional component of the composite battery is the OPST developed by the author which takes 3-5 additional minutes to administer by a school nurse.

TABLE 17-- THE SCREENING EFFICIENCY* OF THE DDST AND THE COMPOSITE BATTERY

Actual Prevalence Rate = 23%

THE RATES	DDST	COMPOSITE
SELECTION	3.5%	24%
VALID POSITIVES	10%	85%
MISSED CASES	90%	15%
FALSE NEGATIVES	21%	3.5%
FALSE POSITIVES	1%	4.7%

*Prevalence Rate is determined by the actual school classification

Selection Rate is the percentage of children screened out

Valid Positive (Positive hits) is the fraction of the time positives identified

Missed cases is the fraction of the true positives missed

False negatives (under-referral) is the fraction of the total population falsely identified as negative

False positives (over-referral) is the fraction of the total population falsely identified as positive.

In a population of 23% actual prevalence rate the DDST selected only 3.5% while the composite battery selected 24%. The DDST selected only 10% of the true positives while the composite identified 85% of the true positives. The DDST missed a total of 90% of the true positives; that is, 90% of the children who needed special education services were not screened out and referred for evaluation by the DDST. The composite, however, missed only 15% most of which were speech referrals. This is understandable since formalized speech and hearing screening was not a part of the actual PSSP. Still, the 15% missed cases rate is quite good.

The DDST had a 21% false negative rate, while the composite battery had only a 3.5% false positive rate. The DDST had a 1% of false positive rate but it also missed 90% of the true positive cases, therefore 1% false positive rate does not reflect screening efficiency. The composite battery had 47% false positive rate most of which were those children who failed the stereo-vision test. Although the school systems do conduct vision screening and SCHCAT reflects their results as well, the equipment they use is not quite as discriminating as the steropsis equipment we haye employed. Therefore, the PSSP battery referred more children for 3-D vision evaluation than did the school system.

In summary, then, the data analysis suggests the superiority of the composite battery over the DDST alone in terms of pre-

dictive capability.

Assertion 3

The implementation of the proposed delivery design will increase efficiency as measured by the desired indices such as screening time per child, cost per child screened, waiting time, number of children screened per screening staff, participation rate, the number of children screened per hour.

The actual PSSP went as planned and was a successful endeavour; PPSP combined a pleasant atmosphere with an efficient process. The total screening program took approximately thirty minutes per child. The breakdown was as follows:

TABLE 18-- TIME SPENT IN DIFFERENT COMPONENTS OF PSSP

Stations	Minutes
Receptionist	3-4
Developmental	15-18
Vision	5-6
Height & Weight	2-4
Evaluation	1-2
Total Range	27-34
(Approximate Average 30 minutes)	

The idle time was minimal and the waiting time was close to zero. In a few instances a few parent-child pairs waited a maximum of three minutes total. The PSSP was designed for imple-

mentation of a throughput of ten children per hour. This was realized.

The Cost Factor

The importance of the cost of a screening program and its effect on the viability need not be elaborated on. The actual out-of-pocket cask cost of the model PSSP was approximately $1,310 or $4.80 per child screened. Clearly this is a very low cost program. Cost figures from other such programs in Massachusetts and other states were not available. However, such data was obtained from a neighboring well established school system of high repute. A cost comparison of these two preschool screening programs is provided below.

TABLE 19--THE COST COMPARISON OF THE AX AND THE MODEL PRESCHOOL SCREENING PROGRAM

Item	Ax	The Model
Actual Cost per Child	$27.00	$5
Imputed cost per child	?	$7-9
Released time for School personnel	22 people ? hours	none
Actual planning cost	$1,680	none
Imputed planning cost	more than $1,680	$210-510

The figures presented for Ax are obtained from their own report. The $27.00 per child figure for Ax does not include the cost of released time provided for twenty-two professional staff. By their own report this translates into $178.00 per hour. However the Ax report did not indicate how many hours were released for each of the twenty-two professional staff. Therefore it was not possible to allocate this overhead cost to per child cost reasonably accurately. It's allocation will raise per child cost considerably. In fact, the Ax report projects and recommends $37.50-$57.74 per child screening cost for the year after. Our actual cost was $5.00 per child.

Ax report of their program states that the cost reported plus the released time does not reflect the true cost of the screening since so much of the work was done by volunteers--area professional volunteers.[148] Total number of people involved as screening staff was fifty-three. Twenty-two of this fifty-three were school personnel.

Computation of Cost of any program must be detailed in order to clarify what it entails. From the school system's point of view cost usually means out-of-pocket cash spent. Therefore costs associated with the Special Education director's time, the volunteers' time and miscellaneous items such as paper, pencils, crayons, etc.are not figured into the total cost. Most of these costs must be included in the cost of the program to more accurately reflect the total cost. This type of figure would be very useful to those who might be planning such a screening

program outside the confines of a school system. For this reason an actual out-of-pocket cost figure and an imputed cost figure is provided for the reader.

The imputed cost per child screened during the Model PSSP ranges from seven to nine dollars. The former figure includes the author's time spent for developing the Face Sheet, meetings with the screening staff and the school system personnel, publicity writing, actual screening, categorization of the PSSP data and writing the sample letters to the parents. The imputed cost figure of $7.00 per child also includes the cost of borrowed equipment and cost of Xeroxing, pencils, papers, etc. In other words, if the above mentioned items were paid for the cost incurred per child screened would have been $7.00 per child screened.

The $9.00 per child screened figure includes the time of school personnel spent in two meetings with the author, as well as the time the Special Education Director spent in conjunction with the PSSP planning and implementation. Ordinarily these cost figures are not included in determining the total cost because such personnel are not paid for separately for these duties. Unlike the released time provided for teachers, substitutes need not be hired for such personnel. When these cost figures are included the total imputed cost would be approximately $9,00 per child screened.

An alternative strategy which can be considered is that of

an on-going preschool screening program with full-time staff. In computing the screening screening staff cost $3.00 per hour rate was used assuming the staff consisted of student nurses. If however the screening program were to be an ongoing process what would the cost be?

A team of professional nurses can be hired for this job on a continual basis. Seven nurses would be needed for screening: five for developmental screening and two for vision. Three aides can perform the job descriptions of the height and weight screener, the facilitator and the receptionist. Figuring the cost per staff at a generous rate of $10.00/hr. for the nurses and $5.00/hr. for the aides the cost per child screened would be $17.00. This cost figure is much lower than even the actual out-of-pocket cash cost of the Ax preschool screening program. It is also less than the actual cost of $26.00 per child screened reported by the Swedish Findings.* As such both the actual cost and the generously imputed costs of the Model PSSP is much lower than the Ax and the Swedish actual cost.

The Desired Indices of the Screening Delivery

The desired indices of the delivery were: a total average screening time per child of thirty minutes, minimal waiting time,

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*The $26 per child screened reported in the Swedish Findings does not include the nurse's salary and the cost of the child Health Center facilities. See Wagner, p. 17.

ten children screened per hour, a total of thirty screening hours, and a parent-child participation of at least 35.0% of the three to five year olds in the school district.

The actual values of the above mentioned indices were favorable. The implementation of the Model PSSP yielded the following indices as depicted in the table below.

TABLE 20-THE DELIVERY INDICES YIELDED BY THE PSSP

Indices	Values
total screening time per child	27-34 min.
parent-child waiting time	0-3 min.
children screened per hour	10
parent-child participation rate	44%

Table 20 summarizes the actual delivery indices as a result of the PSSP implementation. The delivery had a smooth and pleasant flow. A comparison of the PSSP delivery indices with those of the Ax school system's highlights the favorable nature of the model preschool screening program. The table below compares the model PSSP with the Ax screening program.

TABLE 21 THE EFFICIENCY INDICES OF THE Ax AND THE MODEL PRESCHOOL SCREENING PROGRAM

Indices	Ax	Model
Parent-child participation rate	25%	44%
No. of children screened	133	268
Total Screening Time/Child	60-150 min.	27-34 min.
Parent-child waiting time	30-50 min.	0-3 min.
No. of screening staff involved	53	10
No. of children screened/hour	4	10
Routing Flow	Congested	Smooth

Clearly, the Model PSSP delivery indices yielded more favorable results. As is easily observable from the table above, in the Ax program the parent-child waiting time was so long (30-60 minutes) that the flow of the screening delivery was congested. The Model PSSP flow, on the other hand, was very smooth with the parent-child waiting time not exceeding a total of three minutes. Also the total screening time per child at Ax was 60-150 minutes which resulted in tired and uncooperative children as well as anxious and frustrated parents. The Model PSSP total screening time per child was thirty minutes. On the average a parent-child pair spend close to two hours at the screening site in Ax program. During the Model PSSP however, the parent-child pair spent no more than thirty-seven minutes at the screening site.

There were fifty-three screeners involved in the Ax program. Coordinating such a large number of screeners of varied competence and availability must not have been very easy. The inevitable loss of consistency among screeners and its adverse effect on error rate is, of course, the major drawback of such an effort. Being cognizant of such a drawback much effort was put into achieving scoring consistency of screeners in the Model PSSP as reported previously. Ax did not hold screening sessions during days and hours when working parents could bring their children and was criticized on this point. The PSSP offered full day screening session on a Saturday.

The results of the PSSP delivery evaluation are positive as reflected by the values of the desired and the actual indices. The indices of the PSSP delivery in themselves point to the efficiency of the model preschool screening program. Comparison of the PSSP indices with those of the Ax program can further convince the reader of the PSSP's efficiency. Therefore the Assertion 3 is substantiated.

Assertion 4

The screening delivery design and its implementation during the PSSP will increase the acceptibility of the screening process by the clients.

In order to obtain information on the acceptibility of the Model PSSP to the parents and children, parents of the 268 children were asked to evaluate the PSSP. A concise but comprehensive questionnaire was prepared for the parents to obtain their evaluation of the PSSP. The questions asked were:

1. Was the screening comprehensive? Yes, No
2. The rooms and physical set-up are: Good, Adequate, Poor
3. The screening time is: Too long, Too short, Just right
4. The child's reaction to screening is: Enjoyed, Neutral, Upset
5. Parent's reaction to screening is: Enjoyed, Neutral, Upset
6. Did you find the staff cooperative and congenial? Yes, No

The following table summarizes the results of the PSSP evaluation by parents.

TABLE 22--THE RESULTS OF THE PARENT EVALUATION OF THE PSSP

Question	Answer: %	Answer %:	Answer: %
Comprehensive	Yes 99.6	No 0.4	
Physical Site	Good 84	Adeq. 14.3	Poor 0.4
Screening Time	Right 94.2	Short 4.6	Long 1.2
Child's Reaction	Enjoy 80.2	Neutral 15.6	Upset 3.8
Parent Reaction	Enjoy 88.2	Neutral 11.8	Upset 0
Staff Cooperative Congenial	Yes 100		

Clearly the parents' evaluation of the PSSP was very positive. A 99.6% of the parents thought that the screening battery was comprehensive enough, only 0.4% thought that the screening process needed to be more comprehensive. An 84% thought that the physical site was good, 14.3% found the physical site adequate, and only 0.4% rated the physical site as poor. A 94.2% of parents evaluated the screening time to be just right; a 4.6% found the screening time too short and a 1.2% thought the screening time was too long. An 80.2% of parents reported that his/her child enjoyed the screening process; 15.6% reported that the child was neutral to the screening process; and only 3.8%

reported that the child was upset by the screening process. An 88.2% of the parents wrote that they enjoyed the screening process; 11.8% reported feelings of neutrality and no parent said that he/she was upset by the scrbening process. A full 100% of parents reported that they found the screening staff cooperative and congenial.

Clearly the results of the parent questionnaire are very positive and point to high acceptibility of the PSSP by parents and children. Therefore, Assertion 4 is substantiated.

III. Further Refinement Considerations

Some tasks and observations were added to the battery in order to obtain information to be used for future refinement of the battery. Such additions included: color identification, counting, the child's handedness, developmental and health history of the child, the parents' perception of the child's special needs, and behavioral observations as a part of the OPST. The frequency counts of the handedness, the parent's perception of the child's special needs, and historical information were reported in the first part of this chapter. Further analysis of such additional data is recommended for further studies.

The rationale behind the inclusion of historical data was that findings from some current research point to the importance of such data. Brazelton[149] reports considerable differences between average weight full-term newborns and low birth weight

infants in their central nervous system and other future potential. Rutter[150] and Hoffman[151] report positive correlations between difficulties manifested at birth and later developmental problems.

The rationale for including the parent's perception of the child's special needs was because the parents are natural raters and know their child well. Kellam[152] refers to parents as "natural raters". (He also states that teachers are natural raters). Thomas[153] says that parents should be asked for descriptive factual information which does not date too far back in history. The parents then can supply an accurate report which can constitute a valid reflection of the child's behavior.

Data obtained in relation to handedness, color identification and counting was correlated with the later school categorization of children. The table below summarizes this analysis.

TABLE 23-- RESULTS OF COLORS, COUNTING AND HANDEDNESS AS COMPARED WITH SCHCAT

Item	Chi Square	Significance	Cramer's V	Gamma
Colors	19.85769	.0029	.34117	.61753
Counting	49.28396	.0001	.53843	.45551
Handedness	6.19603	.1850	.19204	.31757

The counting capability of a child seems to have a discriminating nature. Counting ability and school categorization of the child appears strongly associated, and statistically significant at .0001 level. The Cramer's V of .34117 and Gamma of .61753 point to a relatively strong positive association.

The color identification ability of the child also seems to be discriminating, although not as strongly as the counting ability. The color identification ability of the child and his/her school classification also appears to be related. The association is statistically significant at the .0029 level with a relatively strong and positive association--Cramer's V .34117 and Gamma .61753.

The relationship of the handedness and later school classification of children is not found to be statistically significant.

Color identification and counting might be included in further refinement studies in the future. The behavioral and speech observations of the Observational Physical Screening tool need to be analyzed. Then criteria must be developed for their use as discriminating items for screening. Similar analysis is recommended for other items which were included in the battery for future refinement purposes.

In summary then, the implementation of the model preschool screening program has operationalized the theoretical framework

developed in this study. The results of data analysis suggest that it was possible to design and implement a preschool screening program which was at once effective and viable. The screening results presented in this chapter have described the population screened and also have substantiated the assertions of this study. A section on the further refinement of the model preschool screening battery has provided suggestions for further study in this respect.

CHAPTER VII

THE SUMMARY AND CONCLUSIONS

The Summary

This study had two major purposes. The first was to develop a theoretical framework for large scale preschool screening. The second major objective was to implement the proposed theoretical framework in an actual preschool screening program in order to: (1) evaluate the assertions, (2) detail the description of the framework in an actual setting, and (3) gain insight into and achieve a refinement of, the proposed theoretical framework.

The theoretical framework encompasses a screening battery design (instrument composite) and a screening delivery design (management protocol) both of which interactively affect one another. In this study, these two equally important components are made compatible with each other and with the screening agency environs.

The Screening Battery

Important screening battery design considerations include the needs for: (1) comprehensiveness, (2) interfacing the medical and educational models, (3) forecasting capability, (4) pretesting the battery design, (5) compatibility with the delivery design, (6) a "Wait and Watch" categorization, and (7) a scheme which allows for a "Specific Referral" categorization.

An important aspect of the battery design is its attempt to interface the seemingly disparate Medical Model and the Educational Model approaches to screening. The Medical Model is generally oriented causally and seeks to diagnose and cure. The Educational Model, however, seeks a descriptive statement of the child's growth and developmental status in order to remediate deficiencies and enhance strengths.

The battery attempts to aid in the early identification of health oriented and physical development related special needs. At the same time, the battery seeks to describe the child's growth and developmental status in ways that will lend themselves to ultimately devising appropriate educational plans. The design of the battery attempts to make the assessment data operational for educational purposes, while at the same time relieving the school systems from the responsibility of dealing with special needs that are "not directly educational". Another important aspect of the battery is its "finer-mesh screening" nature which allows for Specific Referral. The Specific Referral category provides an operational classification of referral types.

The Screening Delivery

The delivery of the preschool screening program is the major determinant of its viability. The program has to be made acceptable to both clients and screening agencies. The delivery of the PSSP was designed to enhance its acceptability to parents, child-

ren, school systems, and government agencies. A screening program must be designed to be convenient and non-intrusive; that is, it must have the attribute of pleasantness. A screening program must not interfere with the school system environs, and it must be compatible with the school systems generally. A screening program must also be economically feasible and efficent from the point of view of both the school systems and the governing agencies.

The major components of the screening delivery include staffing, the physical set-up, screening procedures, publicity, feedback to parents and school systems and a Pilot Project to pretest the delivery design in situ.

The Implementation

A model preschool screening program, PSSP, was designed for and implemented in a Western Massachusetts school system in Spring 1975. The screening tool battery consisted of Denver Developmental Screening Test, Observational Physical Screening Tool developed by the author, and Allen Cards and Stereo-Fly test for vision screening. Height and weight measurements were also obtained. A total of 268 children between the ages of three to five years were screened. Total screening time per child was approximately thirty minutes and the actual cost per child screened was $5,00. The screening staff consisted of ten senior nursing students from a university and their instruc-

tor, the author.

The PSSP met the requirements of the Massachusetts Comprehensive Special Education Law Chapter 766 The PSSP was made available to total population of all children between the ages of three and five. It was designed to describe a child's growth and development status without labeling, and to identify those children who might need alteration of the regular curricula in order to promote their maximum growth potential at school. Thus the PSSP was designed to have a forecasting capability in predicting which children might need special education services or other intervention techniques in their future schooling.

The analysis of data obtained from the implementation of the Model PSSP suggest that the theoretical framework facilitates an effective and viable preschool screening program.

The Conclusions

The major conclusion of the study, as substantiated by the data analysis, is that operationalizing the Theoretic Framework facilitates a preschool screening program which: identifies educationally at-risk children, is acceptible to clients, is compatible with screening agencies, is efficient and is low in cost.

The Screening Battery

The crucial components of an effective preschool screening battery are as follows: the inclusion of the Observational Physical Screening Tool, and a categorization scheme which allows for a Wait and Watch and Specific Referral classifications.

Category II - Wait and Watch

One of the major objectives of screening which at once becomes problematic is prediction. The problem arises because many of the screening tools describe the child's growth and developmental status as it is now (at the time of screening). We are in fact trying to plan for tomorrows while using today's tools. Categorizing children in ways which will affect their future with tools of uncertain validity is a task which warrants much caution. One must exercise much care until predictive capabilities of such tools are reasonably ascertained through longitudinal studies.

Although one must not overlook warning signals--especially those that have a deadline for amelioration such as amblyopia--over-referral and the resultant undue "labeling" at a very young age creates problems of high cost in both monetary and psychosocial terms. Therefore a PSSP should be designed to screen out those children who display developmental lags which will persist into schooling years. We believe that both these criteria must be met for a child to "fail" the screening process and thus be referred. (i.e., the child must have apparent

developmental lags, and a reasonable likelihood of these lags persisting until schooling). However, since "warning signals" should not be overlooked a special category for such cases -- CAT II, Wait and Watch--is recommended.

The DDST is a yes or no tool--referral or no referral. Even the questionable category of the DDST calls for referral of the child, with all the ramifications this referral implies. A PSSP must pick out those characteristics at age three or four which will strongly correlate with developmental difficulties at age six. These factors may or may not presently constitute DDST failures or delays.

The PSSP categorization criteria were designed to adjust for this and create a Wait and Watch category. Approximately a year later, after those children 4[3] and older had been in kindergarten for nine months, the school categorization (SCHCAT) showed that: 54.5% of the children were saved from undue labeling, and at the same time potential special needs of the 45.5% were not overlooked.

Category III--Specific Referral

Not only should a PSSP screen out those children with developmental lags which persist until school years, but it should also be able to identify those characteristics which might interfere with learning. The spirit of the Chapter 766 (Massachusetts Comprehensive Special Education Law) is to detect

and ameliorate those special needs that are educational. However, in order to diagnose educational special needs, other needs, such as those pertaining to health, should be looked into even if it is mainly to explain away physical problems. Almost any special need can be construed to effect a child's learning, but some boundaries have to be drawn.

Non-educational special needs, when identified, could and should be referred to other community resources such as hospitals, physiotherapy departments, etc.

In other words, identified developmental problems which will not persist until school-age should be watched for but not referred (CAT II, Wait and Watch). Those developmental problems identified which will persist until school age but will not necessarily contribute directly to possible educational and schooling problems, (such as scoliosis, eczema, allergies) should be pointed out to parents and, if necessary, referred to other agencies. Those problems which will persist until school-age and might contribute to later school and learning difficulties should be screened out and dealt with by the school system.

In order to differentiate between the needs that can be referred to other agencies and substantial educational needs, a category for specific referral is suggested--Cat. III Specific Referral. This category is to include those children with identifiable specific needs. These needs include visual difficulties, speech impairments, and specific physical handicaps. The

children who display such needs should be referred to appropriate professionals. That is, further evaluation by a specialist is sought for before considering the need's implications for educational planning. This procedure is designed to decrease Core Evaluation Team (CET) efforts which are clearly very expensive--both from a monetary and a psycho-social point of view.

The Observational Physical Screening Tool is recommended to be a part of a comprehensive preschool screening battery. The literature survey of available preschool screening tools revealed a common major weakness--they did not screen for physical development. A major consideration in designing the model PSSP, therefore, was to include this aspect of a child's growth and development. This is the major difference between our screening battery and the others reported in the literature.

The Observational Physical Screening Tool (OPST) not only contributes valuable additional information to the total pre-sch-ol screening battery but it helps predict later school categorization better then the Denver Developmental Screening Test does alone. The OPST was developed to systematically screen a child's physical development in a head-to-toe fashion.* The OPST was developed to screen out the not-directly-educational special

*The OPST was developed independently of the Swedish findings. However items included in the OPST are very similar to those recommended by the Swedish screeners after large-scale screen-experience for at least five years, see Wagner, 1975.

needs of children. Such needs would be those that lend themselves to the Medical Model approach. Substantial differences from the age-appropriate characteristics constitute a reason for referral. The referral is made through a "finer mesh" screening to appropriate professionals such as orthopedists, ophthalmologists, speech pathologists, and pediatricians. During the Model PSSP, the referral grouped themselves into these four main professionals. The more generalized medical model type needs are referred to the Pediatrician first. After such input the educator can devise an appropriate educational plan.

This specific referral categorization brings about a step-by-step evaluation procedure rather than needlessly exposing the child to an all-out evaluation process by teams of professionals. Such a comprehensive multidisciplinary evaluation is then reserved for the few children with multiple special needs that are not easily identifiable, and that do not clearly lend themselves to specific referral. In essence, the OPST aids in cutting down the number of full-scale evaluations. This, in turn, decreases trauma to both children and parents, and decreases the extent of the educator's responsibilities. It also decreases the cost considerably. In the Model PSSP, 35 children would have had to go through an extensive evaluationin the absence of the OPST and Specific Referral. However, only seven children were suggested for such a substantial evaluation.

Furthermore, the OPST facilitates the Wait and Watch cate-

gorization. In the PSSP 57 children were placed in this category. Without such a scheme these children might also have required a substantial evaluation.

The DDST, however, is a binary tool and is designed to screen out to the extent of problems (deviation from normal) but does not categorize in terms of operational referral classifications.

The Observational Physical Screening Tool (OPST), on the other hand, screens for physical development, allows for specific referral and aids in the interfacing of the medical and educational models. Another characteristic of the OPST is that it lends itself to a Wait and Watch categorization. This category is desirable in order to minimize labeling while not overlooking possible signals of the possible development of special needs.

It should also be noted that the OPST has the added advantages of requiring a minimal amount of child-cooperation and not being sensitive to cultural and ethnic backgrounds. The OPST can be effectively administered by the school nurse in 3-5 minutes.

For the reasons discussed aboye a preschool screening battery should include an OPST-like tool.

The Screening Delivery

The crucial components of a screening delivery are staffing, the physical set-up, screening procedures, a pilot project,

publicity and feedback to the parents and the school systems.

A thorough consideration of these factors leads to the following suggestions concerning the design of the PSSP delivery: the screening should take place in a central site and have multiple stations (see appended diagram); the screening should utilize a set routing pattern to insure efficency; the screening should take no more than thirty minutes per child and involve a minimal amount of waiting and idle time; a screening program should include a maximum of parental participation.

A useful heuristic was developed to aid in the decision concerning theoptimum number of stations and the staff allocations per station. The screening delivery heuristic is: throughput times screening time equals the number of stations necessary. (T_p X S_t = N_s)*

Of the delivery considerations the pilot project and the screening staff are most crucial. A pilot project is recommended in order to pretest the delivery design in a nearby nursery school. This dry run facilitates further staff training and decreases the error rate. During the pilot project experiments can be conducted with various delivery related issues. The final decisions on the delivery design can be made after the pilot

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*Throughput is the number of children to be screened per hour. This is obtained by dividing the expected number of children by the desired number of screening hours.

project.*

Screening Staff

The staffing of the PSSP is an important part of the overall delivery. The school nurse is the appropriate professional to do the observational physical screening, she can also administer the DDST. Her educational background, experiences, and training allow the nurse to perform the necessary tasks with a minimum of additional training. Dr. Marsden Wagner reported in 1975 that after five years of screening all four year olds in Sweden, nurses are seen as the "heart" of the screening program. In fact, in Sweden nurses do the bulk of the total screening--including the mental and emotional aspects of the child's growth and development. The Swedish findings state that the validity of many psychological tests is so poor that the more informal observations by an experienced nurse provided the best mental health screening.

In designing the screening delivery it is recommended that a pilot project be conducted in order to test the delivery procedures. The delivery should be designed so as to respect the school system environs. It must also have the attribute of pleasantness--operationally translated as being non-intrusive and convenient. Efficiency must be sought for in order to insure

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*The importance of the pilot project was later corraborated by the Swedish Findings after a full-scale screening experience for at least five years. See Wagner, 1975.

viability, but comprehensiveness and pleasantness should not be compromised. The use of nurses as screeners is recommended because the nurses are readily available to school systems and because the nurses can effectively administer the screening battery. The PSSP delivery so designed was efficient and yet pleasant.

In summary, then, the proposed theoretical framework developed in this study can be operationalized to design and implement as effective and viable preschool screening program. The screening results obtained from such a program should be utilized to alter the prognosis of the educationally at risk children through appropriate interventions by the Medical Model and the Educational Model interface. This action would be translated into facilitating the treatment/prevention or alleviation the special needs of some children. This screening program would also aid in the devising of educational plans for all children, and would promote each child's maximum learning potential.

Remarks

A carefully planned and administered PSSP is important not only from the point of view of reliability and validity but because it can provide crucial baseline data to facilitate individualized instruction for school children. The spirit of Chapter 766 is to compare the child's progress to himself rather than to others, and thus to promote his maximum potential with-

out "labeling". While we must look for causal relationships in specific referrals, when information is to be operationalized in terms of an educational plan the strategy required is different. With special needs children we must use an educational model rather than a medical model for this purpose.

The medical model is causally oriented and seeks to diagnose and cure. The educational model is not, or should not, be concerned with causal relationships and cannot "cure". The educational model describes the child's developmental status, defines educational needs and works to capitalize on strengths and remediate weaknesses. This effort need not be limited to special needs children. The results of a PSSP can be utilized as baseline data to estimate a child's progress through schooling as well as to build an individualized educational plan for those children with or without special needs.

Children who are developing "normally" can also have special programs designed for them based on the description of their growth and developmental status. Such information is inherent in the screening results of a preschool screening battery designed according to our theoretical framework. After all, all children can benefit from individualized instruction.* Furthermore, if education is not individualized for each child, then the "mainstreaming" of the special needs child would be inoperational. Without adequate educational plans to match the needs

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*In a survey conducted by Gomes and Nuttal in Massachusetts,

described by PSSP data, even the most effective PSSP would be of negligible use from an educational point of view.

53% of the 159 educators stated that they would like to use preschool screening data to design individualized educational programs for All children.

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APPENDICES

TO

CHAPTER III

KEY FOR READING THE FOLLOWING TABLE

INSTRUMENTS FOR THE IDENTIFICATION OF PRE-KINDERGARTEN HIGH RISK CHILDREN*

A. Age Range Tested (2-6)

B. Depth (Screening-Diagnostic)

C. Administration Factors
   1. Group - Individual
   2. Time Needed to Complete
   3. Paced - Untimed - Timed
   4. Administrator
      a. T - Trained
      b. N - No Training Necessary
      c. Py - Psychologist
      d. M - Medical Doctor
      e. P - Parent

D. Response During Test (Vocal - Motor)

E. Performance Factors

   1. Auditory Discrimination
   2. Articulation
   3. Language
   4. Developmental
   5. Visual Perception
   6. Motor
   7. School Readiness
   8. Social Skills
   9. Self Concepts
   10. Conceptual Skills

F. Measurements Requiring Subjective Judgment with/without Child
   1. Rating scales by parent
   2. Rating scales by teacher
   3. Interview
   4. Observation

*Adapted from the compilation of tests by Carol D. Mardell and Dorothea S. Goldenberg Handicapped Children Section 188 West Randolph Chicago, Ill. 60601

	AGE									DEPTH		TESTER							RESPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
ABC INVENTORY							x	x	x	x		x				x		T	x	x							x							
ANIMAL PICTURE O SORT			x	x		x	x	x	x	x		x				x		T		x							x							
ANTON BRENNER DEVELOPMENTAL							x	x	x		x	x		3 10		x		T		x					x	x	x							
ARIZONA ARTICULATION PROFICIENCY			x	x		x	x	x	x		x	x		20 30		x		T	x	x	x	x												
ARTHUR ADAPTATION OF LETTER		x	x	x		x	x	x	x		x	x						T		x					x	x								
ARTHUR POINT SCALE						x	x	x	x		x	x					x	T		x					x	x								
ASSESSMENT OF CHILDREN'S LANGUAGE COMPREHENSION				x		x	x				x	x		10		x		T		x			x											
ASSESSMENT PROGRAM OF EARLY LEARNING LEVELS						x	x	x	x		x	x	x	40	x			N		x								x						
AUDITORY DISCRIMINATION TEST							x	x	x		x	x		5				T	x	x														
AYRES SPACE TEST			x	x		x	x	x	x		x	x		10 20			x	T		x				x										

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
BASIC CONCEPT INVENTORY					x	x	x	x	x		x	x		20		x		T	x	x							x			x				
BAYLEY SCALES OF INFANT DEVELOPMENT	x	x	x	x	x	x	x	x	x		x	x		15		x		T	x	x				x		x		x		x				
BENDER GESTALT TEST FOR YOUNG CHILDREN - KOPPITZ METHOD							x	x	x		x	x		10		x		T		x					x	x		x						
BINGHAM BUTTON TEST			x	x	x	x	x	x	x	x		x		20	x			T		x						x	x							
BIRTHDAY TEST					x	x	x	x	x			x			x			N	x									x	x					
BLUM FIELDSTEEL			x	x	x	x	x	x	x	x		x		30				T		x				x				x						
BOEHM TEST OF BASIC CONCEPTS							x	x	x		x		x	15/20				T		x							x							
BOOK ABOUT ME					x	x	x	x	x	x		x	x			x		T	x	x								x	x					
BROWN IDS SELF CONCEPTS REFERENCE TEST					x	x	x	x	x		x	x				x		T	x										x					
CALIFORNIA PRESCHOOL SOCIAL COMPETENCY SCALE		x	x	x	x	x	x	x		x		x		10/20				T		x						x	x				x			

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTOR										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language Development	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
COLOR MEANING PICTURE TEST			x	x	x	x	x	x	x			x			x			T	x	x							x					
CONCEPT ASSESSMENT KIT					x	x		x	x	x		x		15			x	T	x				x			x						
COOPERATIVE PRESCHOOL INVENTORY REVISED EDITION			x	x	x	x	x	x	x	x		x		15	x			T	x	x					x	x	x		x	x			
DADE COUNTY TEST OF LANGUAGE DEVELOPMENT											x	x	x					T	x				x	x									
DAILEY LANGUAGE FACILITY TEST			x	x	x	x	x	x	x	x		x		10		x		T	x				x										
DENVER DEVELOPMENTAL SCREENING TEST	x	x	x	x	x	x	x	x	x	x		x		15/20		x		T	x	x			x	x		x		x					
DEVELOPMENTAL POTENTIAL OF PRE-SCHOOL CHILDREN	x	x	x	x	x	x	x	x	x		x	x				x		T	x	x			x	x		x	x	x		x			
DEVELOPMENTAL TEST OF VISUAL MOTOR INTEGRATION	x	x	x	x	x	x	x	x	x	x	x	x	x	10		x		T		x					x	x							
EARLY DETECTION INVENTORY			x	x	x	x	x	x	x	x		x		15x				T	x	x					x	x	x	x	x	x	x		x

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
EARLY EDUCATION SCREENING TEST BATTERY OF BASIC SKILLS DEVELOPMENT					x	x	x	x	x	x		x		30				T	x	x			x			x	x							
EARLY IDENTIFICATION - MEETING STREET SCHOOL TEST							x	x	x	x	x	x		30x				T	x	x			x		x	x	x		x					
ECHOIC RESPONSE INVENTORY FOR CHILDREN			x	x	x	x	x	x	x	x		x		15		x		N	x		x	x	x											
EVANSTON EARLY IDENTIFICATION SCALE							x	x	x	x		x	x	10/55		x				x						x	x		x					
EXPRESSIVE VOCABULARY INVENTORY			x	x	x	x	x	x	x		x	x				x		T	x				x							x				
FROSTIC DEVELOPMENTAL TEST OF VISUAL PERCEPTION			x	x	x	x	x	x	x		x	x	x	60		x		T	x					x	x									
FULL RANGE PICTURE VOCABULARY TEST	x	x	x	x	x	x	x	x	x	x	x	x		10/15x				T	x	x			x											
GESELL DEVELOPMENTAL KIT							x	x	x	x	x	x		20/30x				T	x	x			x		x	x	x	x	x			x		

	AGE										DEPTH		TESTER						RE-SPONSE		PERFORMANCE FACTORS									SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6		Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator		Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization		Rated by Parent	Rated by Teacher	Interview	Observation
GOLDMAN FRISTOE TEST OF ARTICULATION	x	x	x	x	x	x	x	x	x		x	x	x		10				T		x				x				x							
GOLDMAN FRISTOE WOODCOCK TEST OF AUDITORY DISCRIMINATION					x	x	x	x	x		x	x	x		15 20				T			x	x												
GOODENOUGH HARRIS DRAWING TEST			x	x	x	x	x	x	x			x	x		15		x		T			x				x	x	x			x				
GUMPGOOKIES			x	x	x	x	x	x	x			x	x	x		x			T		x	x								x	x				
HEJNA DEVELOPMENTAL ARTICULATION TEST			x	x	x	x	x	x	x			x	x				x		T		x			x											
HOLBORN VOCABULARY TEST FOR YOUNG CHILDREN						x	x	x	x			x	x				x		T		x			x											
HOUSTON TEST FOR LANGUAGE DEVELOPMENT	x	x	x									x	x		30		x		T		x	x		x	x	x									
ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES	x	x	x	x	x	x	x	x	x	x		x	x		60	x			T		x	x	x		x			x	x			x			

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6.	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
INTER AMERICAN SERIES PRIMARY					x	x	x	x	x		x	x		46/50				T		x							x							
KATZ AUDITORY SCREENING TEST							x	x	x	x		x	x		x	x		T		x	x		x											
LANGUAGE FACILITY TEST			x	x	x	x	x	x	x		x	x		10				T	x		x	x	x											
LINCOLN-OSERETSKY MOTOR DEVELOPMENT SCALE									x	x	x			29/30				T	x							x								
McCANDLESS MARSHALL PLAY INTERACTION			x	x	x	x	x				x	x		100				T		x								x	x					
McCANDLESS MARSHALL SOCIOMETRIC STATUS PICTURE TEST			x	x	x	x	x				x	x		3/15				N		x								x	x					
McCARTHY SCALE OF CHILDREN'S ABILITIES		x	x	x	x	x	x	x	x		x	x		60		x	x	T	x	x			x	x	x	x				x				
MINNESOTA PRESCHOOL SCALE	x	x	x	x	x	x	x	x	x		x	x						T	x	x					x	x				x				
MINNESOTA SOCIOMETRIC STATUS			x	x	x	x	x				x	x																x	x					

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Sccial Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
MSU PUZZLE BOX TASK			x	x	x	x					x	x					x	T		x			x	x	x									
MUMMERY SCALE OF ASCENDANT BEHAVIOR			x	x	x	x	x							5												x		x	x					x
PARENT READINESS EVALUATION OF PRESCHOOLERS			x	x	x	x	x			x		x	60/90	x				P	x	x			x	x		x	x			x	x			
PARSONS LANGUAGE SAMPLE					x	x	x				x	x						T	x	x			x	x										
PEABODY PICTURE VOCABULARY TEST		x	x	x	x	x	x	x	x	x		x		10/15		x		T		x			x											
PREKINDERGARTEN GOAL CARD					x	x	x				x	x			x			N	x	x							x	x	x					
PREPRIMARY PROFILE					x	x	x	x	x	x		x		15				P		x			x	x		x	x	x	x		x			
PRESCHOOL ATTAINMENT RECORD	x	x	x	x	x	x	x	x	x		x	x		15/20		x		T	x						x	x	x	x	x		x	x		
PRESCHOOL LANGUAGE SCALE	x	x	x	x	x	x	x	x	x		x	x		30				T	x	x	x	x	x											

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT				
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization		Rated by Parent	Rated by Teacher	Interview	Observation
PRESCHOOL SELF CONCEPT PICTURE TEST					x	x	x				x	x		10/20		x		T	x	x									x						
QUICK TEST	x	x	x	x	x	x	x	x	x	x		x		3/10				T	x				x												
REYNELL DEVELOPMENTAL LANGUAGE	x	x	x	x	x	x	x	x	x		x	x		20				T					x												
RILEY ARTICULATION AND LANGUAGE TEST							x	x	x	x		x		1/2	x			T	x		x	x	x												
RILEY PRESCHOOL DEVELOPMENT SCREENING INVENTORY			x	x	x	x	x	x	x	x		x	x	3/10		x		T		x				x	x	x	x		x						
RING & PEG TESTS OF BEHAVIOR DEVELOPMENT	x	x	x	x	x	x	x	x	x		x	x		20/50		x		T	x	x			x	x	x	x	x	x	x						
SCHOOL READINESS CHECKLIST - READY OR NOT							x	x	x	x		x		10/20		x		P		x							x	x			x				
SCHOOL READINESS SURVEY					x	x	x	x	x	x	x	x		15/30		x		P	x	x				x			x				x				
SCREENING TEST FOR THE ASSIGNMENT OF REMEDIAL TREATMENTS					x	x	x	x	x	x			x	60			x	T							x	x	x								

	AGE									DEPTH		TESTER						RE-SPONSE		PERFORMANCE FACTORS									SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Special Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
SCREENING TEST OF ACADEMIC READINESS					x	x	x	x	x	x			x	60			x	N									x						
SPRIGLE SCHOOL READINESS SCREENING TEST					x	x	x	x	x	x		x		8 12				M	x	x			x				x						
TEMPLIN DARLEY SCREENING AND DIAGNOSIS TESTS OF ARTICULATION			x	x	x	x	x	x	x	x	x	x		5 15	x			T	x			x											
TEST OF BASIC EXPERIENCES					x	x	x	x	x		x		x	12	5 x			N		x							x						
THOMAS SELF CONCEPT VALUES TEST			x	x	x	x	x	x	x		x	x		15		x		T	x									x					
VALETT DEVELOPMENTAL SURVEY OF BASIC LEARNING ABILITIES			x	x	x	x	x	x	x	x		x		30 60	x			T	x	x			x		x		x						
VAN ALSTYNE PICTURE VOCABULARY TEST			x	x	x	x	x	x	x		x	x		15	x			T		x			x										
VANE KINDERGARTEN TEST					x	x	x	x	x		x	x	x	35	x			PY	x				x	x		x	x		x				
VERBAL LANGUAGE DEVELOPMENT SCALE	x	x	x	x	x	x	x	x	x	x				30		x		PT	x	x			x	x							x	x	x

TABLE III.—Continued

	AGE									DEPTH		TESTER							RE-SPONSE		PERFORMANCE FACTORS										SUBJECTIVE JUDGMENT			
	2	2.5	3	3.5	4	4.5	5	5.5	6	Screening	Diagnostic	Individual	Group	Test Time	Paced	Untimed	Timed	Administrator	Vocal Response	Motor Response	Auditory Discr.	Articulation	Language	Developmental	Visual Perception	Motor	School Readiness	Social Skills	Self Concepts	Conceptualization	Rated by Parent	Rated by Teacher	Interview	Observation
VINELAND SOCIAL MATURITY SCALE	x	x	x	x	x	x	x	x	x		x	x				x		T	x									x						
VISUAL MOTOR GESTALT TEST			x	x	x	x	x	x	x		x	x		10		x		T		x					x	x								
WALKER READINESS TEST FOR DIS-ADVANTAGED PRESCHOOL CHILDREN IN THE UNITED STATES					x	x	x	x	x		x	x			x			T		x							x							
GESELL DEVELOPMENTAL SCHEDULE	x	x	x	x	x	x	x	x	x	x	x	x				x		M	x	x			x	x		x	x	x	x					

APPENDIX III.1

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Test of Basic Experiences 1970, Moss, M.H., California Test Bureau/McGraw Hill, Del Monte Research Park, Monterey, California 93940

Thomas Self Concept Values Test 1969, Thomas, W.L., Educational Service Co., P.O. Box 1882, Grand Rapids, Michigan, 49501

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Verbal Language Development Scale 1959, Mecham, M.J., American Guidance Service, Publishers Building, Circle Pines, Minnesota 55014

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Visual Motor Gestalt Test 1938-46, Bender, L., Grune & Stratton, 381 Park Ave., South, New York, New York 10016

Walker Readiness Test for Disadvantaged Pre School Children in the United States ED ERIC Document 045 736 Walker, W., Bethesda, Maryland 20014

APPENDIX III.2

Detailed Information on Selected Tests for Assessment of the Young Child

Name of Test: BANNATYNE SYSTEM: EARLY SCREENING AND DIAGNOSITC TESTS

Developer: Bannatyne, Alexander

Description: This instrument consists of tests for vocabulary, echolalia, coding, motor ability, orthography, spatial ability, and maturational lag factors. Phase I Screening Assessment consists of five tests and a questionnaire. Phase 2 Screening Assessment consists of ten additional tests for diagnosis of specific learning disabilities.

Age: Preschool and elementary school children.

Test Administration: Tests are short and easy to administer. Assessment time ranges from 15 to 20 minutes. The teacher can be quickly trained to administer and score tests.

Norms: Standardized on 300 children, ages four to six. Adequate norms are available.

Reliability: Not available.

Validity: Not available.

Available from: Learning Systems Press
P.O. Box 2999
Lafayette, Louisiana

References: Bannatyne, Alexander, "Bannatyne System: Early Screening and Diagnositc Tests," Journal of Learning Disabilities, Vol. 8, No. 2, 1975, pp. 68-69.

Name of Test: BEHAVIOR PROBLEM CHECKLIST

Developer: Peterson, D. R.

Description: This rating scale measures personality and conduct disorders. Conduct problems include disruptiveness, disobedience, fighting, attention-seeking, and irritability. Personality problems include inferiority feelings, anxiety, aloofness, reticence, depression, and others.

Age: Kindergarten and elementary school age.

Test Administration: A teacher or interviewer, using a parent as the informant, rates the child on 58 items in terms of three levels of severity (no problem, mild problem, severe problem).

Norms: Not available.

Reliability: Inter-judge reliability for two teachers was .77 and .75 for ratings of 126 kindergarten children. Inter-rater agreement for conduct scores and personality scores was .82 and .68 between two teachers for ratings of 60 kindergarten children.

Validity: Ratings of 831 children were obtained from six Illinois schools. Factor analysis of each subgroup revealed that a factor for conduct problems was independent of a factor for personality problems.

Available from: Document No. 6632, American Documentation Institute, Photoduplication, Library of Congress, Washington, D.C. 20540

References: Peterson, D. R., "Behavior Problems of Middle Childhood," Journal of Consulting Psychology, Vol. 25, 1961, pp. 205-209.

Name of Test: BENDER GESTALT TEST FOR YOUNG CHILDREN

Developer: Koppitz, E. M.

Description: This is a copying test consisting of nine figures of designs which the child must copy. The protocols may be analyzed for a number of factors - visual - perceptual as well as emotional.

Age: Three to eleven years.

Test Administration: A trained professional presents the plates one at a time; each is copied on a blank sheet of paper. Koppitz (1963) presents a developmental scoring system which assesses neurological, emotional, and intellectual functioning.

Norms: Normative data are available on 1100 children ages five to ten years.

Reliability: Inter-scorer reliability is .88 to .96, and test-retest reliability is .60 to .66 for two kindergarten classes.

Validity: Results of studies in which the Bender scores were compared to school achievement and readiness tests have shown that this test is a useful screening instrument for children at the kindergarten level.

Available from: Grune and Stratton, Inc.
111 Fifth Avenue
New York, New York, 10003

References: Koppitz, E. M., The Bender Gestalt for Young Children, Grune and Stratton, New York, New York, 1973.

Name of Test: CIRCUS (1974)

Developer: Anderson, S. B. et al.

Description: This instrument is a comprehensive assessment tool for use by classroom teachers. It consists of 17 separate instruments: Direct child measures of receptive vocabulary, quantitative concepts, visual discrimination, perceptual-motor coordination, discrimination of real word sounds, auditory discrimination, aspects of functional language, comprehension of oral language, productive language, general information, visual and associative memory, problem solving, and divergent pictoral production; indirect measures of the child's activities and behavior; teacher program measures of educational and environmental planning.

Age: Three and one-half to six years.

Test Administration: A combination of teacher ratins and direct evaluation of the child during specified classroom activities. Number scores are converted into "sentence report" provided in tables.

Norms: The national sample consisted of 1,006 nursery school and 1,979 kindergarten children - slightly over-representing children in the northeast and in cities (greater than 50,000), and under-representing children in the southeast and in cities (less than 50,000), as well as black children.

Reliability: "Alpha" (internal consistency) reliability varies from .39 to .94.

Validity: Not available.

Available from: Educational Testing Service
Rosedale Road
Princeton, New Jersey 08540

References: Northeast Regional Resource Center, Early Childhood Assessment List, Hightstown, New Jersey, 1975.

Name of Test: CLASSROOM BEHAVIOR INVENTORY

Developer: Shafer, E. S. and Aronson, M. R.

Description: Teacher rating scale aimed at assessing classroom performance of children and consisting of 15 seven-point items which make three subscales of five items each: Extroversion; task orientation; hostility.

Age: Preschool and elementary age.

Test Administration: Teacher rating takes approximately five minutes and is scored easily by summing each item to obtain subtest score.

Norms: Means and standard deviations available for Fall, 1971 Head Start Variation Sample (N = 4943).

Reliability: Test-retest reliability after three weeks is .70; internal reliability coefficients in upper .60's and low .70's. Inter-rater reliability for paraprofessionals ranged from .49 to .62.

Validity: Correlations with other tests in the Head Start Variation Sample battery were low.

Available from: Research for Better Schools, Inc.
Philadelphia, Pennsylvania 19103

References:

Boyer, E. G., Simon, A., and Karafin, G. R. (editors), Measures of Maturation: An anthology of early childhood observation instruments (3 volumes), Research for Better Schools, Philadelphia, Pa., 1973.

Walker, D. K., Bane, M. J., and Bryk, A.S., The Quality of the Head Start Planned Variation Data (2 volumes), The Huron Institute, Cambridge, Ma., 1973.

Name of Test: DENVER DEVELOPMENTAL SCREENING TEST (DDST)

Developer: Frankenburg, William K., et al.

Description: "To meet the need of having a simple, useful tool to aid in the early discovery of children with developmental problems" via evaluation of the child from birth to age six in four areas of development - personal-social, fine motor adaptive, language, and gross motor.

Age: Two weeks to six years.

Test Administration: The evaluation is by means of the mother's report and tester observation on tasks pertinent to the child's age. Appropriate items are scored pass/fail. The total test is judged to be normal/questionable/abnormal, according to the number of items passed (90% of children accomplish task by the age examined).

Norms: The standardization sample was composed of 1,036 (543 males, 493 females) black and white normal Denver children, ages two weeks to 6.4 years.

Reliability: Test-retest reliability, one week apart, for 20 children was found to be 95.8%. Inter-observer reliability was 90%.

Validity: Correlation with the Stanford-Binet and the Baley Scales of Infant Development showed 7.2% over-referrals and 2.95% under-referrals.

Available from: Laradon Hall
East 51st Avenue and Lincoln
Denver, Colorado 80216

References:

Frankenburg, W. D., Camp, B. W., and Van Natta, P. A., "Validity of the Denver Developmental Screening Test", Child Development, Vol. 42, No. 2, 1971, pp. 475-485.

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Gray, O.P., "The Denver Scale," Developmental Medicine and Child Neurology, Vol, 14, Oct., 1972, pp. 667-668.

Thorpe, H. S., and Werner, E., "Developmental Screening of Preschool Children: A Critical Review of Inventories Used in Health and Educational Programs," Pediatrics, Vol, 53, No. 3, March, 1974.

Name of Test: DEVELOPMENTAL INDICATORS FOR THE ASSESSMENT OF LEARNING

Developer: Mardell, C. and Goldenberg, M.

Description: The DIAL assess the child's levels of progression within six major areas - sensory, motor, affective, social, conceptual, and language. It takes 25 to 30 minutes to administer.

Age: Three to five years.

Test Administration: It utilizes a "station" approach to screening. "Trained" operators collect information on the child in their particular area. Children are identified as "high risks" if they score in the lower 10% of the normative sample.

Norms: Normative data are available on 4,423 children in the state of Illinois.

Reliability: Test-retest reliability is considered to be "highly significant."

Available from: DIAL, Inc.
Box 911
Highland Park, Illinois 60035

References: Mardell, C. and Goldenberg, D., "For Prekindergarten Screening Information: DIAL," Journal of Learning Disabilities, Vol. 8, No. 3, 1975, pp. 13-25.

Name of Test: DEVEREUX ELEMENTARY SCHOOL BEHAVIOR RATING SCALE

Developer: Spivak, G. and Swift, M.

Description: This rating scale is for use by elementary school teachers who wish to describe and understand the overt behavior problems of children in their class. It does not measure personality or character traits.

Age: Elementary-school-age children, kindergarten to sixth grade.

Test Administration: The elementary school teacher who is familiar with the child in the classroom rates the child on eleven behavior factors, comparing him or her to the "average" child in the classroom. Raw scores are converted to a behavior profile.

Norms: Normative data available on 809 children in thirteen elementary schools in a small city public school. The data distribution is not according to census statistics.

Reliability: Test-retest reliability on 128 children, one week apart, ranged from .71 to .91.

Validity: None Available.

Available from: The Devereux Foundation
Devon, Pennsylvania 19333

References: Weintraub, S., Neale, J.M., and Liebert, D.E., "Teacher Ratings of Children Vulnerable to Psychopathology," American Journal of Orthopsychiatry, Vol, 45, No. 5, October, 1975, pp. 838-845.

Name of Test: GESELL DEVELOPMENTAL SCHEDULES

Developer: Gesell, A.

Description: An observational schedule used to assess the level of behavior development in four major areas - motor, adaptive, language, and person-social.

Age: Four weeks to six years.

Test Administration: A standardized procedure to be used by a trained professional to assess the level of development according to "Developmental Age," rather than a chronological age.

Norms: Developmental ages were determined by a series of longitudinal studies.

Reliability: Inter-tester reliabilities, with adequate training, were found to be .95.

Validity: Intended to be a descriptive method for evaluating the course of behavior development.

Available from: Psychological Corporation
304 East 45th Street
New York, New York 10017

References: Gesell, A., and Amatruda, C. S., Developmental Diagnosis, (2 edition), Hoeber-Harper, New York, New York, 1947.

Name of Test: LEARNING ACCOMPLISHMENT PROFILE (LAP), 1974

Developer: Sanford, A. R.

Description: This instrument provides teachers with a criterion-referenced record of the young handicapped child's performance in six areas of development - gross motor, fine motor, social, self-help, cognitive, and language.

Age: Developmental ages - birth to six years.

Test Administration: An evaluation of skills through classroom observation is made by checking off skills in which the child demonstrates competency. The test is discontinued after four to five failures within an area of development.

The developmental age is equaled to the age level of an item immediately preceding the ceiling. The rate of development is equaled to the $\frac{DA}{CA}$ (developmental age). the developmental age is obtained from a variety (15) of well-known normative assessment tools.

Norms: Not available.

Reliability: Not available.

Validity: Not available.

Available from: Kaplan School Supply Corporation
600 Jamestown Road
Winston-Salem, North Carolina 27103

References:

Name of Test: MEETING STREET SCHOOL SCREENIGN TEST (MSSST), 1969

Developer: Hainsworth, P. K. and Siqueland, M. L.

Description: A short (15 to 20 minutes), individually adminstered test for the early detection of learning disabilities. Used for large scale screening or individual diagnosis.

Age: Five and one-half to seven years.

Test Administration: Administered by a professional or trained non-professional in a one-to-one situation according to specific directions in the manual. Individual items are given numerical scores which are summed to determine a cut-off point (score of 39) for "At Risk."

Norms: There are age norms from sample of 220 kindergarten and 274 first graders in East Providence, Rhode Island, who were selected to represent the general population in the 1966 United States census by fathers' occupation, sex, and socio-economic status levels.

Reliability: Test-retest reliability two to four weeks apart yielded coefficients from .75 to .85. Inter-rater reliability consistently above .95 for both experienced and inexperienced examiners.

Validity: Concurrent validity of subtests and the total test with other measures of language and visual-perceptual functioning ranged from .54 to .77. Predictive validity after one to two years ranged from .46 to .66.

Available from: Meeting Street School
333 Grotto Avenue
Providence, Rhode Island 02906

References: Frostig, M., Lefever, D. W., and Whittlesey, J. R. B., The Maryanne Frostig Developmental Tests of Visual Perception, Consulting Psychological Press, Palo Alto, California, 1974.

Gavino, P., Validation of the Meeting Street School Screening Test, unpublished Master's thesis, Queens University, Ontario, Canada, 1968.

Name of Test: PRESCHOOL BEHAVIOR QUESTIONNAIRE

Developer: Behar, Lenore

Description: This questionnaire is a modification of Rutter's Children's Behavior Questionnaire. It evaluates children along three dimensions; hostile - aggressive, anxious - fearful, hyperactive - distractable. Its purpose is the early detection of emotional problems.

Age: Three to six years.

Test Administration: The teacher rates the child's behavior on a scale reading: doesn't apply, applies some, and certainly applies. The total score is compared to that of the normative sample.

Norms: Normative data is available on 496 normal children and 102 disturbed children from preschools in North Carolina and Oregon. Sexes, socioeconomic status, and race are balanced in accord with the general population.

Reliability: Test-retest reliability ranges from .67 - .97. Inter-rater reliability ranges from .53 - .98.

Validity: Concurrent validity is highly significant.

Available from: Learning Institute of North Carolina
1006 Lemond Avenue
Durham, North Carolina, 27701

References: Behar, L. and Stringfield, S., "A Behavior Rating Scale for the Preschool Child", Developmental Psychology, Vol. 10, No. 5, 1974, pp. 601-610.

Name of Test: PRE-SCHOOL SCREENING SYSTEM (Field Trial Edition)

Developer: Hainsworth, P. K., and Hainsworth, M. L.

Description: A short (15-20 minutes) individually administered screening test of learning efficiency which combined with a parent questionnaire is useful in recognizing the special needs of pre-school and kindergarten children.

Age: Four years, four months to five years, four months.

Test Administration: The system includes the following subtest which can be administered by a trained paraprofessional: information processing skills, draw-a-person, and verbal reasoning. The parent questionnaire covers: behavioral characteristics, medical history, and developmental history.

Norms: Normative data is available on 600 Rhode Island middle-class children and their parents; three age groups - 4-4 to 4-7, 4-8 to 4-11, and 5-0 to 5-4.

Reliability: Interscore estimates between .95 - .99. Test-retest reliability not available.

Validity: Short term predictive validity on 432 kindergarten children indicated 77% accuracy of prediction with 13% false negatives and 10% false positives.

Available from: Pre-School Screening System
Box #1635
Pawtucket, Rhode Island, 02862

References: Frostig, M., Lefever, D. W., and Whittlesey, J.R.B., The Maryanne Frostig Developmental Tests of Visual Perception, Consulting Psychologists Press, Palo Alto, California, 1974.

Kirk, S.A., McCarthy, J.J. and Kirk, W.D., Illinois Test of Psycholinguistic Ability (Revised Edition), University of Illinois, Urbana, Illinois, 1968.

Name of Test: STANFORD-BINET INTELLIGENCE TEST - FORM L-M

Developer: Terman, L. M. and Merrill, M. A. (revision of 1937 Binet Scale)

Description: The purpose of the test is to assess intelligence which is most generally defined as general mental adaptability. The test consists of subtests graduated in difficulty according to age. Early subtests contain more non-verbal tasks such as block building and stringing beads, while later subtests contain more verbal tasks such as vocabulary, analogies, and number problems.

Age: Two and one-half to adult.

Test Administration: Individual testing utilizes trained testers and takes approximately 30 to 90 minutes; need kit of materials. Instructions for scoring each test in the manual. Child's mental age, as determined by the test items, and chronological age are converted into intelligence quotient (I.Q.).

Norms: Norms available for white and minority populations from 1972 standardized sample. Previously, norms were only for white sample.

Reliability: Reliability coefficients for ages six to thirteen range from .91 (I.Q.'s 140-149) to .97 (I.Q.'s 60-69).

Validity: Correlates highly with other intelligence tests in studies. Validity based on traditional and cultural acceptance of "intelligence" as defined by what the intelligence test measures, which is questioned by some educators today. Questionable use with non-white populations. Concurrent and predictive validity established with correlations with academic achievement tests (.40 to .75).

Available from: Houghton-Mifflin
Boston, Massachusetts

References: Terman, L.M., and Merrill, M. A., Stanford-Binet Intelligence Scale: Manual for the Third Revision - Form L-M, Houghton-Mifflin, Boston, Ma. 1960.

Name of Test: SCHENECTADY KINDERGARTEN RATING SCALES

Developer: Conrad, Glenn and Tobiessen, Jon.

Description: This instrument was designed to obtain observations from kindergarten teachers on a wide range of activities to provide a comprehensive picture of a child's classroom behavior. The battery consits of fourteen scales: peer relationships, level of organization of play, waiting and sharing, type of motor activity, restraint of motor activity, clarity of speech, verbal skill, activity vs. passivity of speech, cooperation with adults, use of materials, use of scissors, fearfulness, frequency of anger toward adults, frequency of anger toward children.

Age: Kindergarten.

Test Administration: Scales can be administered by a teacher with no formal training in five to ten minutes. Teachers should be instructed to be aware of the items in the instrument in order for them to adequately observe their students with the scales in mind.

Norms: Not available.

Reliability: Adequate inter-rating reliability has been demonstrated.

Validity: Not available.

Available from: Schenectady County Child Guidance Center
Schenectady, New York

References: Conrad, G. and Tobiessen, J. "The Development of Kindergarten Behavior Rating Scales for the Prediction of Learning and Behavior Disorders", Psychology in the Schools, Vol. 4, 1967, pp. 359-363.

Name of Test: SCHOOL - COMMUNITY PROGRAM IN EARLY CHILDHOOD DEVELOPMENT (PECD) 1975

Developer: Holliday, F..B. and Olswang, L. B.

Description: This is a comprehensive screening instrument aimed at assessing strengths and weaknesses in the areas of gross motor/perceptual, fine motor/perceptual, cognitive or learning, speech and language, social and emotional development, and vision and hearing acuity.

Age: Three to five years.

Test Administration: This instrument utilizes a "station approach" whereby the children go from one screening station to the next for assessment in each of the above mentioned areas. Total time to administer is 45 minutes. "Scores" are expressed as "T-scores" which reflect each child's performance relative to the total population screened.

Norms: There were 2,338 children screened and the standardization sample consisted of 692 children; ages 36-71 months, 392 males and 297 females; mixed racially, ethnically, and economically. The cutoff point is for children falling in the lowest 10%.

Reliability: Inter - item correlations were .35 for twelve of twenty-eight items only.

Validity: Not available.

Available from: Evanston Public School System
District #65
Evanston, Illinois

References: Holliday, F. B. and Olswang, L., "School-Community Program in Early Childhood Development", Journal of Learning Disabilities, Vol, 7, No. 9, November, 1974.

Name of Test: SOCIAL AND NON-SOCIAL EXECUTIVE SKILL PROFILE

Developer: Bronson, Martha B.

Description: The child is observed in five major areas: Activities in the classroom (brief narrative of ongoing class activities as a context for the observation); focus of activity (overall level of play, etc., or apparent goal); non-social skills (behaviors positively or negatively related to task completion); social skills (behaviors positively or negatively related to social competence); and affect (child's emotional responses in a particular situation).

Age: Preschool and kindergarten.

Test Administration: Administered according to a modified time sampling procedure with trained observers: Timing device needs to be available to indicate 15-second intervals; minimum of three 10-minute periods for each child for each section (mastery and social), or one hour total per child. There are rate and ratio scores for each category; seven profile scores, nine summary subscores, and two overall scores (Social Skill Score and Non-social Skill Score) need trainer scorers.

Norms: None available.

Reliability: Inter-observer reliability scores range from .22 to 1.00 for individual categories (most in the .80's and .90's), .49 for Social Skill Score, and .65 for Non-social Skill Score.

Validity: Correlations of individual variables and summary scores with General Competence Rating Scale (.50's), with the Meeting Street School Screening Test (.30 to .69), and with the McCarthy Scales of Children's Abilities (.29 to .63) for a kindergarten sample in Brookline Available.

Available from: Bronson
Laboratory of Human Development
Larsen Hall - Harvard University
Appian Way
Cambridge, Massachusetts 02138

References: Bronson, M. B., "Executive Competence in Preschool Children," paper presented at Symposium on Dimensions of Competence in the Classroom, at the American Educational Research Association Convention in Washington, D.C., April 3, 1975.

Bronson, M.B., Observation Manual for the Social and Non-social Executive Skill Profile, Cambridge, Ma., 1975.

Name of Test: SOCIAL BEHAVIOR CHECKLIST

Developer: Ogilvie, Daniel, and Shapiro, Bernice

Description: This instrument utilizes the event-sampling observation technique of the child in a natural setting to assess social competency. Simultaneous coding of behavior into ten categories of interaction with adults, thirteen categories of interaction with peers, and four categories of the child's individual activities are used that may or may not involve interaction with adults or peers.

Age: One to six years.

Test Administration: Trained observers observe each child individually, approximately 40 to 45 minutes per child. A scoring system is based on eight components of social competency is available. Trained scorers are needed.

Norms: Some information on a small sample of young children is available from the Preschool Project.

Reliability: Inter-observer reliability coefficients are in the .80's and .90's.

Validity: Construct validity from instrument development techniques. No concurrent validity with other social competency measures available.

Available from: Shapiro
Preschool Project
Laboratory of Human Development
Larsen Hall - Harvard University
Appian Way
Cambridge, Massachusetts 02138

References: Ogilvie, D., and Shapiro, B., Manual for Assessing Social Abilities on One-to-Six-Year-Old Children, Preschool Project, Harvard University, Cambridge, Ma., 1970 (revised, 1974).

White, B. L., Kaban, B., Marmor, J., and Shapiro, B., Preschool Project: Child Rearing Practices and the Development of Competence, final report to Office of Economic Opportunity, Harvard University, Cambridge, Ma., 1972.

White, B. L., LaCrosse, E. R., Litman, F., and Ogilvie, D., The Preschool Project: Experience and the Development of Human Competence in the First Six Years of Life, Center for Research and Development on Educational Differences, Harvard University, Cambridge, Ma., 1969.

Name of Test: SOCIAL COMPETENCE SCALE AND SYMPTOM CHECKLIST

Developer: Kohn, M. and Rosman, B.

Description: The Social Competence Scale is designed to measure the young child's mastery of the preschool environment. The system checklist is an inventory of those clinically important behaviors which could be observed in a preschool setting. Factor analysis showed each instrument to measure two major dimensions of social-emotional functioning.

Age: Preschool and elementary school age.

Test Administration: Teachers complete global ratings on a three-point scale descriptive of the child's level of functioning (well, moderately well, or poorly functioning).

Norms: Both black and white children (N = 407), ranging in age from 36 to 70 months, and attending day care centers in New York City were tested. In the longitudinal study, 1,232 children in day care centers in New York City, fromprimarily lower and lower middle class families (56% black, 27% white, and 16% Puerto Rican) were tested.

Reliability: Inter-rater reliability of the global ratings was .82 (Sperman Brown corrected). The factor dimensions showed a modest to moderate longitudinal persistence over an 18-month period within day care children (N = 486) and over an 18-month period spanning day care to elementary school (N = 323).

Validity: Significant correlations with corresponding factor dimensions found in the Peterson Problem Checklist and the Schaefer Classroom Behavior Inventory.

Available from: The William Alanson White Institute
of Psychiatry, Psychoanalysis and
Psychology
20 West 74th Street
New York, New York 10027

References: Kohn, M., and Rosman, B. L., "A Social Competence Scale and Symptom Checklist for the Preschool Child," Developmental Psychology, Vol. 6, No. 3, 1972, pp. 430-434.

Kohn, M., and Rosman, B., "Relationship of Preschool Social-Emotional Functioning to Later Intellectual Achievement," Developmental Psychology, Vol. 6, No. 3, 1972, pp. 445-452.

Name of Test: WECHSLER PRESCHOOL AND PRIMARY SCALE OF INTELLIGENCE

Developer: Wechsler, D.

Description: A test of general intelligence which has subtests in two subgroupings: Verbal Scales (General Information, General Comprehension, Arithmetic, Similarities, Vocabulary) and Performance Scales (Picture Completion, Block Design, Animal House, Mazes). A Spanish version of the test does exist.

Age: Four to six and one-half years.

Test Administration: Individual testing administered by a trained tester and takes approximately 40 to 60 minutes; need kit of materials. Scoring is done according to the manual. Raw scores are converted to Verbal, Performance, and Full Scale I.Q.'s.

Norms: Standardized norms are available; also available are Spanish-speaking norms for a sample in San Juan, Santurce and Cantano.

Reliability: Reliabilities reported in high .80's and .90's for scale scores.

Validity: Correlations with the Stanford-Binet test in the .80's for most studies using both measures. Validity is based on the culturally-accepted, traditional notion of intelligence being defined as what the intelligence test measures, which has been questioned recently by many educators.

Available from: Psychological Corporation
304 East 45th Street
New York, New York 10017

References: Northeast Regional Resource Center, Early Childhood Assessment List, Hightstown, New Jersey, 1975.

APPENDIX III.3

The List of Additional Tests Reviews

1. The Oseretsky Tests of Motor Proficiency
2. School Community Program in Early Childhood Development
3. Project Genesis
4. Denver Articulation Screening Exam
5. Developmental Sequences of Perceptual-Motor Tests (Cratty)
6. Draw-a-Person Test
7. Behavior Rating Scale (Burks)
8. The Vermont Preschool Check List
9. The Delco-Elfman Developmental Achievement Test
10. The Iowa Test of Preschool Development (Scott)
11. The Developmental Progress Scale

APPENDICES

TO

CHAPTER V

APPENDIX V.1

FACE SHEET

Name of Child _____ Birth Date _____

Screening Date _____ Hour _____

Father's Name _____ Occupation _____

Mother's Name _____ Occupation _____

Home Address _____ Telephone _____

PARENT QUESTIONNAIRE:

Informant: Mother _____ Father _____ Other? _____

1. Where did you hear of the screening?
2. Do you think that your child has any "special needs"? Yes___ No ___ If yes, where? Result?
3. Are there any health conditions that run in the family? Yes ___ No ___ If yes, what?
4. Has this child had anything unusual in his health or development? Yes___ No___ If yes, what?

	RETEST		
	Done	Refused	Hard
Ht. and wt. Write in			
Physical			
DDST			
Vision Write In			

FINAL	CATEGORIZATION	
FINE		
RETEST	Refused	Hard
FOLLOW-UP		

PARENT FEEDBACK:

1. Was the screening comprehensive? Yes___ No___
2. The rooms and physical set-up are: Good__ Adequate__ Poor__
3. The screening time is: Too long__ Too short__ Just right__
4. The child's reaction to screening is: Enjoyed__ Neutral__ Upset
5. Parent's reaction to screening is: Enjoyed__ Neutral__ Upset__
6. Did you find the staff cooperative and congenial. Yes__ No__

APPENDIX V.2

The Physical Set-Up

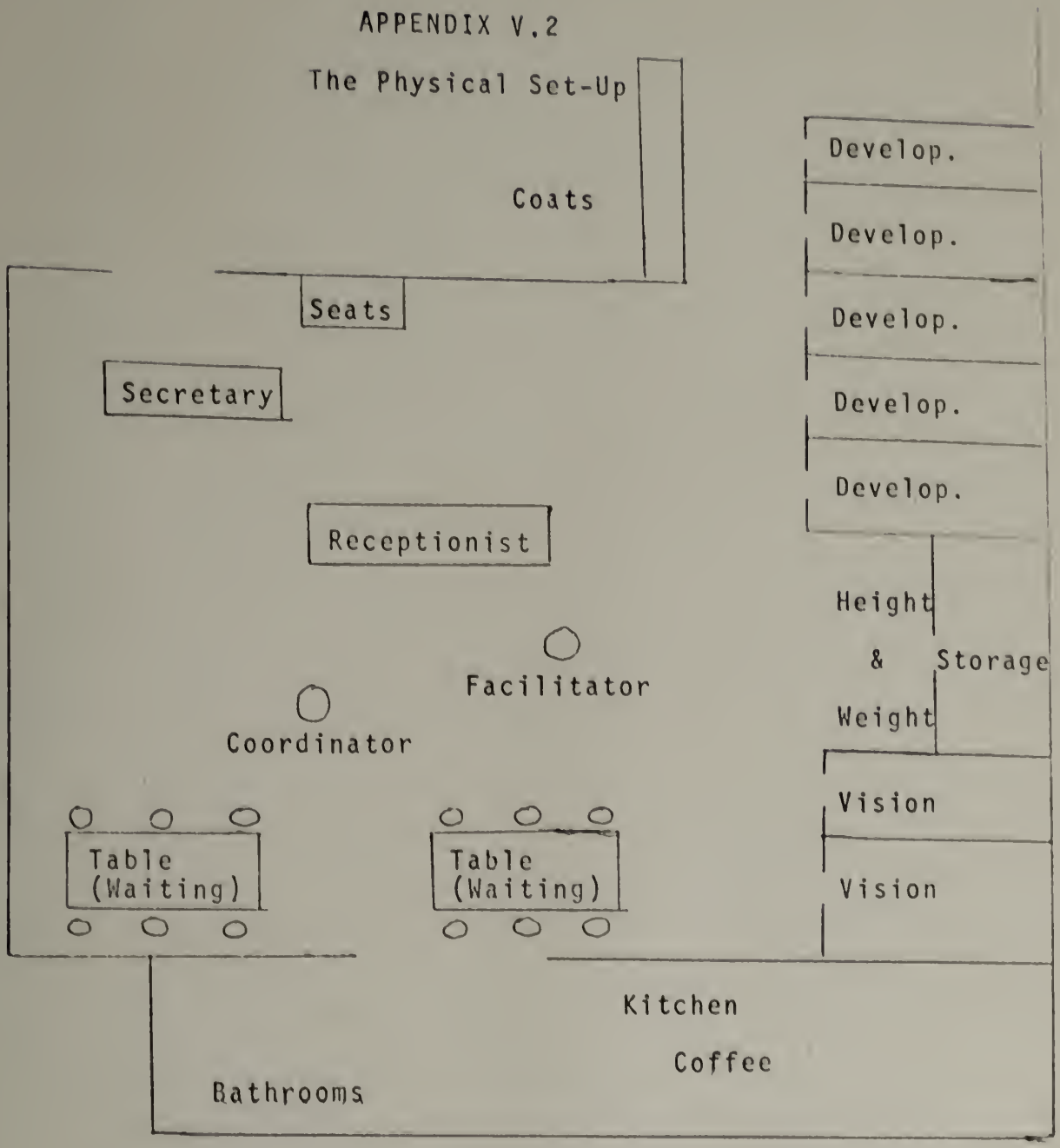


Figure 1: A schematic representation of the PSSP physical set up. The screening areas were free from distracting paraphernalia and children were not able to see each other.

APPENDIX V.3

The Routing Flow

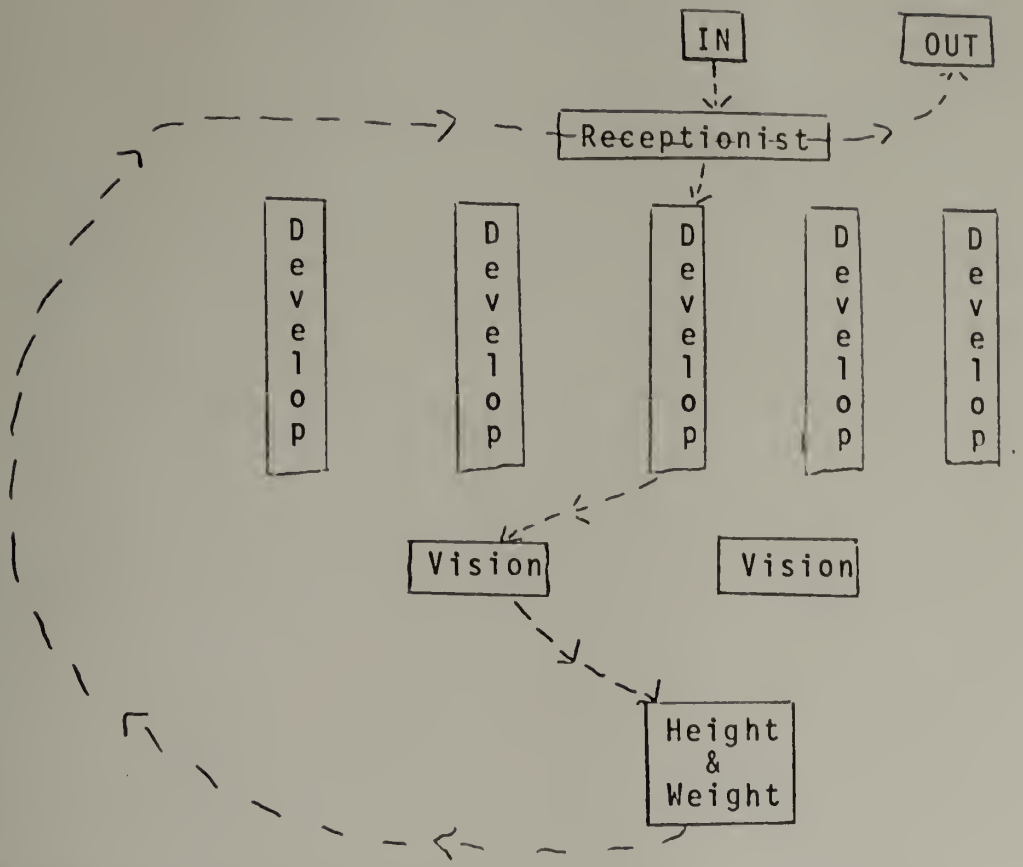


Figure 2: A schematic representation of the PSSP flow depicting a parent-child pair's routing.

APPENDIX V.4

The Observational Physical Screening Tool

Directions: Circle observed state Good means age-appropriate

GENERAL

Body build	good, toddler-like, weak, disproportionate, asymmetric, too thin, too fat.
Posture	good, slumping, curved spine, squatting, asymmetric
Gait	good, limp, tense, waddling, jerky, scissoring, trips over easily, difficulty
Coordination	good, tremors, twitching, difficulty, awkward, jerky, asymmetric movements.
Skin	1. Color: good, pallor, jaundice, red, unusual pigmentation 2. Eruptions: petechie (red spots caused by enlarged capillaries), Echymosis (black & blue spots), lesions, rash. 3. Texture: good, scaling, dry skin, unusual scars, moist, hairy 4. Turgor: good, limp, edema
Speech	good, unusual, immature, unusual voice, responds appropriately, unusual response, no response.

HEAD

Hair	good, unusual distribution, unusual color, dry, unusual amount, lesions.
Face	good, unusual facies, asymmetric, paralysis, unusual color, unusual size, unusual shape, lesions.
Eyes,	good, exophthalmos, strabismus, unusual occular movement, nystagmus, ptosis, styes, eye discharge, asymmetric pupils, unusual blinking, asymmetric eye-balls, epicanthal folds, unusual size R.L., unusual color R. L., unusual shape R.L., lesions R.L.
Nose	good, deviated (crooked), unusual discharge, redness, flaring, bleeding, lesions, unusual position, unusual size, unusual shape, odor.
Ears	good, unusual discharge, lesions, asymmetric, unusual position, unusual color, unusual size, unusual shape, odor.
Lips	good, paralysis, cleft, fissures, lesions, pallor, redness, edema, cyanosis, unusual position, unusual color, unusual size, unusual shape, odor.

APPENDIX V.4 Continued

Mouth	good, decayed teeth, excess salivation, tongue unusual color, gums unusual color, gums swollen, lesions, unusual size, unusual shape, asymmetric, odor.
Neck	good unusual size, toirticollis, lack of motion, unusual motions, unusual position, unusual color, unusual size, unusual shape, asymmetric, lesions, obviously enlarged lymph nodes.
TRUNK	
Shoulders	good, asymmetric, lack of motion, child cannot reach up with one or both arms R, L,; unusual position R, L, unusual shape R, L.
Chest	good, barrel chest, wide and shallow chest, asymmetric, unusual position, unusual size, unusual shape.
Spine	good, lordosis, kyphosis, scoliosis, lack of motion, child cannot bend, asymmetric, unusual position, unusual size, unusual shape.
Hips	good, asymmetric, unusual position, R, L; unusual size R, L, unusual shape, R, L,; unusual motion R, L.
EXTREMITIES	
Legs	good, asymmetric, limp, bowing, R. L., unusual position, R, L,; unusual color, R. L.; unusual size, R. L.; unusual shape, R.L.; unusual motion R. L.
Feet	good, toeing in R, L; toeing out R, L; flat foot R, L; equinus R, L; calcaneous R, L; unusual position R, L; unusual color R, L; unusual size R, L; asymmetric, lesions, R. L; unusual motion, R. L.
Arms	good, asymmetric, lack of motion R, L; cannot reach up fully R, L; edema R, L; lesions R, L; unusual position R, L; unusual color R, L; unusual size R. L; unusual shape R, L; unusual motion R. L.
Fingers	good, cyanotic nails, clubbing, unusual number, unusual position, unusual color, unusual size-long, short, unusual shape, lesions.
BEHAVIORAL OBSERVATIONS	
Social Interaction	shy, aggressive, hostile, pleasant, sociable other:
Separation from Parent	clings to parent, separates easily but acknowledges, ignores parent other:

APPENDIX V.4 Continued

Attitude Toward the Task and the Professional	cooperative, noncooperative, easily distracted other:
Response to Difficult Tasks	good, frustrated, tense, miserable, gives up easily other:

DENVER DEVELOPMENTAL SCREENING TEST

STO. = STOMACH
SIT = SITTING

PERCENT OF CHILDREN PASSING
25 50 75 90
Test Item
May pass by report →
Footnote No. →
see back of form

Date
Name
Birthdate
Hosp. No.

MONTHS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
YEARS 2½ 3 3½ 4 4½ 5 5½ 6

PERSONAL-SOCIAL

- REGARDS FACE
- SMILES RESPONSIVELY
- SMILES SPONTANEOUSLY
- INITIALLY SHY WITH STRANGERS
- PLAYS PAT-A-CAKE
- PLAYS BALL WITH EXAMINER
- FEEDS SELF CRACKERS
- INDICATES WANTS (NOT CRY)
- RESISTS TOY PULL
- 50%
- PLAYS PEEK-A-BOO
- DRINKS FROM CUP
- ★ 100% pass at birth
- WORKS FOR TOY OUT OF REACH
- IMITATES HOUSEWORK
- USES SPOON, SPILLING LITTLE
- WASHES & DRIES HANDS
- HELPS IN HOUSE — SIMPLE TASKS
- REMOVES GARMENT
- PUTS ON CLOTHING
- BUTTONS UP
- DRESSES WITH SUPERVISION
- SEPARATES FROM MOTHER EASILY
- PLAYS INTERACTIVE GAMES e.g., TAG
- DRESSES WITHOUT SUPERVISION

FINE MOTOR-ADAPTIVE

- FOLLOWS TO MIDLINE
- EQUAL MOVEMENTS ★
- FOLLOWS PAST MIDLINE
- GRASPS RATTLE
- REGARDS RAISIN
- REACHES FOR OBJECT
- FOLLOWS 180
- HANDS TOGETHER
- SIT, LOOKS FOR YARN
- SIT, TAKES 2 CUBES
- RAKES RAISIN ATTAINS
- PASSES CUBE HAND TO HAND
- BANGS 2 CUBES HELD IN HANDS
- THUMB-FINGER GRASP
- NEAT PINCER GRASP OF RAISIN
- DUMPS RAISIN FROM BOTTLE-DEMONSTR
- SCRIBBLES SPONTANEOUSLY
- TOWER OF 2 CUBES
- TOWER OF 4 CUBES
- TOWER OF 8 CUBES
- IMITATES VERTICAL LINE WITHIN 30°
- DUMPS RAISIN FROM BOTTLE-SPONT.
- COPIES +
- COPIES O
- IMITATES BRIDGE
- COPIES □
- IMITATES □ DEMONSTR.
- DRAWS MAN 3 PARTS
- DRAWS MAN 6 PARTS
- PICKS LONGER LINE 3 OF 3

LANGUAGE

- RESPONDS TO BELL
- VOCALIZES - NOT CRYING
- LAUGHS
- SQUEALS
- TURNS TO VOICE
- DADA OR MAMA, NONSPECIFIC
- DADA OR MAMA, SPECIFIC
- IMITATES SPEECH SOUNDS
- 3 WORDS OTHER THAN MAMA, DADA
- COMBINES 2 DIFFERENT WORDS
- POINTS TO 1 NAMED BODY PART
- NAMES 1 PICTURE
- FOLLOWS DIRECTIONS/2 of 3
- USES PLURALS
- GIVES 1ST & LAST NAME
- COMPREHENDS COLD, TIRED, HUNGRY/2 of 3
- COMPREHENDS PREPOSITIONS/3 of 4
- RECOGNIZES COLORS/3 of 4
- OPPOSITE ANALOGIES 2 of 3
- 87%
- DEFINES WORDS/6 of 9
- 87%
- COMPOSITION OF/3 of 3

GROSS MOTOR

- R STO LIFTS HEAD
- STO HEAD UP 45
- STO HEAD UP 90°
- STO CHEST UP ARM SUPPORT
- SIT - HEAD STEADY
- ROLLS OVER
- BEAR SOME WEIGHT ON LEGS
- PULL TO SIT NO HEAD LAG
- SITS WITHOUT SUPPORT
- STANDS HOLDING ON
- PULLS SELF TO STAND
- GETS TO SITTING
- STANDS MOMENTARILY
- WALKS HOLDING ON FURNITURE
- STANDS ALONE WELL
- STOOPS & RECOVERS
- WALKS WELL
- WALKS BACKWARDS
- WALKS UP STEPS
- KICKS BALL FORWARD
- THROWS BALL OVERHAND
- BALANCE ON 1 FOOT 1 SECOND
- JUMPS IN PLACE
- PEDALS TRICYCLE
- BROAD JUMP
- BALANCE ON 1 FOOT 10 SECONDS/2 of 3
- HOPS ON 1 FOOT
- CATCHES BOUNCED BALL/2 of 3
- HEEL TO TOE WALK/2 of 3
- BACKWARD HEEL - TOE/2 of 3
- BALANCE ON 1 FOOT 5 SECONDS/2 of 3

DIRECTIONS

DATE

NAME

BIRTHDATE

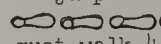
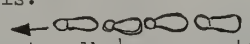
HOSP. NO.

1. Try to get child to smile by smiling, talking or waving to him. Do not touch him.
2. When child is playing with toy, pull it away from him. Pass if he resists.
3. Child does not have to be able to tie shoes or button in the back.
4. Move yarn slowly in an arc from one side to the other, about 6" above child's face. Pass if eyes follow 90° to midline. (Past midline; 180°)
5. Pass if child grasps rattle when it is touched to the backs or tips of fingers.
6. Pass if child continues to look where yarn disappeared or tries to see where it went. Yarn should be dropped quickly from sight from tester's hand without arm movement.
7. Pass if child picks up raisin with any part of thumb and a finger.
8. Pass if child picks up raisin with the ends of thumb and index finger using an over hand approach.

9. Pass any enclosed form. Fail continuous round motions.
10. Which line is longer? (Not bigger.) Turn paper upside down and repeat. (3/3 or 5/6)
11. Pass any crossing lines.
12. Have child copy first. If failed, demonstrate

When giving items 9, 11 and 12, do not name the forms. Do not demonstrate 9 and 11.

13. When scoring, each pair (2 arms, 2 legs, etc.) counts as one part.
14. Point to picture and have child name it. (No credit is given for sounds only.)

15. Tell child to: Give block to Mommie; put block on table; put block on floor. Pass 2 of 3. (Do not help child by pointing, moving head or eyes.)
16. Ask child: What do you do when you are cold? ..hungry? ..tired? Pass 2 of 3.
17. Tell child to: Put block <u>on</u> table; <u>under</u> table; <u>in front</u> of chair, <u>behind</u> chair. Pass 3 of 4. (Do not help child by pointing, moving head or eyes.)
18. Ask child: If fire is hot, ice is ?; Mother is a woman, Dad is a ?; a horse is big, a mouse is ?. Pass 2 of 3.
19. Ask child: What is a ball? ..lake? ..desk? ..house? ..banana? ..curtain? ..ceiling? ..hedge? ..pavement? Pass if defined in terms of use, shape, what it is made of or general category (such as banana is fruit, not just yellow). Pass 6 of 9.
20. Ask child: What is a spoon made of? ..a shoe made of? ..a door made of? (No otner objects may be substituted.) Pass 3 of 3.
21. When placed on stomach, child lifts chest off table with support of forearms and/or hands.
22. When child is on back, grasp his hands and pull him to sitting. Pass if head does not hang back.
23. Child may use wall or rail only, not person. May not crawl.
24. Child must throw ball overhand 3 feet to within arm's reach of tester.
25. Child must perform standing broad jump over width of test sheet. (8-1/2 inches)
26. Tell child to walk forward,  heel within 1 inch of toe. Tester may demonstrate. Child must walk 4 consecutive steps, 2 out of 3 trials.
27. Bounce ball to child who should stand 3 feet away from tester. Child must catch ball with hands, not arms, 2 out of 3 trials.
28. Tell child to walk backward,  toe within 1 inch of heel. Tester may demonstrate. Child must walk 4 consecutive steps, 2 out of 3 trials.

<u>DATE AND BEHAVIORAL OBSERVATIONS</u> (how child feels at time of test, relation to tester, attention span, verbal behavior, self-confidence, etc,):