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Relationship of Self-Injurious Behavior and Aggression to Social Skills in Persons With Severe and Profound Mental Retardation.

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RELATIONSHIP OF SELF-INJURIOUS BEHAVIOR
AND AGGRESSION TO SOCIAL SKILLS IN
PERSONS WITH SEVERE AND PROFOUND MENTAL RETARDATION

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
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requirements for the degree of
Doctor of Philosophy

in

The Department of Psychology

by

Dee Duncan
B.A., University of Utah, 1985
M.S., North Dakota State University, 1988
December, 1997

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Dedication

This Dissertation is dedicated to my parents, Rulon and Ione Duncan, who have encouraged their children to be the best they can be. Thanks to my dad for teaching me to be compassionate, flexible and persevering. Thanks to my mom for instilling in me a curiosity for learning and intellectual pursuits.
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Abstract

In the literature, self-injurious behavior and aggression are often lumped together collectively as maladaptive behaviors. This study examined the social skills characteristics between persons with self-injurious behavior, aggression and a control group using the Matson Evaluation of Social Skills in Persons with Severe and Profound Retardation (MESSIER). Persons engaging in self-injurious behavior were significantly different from persons engaging in aggression as well as from the control group on five of the six subscales. The self-injury group had lower scores on subscales measuring positive behaviors and higher scores on subscales measuring negative behaviors. As expected for persons engaging in aggression, scores on the subscales measuring negative behaviors were higher than the control group. In an unexpected finding, however, the means of the aggression group were significantly higher than the means of the control group. In a discriminant functional analysis (DFA), the scores from the General Negative subscale maximized the spread among the three groups and the scores of the General Positive subscale distinguished the self-injurious behavior and aggression groups from the control group. The DFA correctly classified 50% of the cases. An additional analysis examined the characteristics
of a separate group of persons who engaged in both aggression and self-injurious behavior. Their group means were significantly different on the negative subscales only. The DFA suggested that the scores on the General Negative subscale best separated the two groups. The DFA correctly classified 80% of the cases. Implications for treatment outcomes are discussed and future research ideas are presented.
Introduction

Individuals with mental retardation evincing aggression and self-injury comprise 52% of the institutionalized population (Hill & Bruininks, 1984). Institutionalized populations are also typically comprised of persons with severe and profound mental retardation (Hill & Bruininks, 1984). The co-existence of both of these conditions, severe behavior problems and severe mental retardation, represent a subgroup of institutionalized individuals with many needs and an even greater need for understanding. Despite high levels of money, time, and energy allocated to this group, there is still much to be learned about them. One thing that is known about this group is that the presence of these recalcitrant behaviors is a significant reason for continued institutionalization (Pagel & Whitling, 1978). Efforts to de-institutionalize these individuals could be enhanced if they, as a group, were better understood. Too often, researchers investigating self-injurious behavior and aggression combine these two behavior categories together under the collective term, maladaptive behaviors (for example see, Shore, Iwata, Vollmer, Lerman, & Zarcone, 1995) leading, unintentionally, to continued misunderstandings. The focus of this investigation was to identify differences
that might distinguish the two groups of individuals who engage in self-injurious behavior or aggression.

Further investigation of the specific deficits associated with self-injurious behavior and aggressive behaviors may assist these individuals in successful community placements and increase their quality of life. Identification of these deficits may lead to more effective ways to treat these unwanted and unproductive behaviors. One small, first step in this investigation might be to examine the behavior patterns of persons who exhibit aggression or self-injurious behavior to determine whether there are clusters of behaviors that co-occur with the maladaptive behaviors. If behavioral correlates (such as those measured on scales that assess social skills) of aggression and self-injurious behavior were identified, those behaviors could also be targeted for intervention. With this beginning, further studies could lead to expansion of the understanding of these behaviors and could also lead to studies to determine if interventions, such as social skills training, aimed at the co-existing behaviors would be effective in reducing the occurrence of aggression and self-injurious behavior.

Central to this effort has been the attempt of psychologists to accurately assess deficits and
inappropriate excesses in social functioning in the population of persons with developmentally delays who are institutionalized. We know that there is a relationship between severe problems behaviors (such as those described above) and social skills (Cicchetti, Sparrow, & Rourke, 1991). Therefore, research that demonstrates the link between self-injurious behavior, aggression and social skills could have important implications for the development of effective treatments. This study, therefore, is one small step in a beginning effort to better understand the complexity of severe behavior problems (such as aggression and self-injurious behavior) in persons with severe and profound mental retardation.

In the present research, the relationship between social skills and severe maladaptive behavior in individuals with severe and profound mental retardation was studied. A review of the literature highlighted definitions of mental retardation, and social skills. The prevalence and etiologies of self-injury and aggression were reviewed. Next, assessment of social skills in individuals with severe and profound mental retardation was reviewed. Finally, a rationale was presented and a study suggested which may address the lack of understanding of the relationship between social skills and maladaptive behavior.
Literature Review

**Mental Retardation**

**Overview.** Historically, mental retardation has only recently become the focus of scientific investigation (Clark, 1994). In the past, uncertainty about what to do with these individuals often led to a range of actions from labeling (such as fool, moron, idiot, feebleminded, mental defective and retardate) to outright inhumane treatment (Clark, 1994). Events began to change with the demonstration of success with the wild boy of Aveyron (Westling, 1986) and with Sequin's systematic training programs in the United States in 1837 (Seguin, 1846, as cited in Clark, 1994). In 1934 medical attention to mental retardation increased after demonstrations that a metabolic disorder, PKU (phenylketonuria), led to preventable mental retardation (Clark, 1994; Westling, 1986). Thirty years later President John F. Kennedy initiated legislation to support the scientific investigation of mental retardation. These efforts allowed better understanding and more humane treatment of these complex and unique individuals.

One issue under constant scrutiny has been the issue of who should be diagnosed as mentally retarded. Currently, the essential features of mental retardation as set forth in the Diagnostic and Statistical Manual, Fourth Edition, (DSM-IV)
are significantly subaverage general intellectual functioning co-occurring with significantly subaverage adaptive functioning, with onset prior to age 18 (American Psychiatric Association, 1994). With this definition, estimates are that roughly one percent of Americans are individuals with mental retardation (Tarjan, Wright, Eyman, & Keeran, 1973).

Classification. As in any classification system, the purpose is to communicate to others a set of clearly defined parameters to reduce ambiguity and to promote more definitive communication about the population of concern. If the definition is clear and the criteria explicit, everyone should be able to reach the same diagnosis. In definitions of mental retardation the perception of intelligence, behavior, and physical characteristics have been influenced by the personal, social and political values of the proponents of a specific definition (Patton & Jones, 1994).

The most often used definition of mental retardation is that provided by the American Association on Mental Deficiency (AAMD) which has undergone various changes over time reflecting the ever changing sociopolitical climate. Westling (1986) reported that the definition in 1959 stated, "Mental retardation refers to sub average general intellectual functioning which originates during the
developmental period and is associated with impairment in
one or more of the following: (1) maturation, (2) learning,
and (3) social adjustment"(p. 8).

The significance of adaptive behavior and social
competence is not emphasized in this definition. As a
result, the definition was revised in 1961 to include these
important aspects. Four levels of mental retardation can be
specified, indicating an individual's degree of intellectual
and adaptive impairment. The levels are Mild (characterized
by IQ scores of 50-55 to approximately 70); Moderate (35-40
to 50-55); Severe (20-25 to 35-40); and Profound (20-25 or
below). When an individual's intellectual and adaptive
behavior scores are discrepant, the diagnosis conferred
corresponds to the higher score.

Intellectual assessment and adaptive assessment have
periodically been at the forefront of the classification
procedure in terms of primary importance. Prior to the
development of intelligence tests, adaptive or social
behavioral deficits most clearly delineated the mentally
retarded persons from the non-retarded individuals. When
psychometric tests emerged and proposed a more objective and
quantifiable method of measurement that included levels of
retardation, intellectual assessment became of primary
importance (Westling, 1986). However, in the recent past,
the importance of adaptive behavior has resurfaced and has
gained particular importance, especially in persons with
severe and profound levels of mental retardation.

The assessment of adaptive functioning has always been
problematic, with many definitions of adaptive functioning
being proposed (Leland, 1991; McGrew & Bruininks, 1989;
Widaman, Gibbs, & Geary, 1987; Widaman, Stacy, & Borthwick-
Duffy, 1994). No consensus has emerged regarding a possible
factor structure to adequately characterize adaptive
behavior. Recent changes in the manner of defining adaptive
functioning (Luckasson, Coulter, Polloway, Reiss, Schalock,
Snell, Spitalnik, & Stark, 1992) suggest that disagreements
will persist for some time (Gresham, MacMillan, &
There are 10 areas of adaptive functioning. While some
researchers argue that, as yet, no reliable, valid
diagnostic instruments exist for assessing any of them
(Gresham, et al., 1995; MacMillan et al., 1993) many others
have argued the opposite (for review see Leland, 1991,
McGrew, & Bruininks, 1989). Still in use are the traditional
instruments: the Vineland Adaptive Behavior Scales (VABS;
Sparrow, Balla, & Cicchetti, 1984) and the AAMR Adaptive
Behavior Scales (Nihira, Foster, Shellhaas, & Leland, 1974).
Impairments in adaptive behavior are significant limitations in the person's effectiveness in meeting the standards of maturation, learning, personal independence, and/or social responsibility that are expected for his or her age level and cultural group. These standards are determined by clinical assessment and, usually, standardized scales. Social skills, as an element of adaptive behavior, is discussed in detail in the following section.

Operational definitions. Mental retardation was defined here using the 1994 definition found in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, (DSM-IV; American Psychiatric Association, 1994). Age of onset must have occurred during the developmental period (birth to age 18), deficits in adaptive functioning must include two or more domains of adaptive functioning and level of cognitive functioning must be two standard deviations below the mean on standardized intelligence tests. The classification of Severe and Profound levels of mental retardation was set using the levels from the DSM-IV (American Psychiatric Association, 1994). Individuals with scores on standardized intelligence tests in the 20-25 range to 35-40 range were classified as Severe and scores on standardized intelligence tests in the range of 20-25 or lower were classified as Profound.
Social Skills

Definitions. Libet and Lewinsohn (1973) stated that an individual who is socially skilled exhibits behaviors which are reinforced and refrains from exhibiting those which are punished. This definition was found lacking by Curran (1979), who pointed out that unacceptable behavior can also be reinforced (e.g., whining or tantrumming), and that acceptable behavior may be subject to extinction or punishment (e.g., telling the truth rather than lie for a friend).

Hersen and Bellack (1977) referred to social skills as an ability to express both positive and negative feelings in a specific context without losing reinforcement. Similarly, Libet and Lewinsohn (1973) consider social skills the ability to be maximally reinforced and minimally punished in social interactions. Combs and Slaby (1977) defined social skills as the capacity to interact in social settings in ways that are socially acceptable and which benefit self, others, or are of mutual benefit. Curran (1979) points out that Liberman, Vaughn, Aitchison, and Falloon expanded the scope of the term social skills, including both cognition and nonverbal behavior. Foster and Richey (1979) attempted to further expand the realm of social skills research to include an evaluation of the effect of both antecedents and
consequences on social functioning. They recognized that the operant paradigm had not been fully incorporated into social skills theory. They also pointed out that both the presence of positive and the absence of inappropriate behaviors are needed to consider an individual socially skilled.

Curran (1979) noted that definitions of social skills were progressively attempting to encompass larger realms of human activity. He rejected the ever-widening array of behavior being referred to as social skills, and stated that social skills should be inferred from overt motoric behavior, rather than relying on constructs not based on behavioral principles. Other researchers agreed (e.g., see Bernstein, 1981; Bramson & Spence, 1985; Gresham & Elliott, 1987; Matson, 1978; Matson & Senatore, 1981).

Foster and Ritchey (1979) suggest that social skills depend on context, and include both the presence of desirable and the absence of undesirable behaviors. Kelly (1981) states that social skills are identifiable, learned behaviors that individuals use in obtaining or maintaining an environment that is socially reinforcing. An individual who easily meets others, converses effectively, shares information, and leaves others with positive feelings following interactions can be said to be socially skilled (Kelly, 1982). Andrasik and Matson (1984) state simply that
social skills are comprised of the behaviors encompassing interpersonal responding.

Bedell and Lennox (1994) argued that two types of skills, cognitive and behavioral, are the current focus of social skills research in rehabilitation of individuals with chronic mental illness. They pointed out that little objective data exists to support a universal definition of social skills, more specifically, that the behavioral aspect of a definition had two component parts, topography and function. Topography of social skills is described by features of communication (verbal, nonverbal, and paralinguistic), and function of social skills is described by outcomes of social interactions, i.e., attainment of short term goals and maintaining a long term relationship. Social perception and information-processing skills are part of the cognitive components of social skills (McFall, 1982). Bedell and Lennox (1994) proposed that a comprehensive definition of social skills should include accurately perceived information, transformation of that information into a viable behavioral program, execution of that program through verbal and nonverbal behaviors that maximize goal attainment, both short and long term. In short, they argue for a problem-solving model of social skills and that this approach may be suited for persons with schizophrenia by
focusing on the cognitive component of social skills as the agent of change and that the change be measured behaviorally. In contrast, Marchetti and Campbell (1990) stated that cognitive abilities may be of a lesser concern when implementing acquisition programs with persons evincing mentally retarded. Increases in overt motoric behaviors reflect the success necessary to perform competently in social situations.

In light of the various theoretical arguments, behaviorists have nonetheless had considerable success in training social skills in persons with mental retardation (for review see Marchetti & Campbell, 1990). What has proven most successful, in terms of defining social skills, has been to identify the presence or absence of generally positive behaviors that are socially desirable, and generally negative behaviors that are socially undesirable. The goal for much social skills training has been to increase the positive behaviors, as well as to decrease the negative behaviors.

In summary, social skills can be defined in many ways, but typically are divided into verbal and nonverbal. The distinction can also be drawn between behavior that is generally desirable or appropriate (positive) and that which is generally undesirable or inappropriate (negative).
Positive verbal, positive non-verbal, negative verbal and negative non-verbal behaviors constitute the first four categories of behavior on the Matson Evaluation of Social Skills for Individuals with Severe Retardation (MESSIER), an assessment instrument designed by Matson (1995) for use with persons with severe and profound mental retardation. Furthermore, some behavior may be said to be neither exclusively verbal or non-verbal; these constitute general positive and general negative behavior as conceptualized in the final two categories of behavior on the MESSIER (Matson, 1995).

For this study, a behavioral definition of social skills was used, encompassing both verbal and nonverbal behaviors. These verbal and nonverbal behaviors can be either positive or negative in terms of their interaction with others in their environment. Additionally, general behavior that is not mutually exclusive of verbal or nonverbal behavior but can be judged to be either positive or negative were also included.

Theoretical Models. There have been many attempts to generate models of social skills. However, researchers have yet to agree on an acceptable and comprehensive model. Some have felt that the exact behaviors comprising social skills are not easily identified, and that the construct has not
been empirically derived. To this end, McFall (1982) reviewed two conceptual models that provide the basis for most definitions. These are the molecular and the trait/molar models.

The molecular model of social skills states that social skills are the observable specific behaviors that make up an individual's social repertoire (McFall, 1982). These behaviors are thought to be situation specific, vary across settings, and are relatively stable over time. The model suggests that social functioning is more situationally than individually determined. Thus, an individual's social skills can (theoretically) be operationally defined, assessed by appropriately trained individuals, and objectively evaluated using appropriately normed instruments. This model suggests that rather than possess an amount of social skills per se, an individual performs more or less adaptively (i.e., successfully) across various social settings, depending on their ability to apply or generalize based on their reinforcement history.

Problems with the molecular model include the difficulty, given the trans-situationality of behavior, of operationalizing a specific motor pattern as a social skill. This leads to problems specifying which of a given series of actions constitutes a social skill, how to evaluate setting
events, what settings are appropriate for assessing social skills, and what situations call for the display of particular social skills.

This approach can be contrasted with the trait/ability or molar model of social skills, which suggests that social skills are an element of personality possessed in different quantities by different individuals. One's observed social skills result from the behavioral expression of one's internal store of social skills. This model thus presumes that one's social behavior is innately determined; that is, an individual's predisposing genetic tendencies compel him or her to a given manner of social responding. These inborn predispositions are stable, consistent across different settings and time, and are resistant to change. Problems with the model center around the inferential nature of the trait theory itself. One can generalize from behavior, yet objective proof for the existence of traits cannot be demonstrated. To argue that one behaves in a given way due to hypothetical internal predispositions, and then to explain the existence of the theorized traits by observing the same behavior constitutes circular reasoning. The behaviorist would suggest that this is no explanation. Perhaps more disconcerting to the behaviorist is the theory's implication that treatment of social skills is
necessarily limited to one's potential store of innate social skill; thus, treatment can be of only limited benefit for individuals with a small store of social skills.

Proponents of the trait model argue that one's social behavior is an expression of innate, stable tendencies (McFall, 1992). Thus, a person is either socially skilled or not. This simplifies treatment for low functioning individuals; one simply posits that they are incapable of learning the necessary skills and ignores them. This harkens back to the 1960's when the theories of that era considered human behavior to be determined by lockstep developmental patterns of stable, unchanging personality traits. It assumed that behavior was relatively stable and was determined by developmental, biological, and intrapsychic processes that were primarily beyond the control of the individual (Bedell, 1994). Treatment arising from such a model has become the standard which the past 30 years of treating the developmentally delayed has sought to overcome.

The definitions often reflect the model on which they are based. Gottlieb and Alter (1984) reviewed the social skills literature and reported on 10 models of training used in the classrooms with handicapped children, 40% of whom were persons with mental retardation, and 36% who were persons with emotional handicaps. The models were listed as
behavioral, humanist, psychological, transactional, neuropsychological, ecological, psychoanalytic, sociological, cognitive-developmental, and social learning. Of the 95 curricula sampled, 21 had no theoretical model guiding their development. Of those using a theoretical model, Gottlieb and Alter (1984) reported that the behavioral model was the most frequently used for developing social skills training.

For Gotlieb and Alter (1984) the definition of social skills used were four areas identified as encompassing social skills training: disruptive behavior, social interacting, activities of daily living (ADL's), and personal functioning (e.g. reduction in self-stimulating behavior).

Two general attitudes seemed to divide the field in terms of what could be expected from social skills training (Gotlieb & Alter, 1984). The static approach, usually used with the severely mentally retarded, assumed that independence was not likely to be achieved and therefore, the goal of training was limited to self-care and management in personal and social situations. The dynamic approach assumed that all students are entitled to programs that prepare them with the skills, attitudes, and knowledge to be functional members of society and that self-care and
management skills are seen as a means towards the end of more complex development and personal independence. The static approach was used most often and focused on the "useful" things needed for daily living (Gotlieb & Alter, 1984).

The behavioral model was used for this study. Social skills in persons with severe and profound mental retardation will be viewed as observable behaviors which are learned responses to stimuli. Environmental forces (such as establishing operations, setting events, operant conditioning, etc.,) are determinants of behavior and that changes in the environment will produce changes in behavior. Observable behaviors, both verbal and nonverbal, can be said to be positive or negative. Additionally, general behavior that is not mutually exclusive of verbal or nonverbal behavior but can be judged to be either positive or negative will also be included in the model.

Self-Injurious Behavior

Definitions. While it is recognized that self-injurious behavior has been observed in normal infants and young children (Baumeister, & Rollings, 1976; Murphy & Wilson, 1985), and that suicidal gestures, self-neglect, self-mutilation, Munchausen Syndrome, and masochistic behaviors could fall into a generic definition of self-injurious
behavior (Fee & Matson, 1992), this research project focused on cases of self-injurious behavior commonly found among individuals with mental retardation. The difficulty in conducting research on self-injurious behavior is that no specific definition exists that readily encompasses the wide range of topographies of the condition. In general, definitions of self-injurious behavior include two components, injury with the source of the injury is the person, themselves. Two examples of commonly used definitions can be found in Tate and Baroff (1966) and Grossman (1983). Tate and Baroff (1966) suggested that self-injurious behavior be defined as behavior which produces physical injury to the individual's own body and Grossman (1983) defined self-injurious behavior as damage or disfigurement to a body part by one's own action. The DSM-IV (American Psychiatric Association, 1994) defines self-injurious behavior as self-inflicted bodily injury that is significant enough to require medical treatment (or would result in such injury if protective measures were not used) and gives examples listed previously as well as additional examples including self-biting, picking at skin or bodily orifices. Researchers often are required to define self-injurious behavior according to the populations under investigation. The definition used here is based on Matson
which defined self-injurious behavior as a class of behaviors, often highly repetitive and rhythmic, that result in physical harm to the individual displaying the behavior.

After establishing a definition, the next difficulty researchers face centers on which topographies to include in their investigation. Gorman-Smith and Matson (1985) reviewed the literature on self-injurious behavior and listed the wide range of topographies included in the studies under review. Topographies included head-hitting, head-banging, self-biting, eye-gouging, hair-pulling, nail-picking, and multiple self-injuries to include two or more of the behaviors. Topographies included in this study included head-hitting, head-banging, self-biting, eye-gouging, hair pulling, nail-picking, and picking at scabs or sores.

Prevalence. Knowledge regarding the prevalence of self-injurious behavior among individuals with mental retardation is important in attempting to gain an understanding of the possible etiology of self-injurious behavior and perhaps treatment (Johnson & Day, 1992). In a literature review including over 30 studies, Johnson and Day (1992) reported prevalence rates of 17 to 74 per 100 cases for persons with profound mental retardation and rates of 11 to 44 per 100 cases in persons with severe mental retardation. Johnson and Day (1992) reported that there appeared to be an inverse
relationship between self-injurious behavior and level of intellectual functioning, i.e., higher rates for lower levels of intellectual functioning. Additionally, the literature reviewed by Johnson and Day (1992) indicated that profoundly mentally retarded persons living in institutions had prevalence rates of self-injurious behavior of 26 to 74 per 100 cases compared to 17 to 20 per 100 cases for those living in the community.

**Etiology.** Self-injurious behavior may occur in covary with certain disorders (e.g., congenital insensitivity to pain, Harris, 1992) or as a feature of a syndrome, (e.g., Lesch-Nyhan, Cornelia de Lange, and Rett syndromes; Harris, 1992). However, self-injurious behavior occurs most often in association with mental retardation and without an identifiable physiological basis (Harris, 1992; Johnson & Day, 1992). Research into the possible causes of self-injurious behavior can be grouped into two broad categories: biological and behavioral. The biological perspective involves a physical defect as the source of self-injury. Explanations such as a genetic error (Baumeister & Rollings, 1976; Friedmann, 1995; Galjaard, 1980), a disruption in a neural structure (Capone, Aylward, Pulsifer, Abrams & Reiss, 1995), or a chemical imbalance (Buitelaar, 1993; Sandman & Hetrick, 1995) presumes that the individual engages in self-
injurious behavior through no fault of their own and that they couldn't stop hurting themselves even if they chose to (Field, 1997). The biological perspective will be reviewed below.

The behavioral perspective focuses on the function of the behavior and its reinforcement history. Analogue functional analyzes have been instrumental in determining environmental factors that maintain self-injurious behavior and perhaps offer some understanding of a possible etiology, that is, the "learning" of the behavior through reinforcement (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982). The behavioral perspective will be reviewed following the discussion of biological approaches below.

Congenital insensitivity to pain is characterized by the absence of pain sensation from birth and the entire body is affected in contrast to all other sensory modalities being intact (Thrush, 1973). These children spend much of their early life in hospitals because of repeated self-mutilations and injury yet they are described as likeable, affectionate children with the normal ranges of likes, dislikes, and emotions, who will cry when upset (Thrush, 1973). In the clinical sample studied by Thrush (1973), much of the self-injury was done for the amusement and social acceptance of others but at other times it was the result of
inexperience or inattention. Exhaustive biological studies of congenital insensitivity to pain have discovered no abnormalities that could account for the total absence of pain and have not provided any information about the self-injurious behavior seen in the populations of persons with mental retardation.

Lesch-Nyhan syndrome is an X linked chromosomal abnormality that affects only males (Lesch & Nyhan, 1964). The self-injurious behavior associated with Lesch-Nyhan syndrome is described as self-biting which is intense enough to result in tissue damage often leading to amputation of fingers and loss of tissue around the mouth (Nyhan, 1976). Because of a missing enzyme, excessive uric acid build-up leads to medical complications such as arthritic tophi, renal stones and neuropathy. Reduction in uric acid through effective drug treatments does not influence the neurological or behavioral aspects of the syndrome even if treated from birth (Harris, 1992). Despite neurobiological studies, including post mortem brain studies, no site(s) of brain dysfunction related to self-injury were located in Lesch-Nyhan subjects (Harris, 1992). Friedmann (1995) has proposed gene therapy with individuals with Lesch-Nyhan as a mode to study self-injurious behavior in humans. However, he also recognizes that because there is variability in the
phenotypic expression of the genotype, that a great deal more needs to be understood before a definitive genetic therapy is feasible.

Rett syndrome is an infantile dementia found only in females (Harris, 1992). Behaviorally, these individuals are characterized by progressive loss of previously acquired skills and develop a characteristic hand-wringing and hand mouthing that leads to tissue damage. Despite extensive studies and international conferences to share their most current findings no specific biological marker has been found for the syndrome or its accompanying self injury (Naidu, Murphy, Moser, & Rett, 1986).

Individuals with Down syndrome, a genetic disorder as a result of an extra chromosome 21 (Trisomy 21), have a reputation for being pleasant and mild mannered; however, Pulsifer and Capone (1995) found a subgroup of persons with Down Syndrome who also exhibited severe behavior problems which included self-injurious behavior. In studying this subgroup in greater detail, Capone, Aylward, Pulsifer, Abrams, and Reiss (1995) reported on the results of MRI brain scans on five subjects with matched controls which indicated significant differences between the two groups in several areas. (For example, the individuals with Down Syndrome and severe behavior problems had a smaller corpus
callosum compared to controls.) While this particular study is small and preliminary, it does seem to suggest that there may be a biological component to self-injurious behavior. More questions are raised than answered. More research is needed, however, before definitive conclusions can be reached.

Persons with Cornelia de Lange syndrome, a pathobehavioral syndrome of mentally handicapped individuals (Gualtieri, 1991), often exhibit self-injurious behavior. Gualtieri (1991) reported that self-injurious behavior occurred only in a small number of the 120 persons evaluated in their study of Cornelia de Lange syndrome. They reported that when the self-injurious behavior was present, it was usually mild and self-limited and more importantly, it appeared to be correlated with either a physiological event, such as pain, gastroesophageal reflux, or an environmental condition (Gualtieri, 1991). Gualtieri's (1991) finding is consistent with that of other researchers (Bryson, Sakati, Nyhan & Fish, 1971; Hawley, Jackson, & Kurint, 1985; Picker, Poling, & Parker, 1979).

Self-injurious behavior occurs most often in association with mental retardation (Harris, 1992; Johnson & Day, 1992). Attempts to better understand self-injury in persons with mental retardation have led to investigations
of opiate mechanisms (Sandman & Hetrick, 1995; Thompson, Symons, Delaney & England, 1995), investigations of animal models (Breese, Criswell, Duncan, Moy, Johnson, Wong, & Mueller, 1995; Tessel, Schroeder, Stodgell, & Loupe, 1995), and investigations of chemical imbalances, specifically, dopamine modulators (Schroeder, Hammock, Mulick, Rojahn, Walson, Fernald, Meinhold, & Saphare, 1995).

Self-injurious behavior flies in the face of common sense and a primordial sense of self-preservation to avoid pain, and so, with the discovery of the opiate system in the human body (Pert & Snyder, 1973), the endogenous opiate system became a major focus of research. In reviewing the current state of affairs in opiate research, Sandman and Hetrick (1995) indicated that two versions of the opiate hypothesis have evolved to explain self-injurious behavior: the analgesia and the addiction hypotheses. The analgesic hypothesis suggests that high-circulating levels of beta-endorphins reduce the perception of pain and that the concomitant behaviors of self-injury are a form of self-stimulation. The addiction hypothesis suggests that the release of opiates after self-injurious behavior produces pleasure and, as a consequence, persons with mental retardation who engage in self-injurious behavior become addicted to their own opiate system (Thompson, et al.,
Proponents of these theories argue that studies using opiate receptor blockers (e.g., naloxone and naltrexone) sometimes reduce or eliminate self-injurious behavior (for reviews see Jaffe, 1985; Sandman 1990/1991). Opponents argue that not all persons with self-injurious behavior respond to opiate antagonists (Campbell, Anderson & Small, 1993; Gillberg & Terenius, 1985; Thompson, Hackenberg, & Ceruti, 1994). It is argued that the effects are limited to a very narrow range of self-injurious behaviors (e.g., head hitting, head banging and self-biting) and do not account for the broad range of possible topographies (e.g., pinching, skin scratching, and poking fingers in eyes, ears, nose and mouth). After reviewing the raw data received from the authors of approximately 80% of published studies, Wayne Fisher (personal communication, November 12, 1996) indicated that the treatment gains from the studies could be explained by environmental factors and not necessarily from the effects of the opiate antagonists.

Investigation of self-injurious behavior using animal models has led to a proposed dopamine deficiency model for persons with mental retardation who may have this neurotransmitter deficiency (Breese, et al., 1995). Neonatal lesions of the dopaminergic neurons produces self-injurious behavior in rats but the same lesions in an adult rat do
not. From this finding, the researchers suggested that a reduction of dopamine during development may have resulted in one or more adaptations within the motor movement circuitry increased the susceptible to self-injurious behavior, i.e., a dopamine supersensitivity (Schroeder, et al., 1995; Breese, et al., 1995).

In summary, the relatively recent biological emphasis on the etiology of self-injurious behavior has not resulted in the discovery of the pathogenesis of self-injurious behavior. While the evidence is mounting that biological components are somehow implicated, the behavioral approach still has a role to play in understanding the function of self-injurious behavior.

Ever since the publication of the seminal article by Iwata et al. (1982), functional analysis has been the dominant focus of the behavioral investigations of the function, and hence the etiology, of self-injurious behavior. The behavioral model is based on the assumption that the self-injurious behavior is a learned operant response and maintained by environmental factors (Mace & Mauk, 1995; Schroeder, 1991; Schroeder, Rojahn, Mulick & Schroeder, 1990). Environmental factors can include setting events (Carr & Smith, 1995), avoidance (Schroeder, et al., 1990), escape (Iwata, Pace & Kalsher, 1990), attention (Carr
& McDowell, 1980), communication (Carr & Durrand, 1985), to obtain tangible items (Derby, Wacker, & Sasso, 1992), or a combination of environmental factors (Smith, Iwata, & Vollmer, 1993).

**Assessment.** No instrument has been developed to specifically assess the complexities of self-injurious behavior. Assessment is done primarily through informant report and direct observation. The identification of persons with self-injurious behavior often begins with a referral from an informant as a request for treatment or it is identified on a subscale on instruments designed to measure adaptive and/or aberrant behavior. The Vineland, the AMR AAMD, the MESSIER, and the DASH II are examples of these types of instruments. If treatment is indicated, further assessments through informant report, direct observation and functional analysis to identify the topographies and function(s) of the self-injurious behavior are conducted.

**Aggressive Behavior**

**Definitions.** The literature dealing with the study of aggression is fragmented into two major categories: that which is found in persons with retardation and that which is found in the non-retarded population. Research and theories in the non-retarded population focus on aggression and violent behavior as symptoms of antisocial behavior and its
relationship to the judicial system and social policy. Aggression in persons with mental retardation focuses primarily on rate, duration and intensity of the topographies and how they can be reduced through principles of behavior modification. This study focuses on aggression in the field of mental retardation.

Baron (1994) defined aggression as any behavior aimed at harming or injuring another person. Berkowitz (1993) defined aggression as motor behavior that has the intent to harm, hurt or injure another person or object. These definitions do not account for the context of the aggression. For example, pushing or shoving someone would be considered aggression except when pushing or shoving someone out of the path of an oncoming car; then it is seen as helpful. Berkowitz's (1993) definition also requires physical contact but does not address verbal aggression. Yelling or shouting angrily at someone is often described as verbal aggression and physical injury does not occur. The "intent" of the aggression in Berkowitz's (1993) definition requires harm, hurt or injury but the "intent" of the bully is initially non-injurious. However, because the goal is to coerce others, the bully will initially use verbal aggression then escalate to physical aggression depending on the response effort needed to obtain the reinforcement of
dominance or control over others. Thus, the intent to harm only occurs if the victims defy the bully and the bully then resorts to physical injury to obtain the goal. Despite the problems inherent in including intent in the definition, it is necessary in order to exclude situations where harmful actions occur accidently (Volavka, 1995), or are part of a competitive (offensive) and defensive response with the potential for harm (Brain, 1994).

Kassinove and Sukhodolsky (1995) try to account for the deficiencies in previous definitions by defining aggression as motor behavior carried out with the intent of hurting someone through physical contact. This act can be either instrumental or emotional. Kassinove and Sukhodolsky (1995) differentiate behavioral (aggressive) actions with the goal of bodily harm (which produces direct results) from verbal (angry) actions which are more likely to be the preservation of a reputation or status in a hierarchy as the goal and which produce learned or conditioned outcomes. The definition used in this study is based on Mulick, Hammer and Dura's (1991) discussion of aggression in which the aggressive behavior is said to occur in a social context, is aversive to others, is usually instrumentally directed toward other people and generally has relatively clear reinforcing consequences.
Because of the variability in defining aggression in the literature, predatory, violent, dangerous, dishonest, manipulative, fraudulent, obnoxious, unhealthy or embarrassing behaviors can be included (Dumas, Blechman, & Prinz, 1992; Nietzel & Susman, 1990). Nietzel and Susman (1990) recommend that any study of aggression be limited to a clearly prescribed set of topographies. Therefore, aggression in this study has been limited to hitting, slapping, kicking, pinching, biting, spitting, hair pulling, scratching and pushing others.

**Prevalence.** Estimates of the prevalence of aggression in persons with severe or profound mental retardation vary from study to study due to wide discrepancies in the definitions, topographies, and settings under investigation (Sisson, 1994). Aggression in samples from institutionalized persons with mental retardation were found to be 27% in a California sample (Ross, 1972), 55% in a Texas sample (Griffin, Williams, Stark, Altmeyer, & Mason, 1986) and 30% in a nationwide sample (Hill & Bruininks, 1984). In all cases the rates were higher in the institutionalized compared to the community sample.

**Etiology.** There is no known etiology of aggression. However, certain syndromes and medical conditions have aggressive behavior associated with them. Studies of these
syndromes and conditions have not been successful in determining the etiology of aggressive behavior because aggression is thought to be influenced by the interplay of diverse factors that are difficult to disentangle. These influences can include biological factors (genes, neural systems, neurotransmitters and hormones), situational determinants (i.e., environmental or social contexts), and accumulated individual experiences (Brain, 1994).

Once there was thought to be a link between genes and aggression (Jacobs, Brunton, Melville, Brittain, & McClemont, 1965). They reported that XYY males were much more common among individuals imprisoned for violent crimes than the general population. Subsequent studies and reassessments of the data suggested that these XYY males were more likely to be mentally retarded and, therefore, more likely to be caught and arrested (Baron, 1994). According to Brain (1994) there is no evidence (in humans or animals) of specific genes for aggressive behavior.

Studies looking at possible links between neural systems that can be affected by neuropsychiatric disorders, alcohol, or seizures and aggressive behavior have not produced any direct links (Brain, 1994). The aggressive behavior occasionally displayed by persons with schizophrenia can often be explained by other variables such
as gender, socioeconomic status, age, drug exposure (both legal and illegal), comorbidity of more than one severe mental illness, and prior aggression (Brain, 1994; Tardiff & Sweillam, 1990; Virkkunen, 1983).

The relationship of aggression and epilepsy has been debated, with some studies reporting positive correlations (Weiger & Bear, 1988). Other research suggests that association is spurious and related to other factors (Virkkunen, 1983) or that the association can better be accounted for by the socioeconomic class of the subjects (Tardiff & Sweilam, 1980). Seigel and Mirsky (1990) reviewed the literature and made the distinction between acts occurring during a seizure (ictal) and those occurring between seizures (interictal). Ictal aggression is reported to be rare (Bear, 1991; Seigel & Mirsky, 1990) but Weiger and Bear (1988) argue that interictal behaviors are an identifiable syndrome whereas Seigel and Mirsky (1990) argue that no clear conclusions can be drawn about interictal aggression because of biased sampling.

A popular notion in the current culture associates testosterone with male aggressive behavior. The early studies from which this idea seeped into the culture were difficult to replicate or find research support (Brain, 1984). In a review of the literature, Archer (1991)
emphasized the correlational nature of the existing evidence between androgenic hormones and measures of aggression. Androgens do not have a simple causal effect on human aggression but the patterns of production of sex steroids do appear to influence mediator variables that then influence a predisposed individual to carry out actions (Brain, 1994).

Studies of aggression within the field of mental retardation discuss the etiology of aggression in terms of the function it serves for many of these individuals. Studies also discuss the environmental factors which maintain the aggressive behavior. For example, the function of the aggression can be communicative (Carr & Durrand, 1985), to obtain a desired object or to escape from a demand (Iwata, et al., 1982). In these persons with mental retardation, who often have limited ways of expressing themselves, the functionality of the aggressive behavior is considered to be the etiology of the behavior. Higley, Linnoila, and Suomi (1994) state that aggression is not just a function of genetic or environmental influences, but an ongoing interplay of both influences.

In summary, aggression can be a by-product of the interplay of complex biological and environmental interactions but at times it may have a strictly behavioral component. For some individuals, a biological predisposition
may lead to the occurrence of aggression and then environmental factors may maintain it. For others, aggression may have been just one of many behaviors sampled in a setting event and the individual learned how effective the aggression was in obtaining the goal or achieving the desired results. Thereafter, the environment maintained the behavior. An accurate assessment of aggression can be helpful in determining both the etiology and the maintaining factors.

**Assessment.** Assessment of aggression in the nonretarded population is accomplished through the use of self-report checklists, questionnaires, direct observation, and role play situations, many of which have normative data from which to make comparisons. Occasionally informant reports are used. In contrast, assessment of aggression in persons with mental retardation does not have the same luxury, especially in persons with severe and profound mental retardation populations where speech is usually absent. These assessments must rely on either direct observations, which are very labor intensive, or on informants, such as family members or staff members to complete the checklists and questionnaires.

For persons with severe or profound mental retardation who also engage in high rates of severe aggression, a
functional analysis can be useful in identifying the maintaining variable(s) which would then point to a treatment (Iwata, et al., 1982). The advantage of a functional analysis is that it can be individualized for each person and their particular learning history. The disadvantage is that functional analyzes are often the purview of inpatient hospital settings with attending high labor costs. In an attempt to achieve similar results in an outpatient setting, Derby, et al., (1992) proposed a brief functional analysis to obtain the same information. They have met with limited success with most of the success coming from patients with less severe behaviors. As a compromise between labor intensive inpatient functional analysis and brief outpatient functional analysis, Gardner and Cole (1990) proposed a multicomponent model.

Gardner and Cole (1990) propose a multicomponent model for assessment and treatment of aggression. Their system provides for the assessment of those variables involved in the instigation of aggressive behaviors as well as those contributing to the acquisition and persistent recurrence of the problem behaviors. Their broad based model de-emphasizes a unitary approach of suppressing aggression with operant conditioning offering instead a three step process that includes: (1) gather assessment data relative to the
conditions under which aggression is likely to occur, (2) develop hypotheses concerning potential influences, and (3) develop related treatment procedures (Gardner & Cole, 1990). The following paragraphs outline their model.

Step 1, gathering assessment data, needs to consider factors that may instigate aggression (i.e., environmental and client characteristics), contribute to the acquisition of aggressive behavior (i.e., aggressive peer role models) and contribute to the persistent recurrence of aggression (i.e., events which strengthen and maintain the behavior). Traditional assessment data about events which decrease aggression, such as the removal of positive events, or the presentation of aversive events is also obtained.

Step 2, hypotheses development, allows the clinician to develop ideas about the current factors contributing to the client's aggression. Given the complex nature of aggression, more than one hypothesis is usually generated.

In Step 3, selection of treatment strategies, the clinician can draw from a wide range of techniques and procedures: antecedent events can be altered, alternative skills can be taught, schedules of reinforcement can be restructured, medical consults requested, and aversive consequences applied as deemed necessary.
In summary, assessment of aggression in persons with severe or profound mental retardation can be achieved through informant reports that provide historical information about the factors that can prompt aggression, and contribute to the maintenance of it. A multi-component approach appears to be the most comprehensive model for accomplishing the assessment.

**Assessing Social Skills in Persons with Severe or Profound Mental Retardation**

Until recently there was no instrument to specifically assess social skills in persons with severe or profound mental retardation. Social skills were usually found in subscales of instruments designed primarily to assess adaptive functioning in a broad range of individuals. Examples include the American Association of Mental Deficiency Adaptive Behavior Scales (AAMD ABS; Nihira, Foster, Shellhaas, Leland, 1974) and more recently, the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984). Even though these scales are often used to assess social skills as just one part of an adaptive functioning assessment in a comprehensive evaluation to determine level of retardation, social skills assessment is not the main focus. Hence, the development of the Matson Evaluation of Social Skills for Individuals with Severe
Retardation (MESSIER; Matson, 1994). The MESSIER was designed to assess social skills in persons with severe or profound mental retardation. The construction of the MESSIER began as 95 items assembled from relevant items on the communication and socializations domains of the VABS, relevant items from the Matson Evaluation of Social Skills (MESSY; Matson, Rotatori, & Helsel, 1983) and items nominated by experts. It was then administered to 55 adults with severe or profound mental retardation and two weeks later re-test data were collected from a second administration. Items with low correlations (> .40) were dropped leaving 85 items. These items were then divided into six clinically-derived subscales as follows: positive verbal behavior, positive non-verbal behavior, general positive behavior, negative verbal behavior, negative non-verbal behavior, and general negative behavior. The MESSIER is available for use with persons with severe or profound mental retardation and research with the MESSIER is beginning to appear in the literature.

Using the MESSIER to accurately assess the social skills of persons with severe or profound mental retardation was evaluated by LeBlanc (1996). She reported internal consistency of $r=.94$, inter-rater agreement of $r=.79$ and test – retest of $r=.86$. Convergent validity was assessed by
examining the correlations between MESSIER total score and staff's rank order. LeBlanc reported that the correlations ranged from $r=.09$ to $r=.98$ (mean $r=.6$). The MESSIER has good reliability and modest convergent validity with staff rankings.

The MESSIER was used to evaluate the relationship between social skills and psychopathology (Smiroldo & Matson, 1995). Scores from the MESSIER and psychopathology assessment instruments of 207 individuals with severe and profound mental retardation were examined. A linear regression analysis was performed and indicated that increases in psychopathological symptoms are predictive of increases in negative behaviors. After running a cluster analysis to determine if individuals presenting with different psychological diagnoses exhibited different profiles of social skills excesses and deficits, Smiroldo (1995) reported that specific profiles of excesses and deficits did not exist for the diagnostic groups. However, after looking at a subgroup of subjects (those diagnosed with stereotypic movement disorder) and comparing their scores with a control group, it was reported that the two groups differed in general positive and positive nonverbal skills. This then raises the question of what other groups of persons might have unique differences. For example, is it
possible that persons who engage in aggression or self-injurious behavior have unique differences? It remains an empirical question.

**Purpose of the Study**

The present study was designed to evaluate the relationship between specific maladaptive behaviors (self-injurious behavior and aggression) and social skills in persons with severe and profound mental retardation. The study may have applicability in terms of discerning patterns of responding that directly impact an individual's social functioning. A possible implication is that the knowledge of specific behavioral function may lead to social skills treatment packages tailored to address the unique challenges presented by this under-served population. The present study may also identify patterns of co-occurring behaviors that can become a focus of intervention strategies. This process could in turn improve the quality of these individuals' lives, and possibly lead to a higher frequency of individuals with aggressive and self-injurious behavior to function successfully in community settings.

The purpose of this study was to examine three questions about the relationship of social skills to self-injurious behavior and aggression in individuals with severe and profound mental retardation. First, do individuals
engaging in self-injurious behavior have different profiles of social skills from individuals who engage in aggression? Second, is the presence of self-injurious behavior associated with more extensive social skills deficits in this population compared to a control group? Individuals exhibiting self-injurious behavior may have more negative social behaviors and less positive social behaviors than individuals of the same level of functioning who do not exhibit self-injurious behavior. Third, is the presence of aggression associated with more extensive social skills deficits in this population? Individuals exhibiting aggression may also have more negative social behaviors and less positive social behaviors than individuals of the same level of functioning who do not exhibit aggression.

These questions were examined by reviewing the records of a large group of institutionalized individuals with severe and profound mental retardation who also engage in self-injurious behavior or aggression. Information on presence or absence of aggression and self-injurious behavior were obtained in addition to standardized social skills assessment results (MESSIER). The social skills profiles of these two groups as measured by the six clinical subscales of the MESSIER were compared to each other and to a control group exhibiting neither maladaptive behavior.
Methods

Participants

Participants were individuals with severe and profound mental retardation living in a state facility for persons with mental retardation. A total of 276 cases were selected for inclusion in this study. There were three groups: individuals with self-injurious behavior (n = 75), individuals with aggressive behavior (n = 75) and a control group of individuals with neither maladaptive behavior (n = 75). An additional subgroup of individuals with both maladaptive behaviors (combined aggression and self-injurious behavior) was selected (n = 51) for a secondary analysis. The groups were matched on age using group means. Informed consent was obtained according to state facility policy.

The demographics of the self-injurious, aggression, and control groups are listed in Table 1. There was an approximate 60 - 40 split between males and females represented in the sample with males comprising the majority of cases. There was a 75 - 25 split between the Caucasians and Afro-Americans represented in the sample with Caucasians comprising the majority of cases. There was an approximate 80 - 20 split between the level of retardation represented in the sample with individuals with profound mental
retardation comprising the majority of the sample. The age range of the sample was 12 years to 77 years old and the average age was 43 years of age (M =42.87).

Table 1
Demographics of Self-Injurious, Aggression and Control Groups in Primary Analysis

<table>
<thead>
<tr>
<th></th>
<th>SIB</th>
<th>AGG</th>
<th>CTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Age M</td>
<td>40.2</td>
<td>45.2</td>
<td>44.7</td>
</tr>
<tr>
<td>Age SD</td>
<td>12.9</td>
<td>12.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Age Range</td>
<td>12-75</td>
<td>24-77</td>
<td>11-77</td>
</tr>
<tr>
<td>Gender Males</td>
<td>44 (59%)</td>
<td>42 (56%)</td>
<td>52 (69%)</td>
</tr>
<tr>
<td>Gender Females</td>
<td>31 (41%)</td>
<td>33 (44%)</td>
<td>23 (31%)</td>
</tr>
<tr>
<td>Race Caucasian</td>
<td>56 (75%)</td>
<td>56 (75%)</td>
<td>56 (75%)</td>
</tr>
<tr>
<td>Race Afro-American</td>
<td>19 (25%)</td>
<td>19 (25%)</td>
<td>15 (25%)</td>
</tr>
<tr>
<td>Race Other</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>MR Level Severe</td>
<td>4 (5%)</td>
<td>15 (20%)</td>
<td>15 (20%)</td>
</tr>
<tr>
<td>MR Level Profound</td>
<td>71 (95%)</td>
<td>60 (80%)</td>
<td>60 (80%)</td>
</tr>
</tbody>
</table>

Note. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control; MR = Mental Retardation.

To verify that the ages of the subjects were equivalent across groups (self-injurious behavior, aggression, and control), the group means were analyzed using a one-way Analysis of Variance (ANOVA). No two groups were significantly different at the .05 level, F(2, 212) = 2.60, p =.076.
The characteristics of the groups in the secondary analysis were also examined. The demographics of the combined aggression and self-injurious behavior group and the control group are listed in Table 2. There was an approximate 60 - 40 split between males and females.

Table 2
Demographics of the Combined Aggression and Self-Injurious Behavior Group and the Control Group

<table>
<thead>
<tr>
<th>Demo-graphics</th>
<th>CTL</th>
<th>A&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>42.6</td>
<td>40.4</td>
</tr>
<tr>
<td>SD</td>
<td>11.0</td>
<td>13.2</td>
</tr>
<tr>
<td>Range</td>
<td>19-67</td>
<td>19-63</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>30 (59%)</td>
<td>23 (45%)</td>
</tr>
<tr>
<td>Females</td>
<td>21 (41%)</td>
<td>28 (55%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>37 (75%)</td>
<td>39 (76%)</td>
</tr>
<tr>
<td>Black</td>
<td>13 (25%)</td>
<td>12 (24%)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>MR Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>10 (20%)</td>
<td>7 (14%)</td>
</tr>
<tr>
<td>Profound</td>
<td>40 (80%)</td>
<td>44 (86%)</td>
</tr>
</tbody>
</table>

Note. CTL = Control; A&S = Aggression and Self-Injurious Behavior; MR = Mental Retardation.

represented in the secondary sample with males comprising the majority of cases. There was an approximate 75 - 25 split between the Caucasians and Afro-Americans represented in the sample with Caucasians comprising the majority of
cases. There were no other cultures represented in the study. There was an approximate 80 - 20 split between the level of retardation represented in the sample with individuals with profound mental retardation comprising the majority of the sample. The age range of the sample was 19 years to 67 years old and the average age was 41 years of age (M = 41.00).

To verify that the ages of the subjects were equivalent across groups (control and combined aggression and self-injurious behavior), the group means were analyzed using a one-way Analysis of Variance (ANOVA). No two groups were significantly different at the .05 level, \( F(1, 96) = 1.96, p = .164 \).

**Procedures**

The subjects were selected from the records of a state facility's data base of 400+ individuals who had available data. Records which indicated the presence of either self-injurious behavior or aggression (or both) as a target behavior on the individual's behavior treatment plan were selected. There were 95 self-injurious behavior, 82 aggression and 238 controls cases available for the study. Seventy five cases were randomly selected from the available pools for each of the groups. All 51 of the available cases with combined aggression and self-injurious behavior were
retained. A control group for use as a comparison group for the combined aggression and self-injurious group was created by randomly selecting 51 cases from the 75 cases of the previously selected control group.

For all subjects, the information retrieved from facility records was limited to client number (no names were used), age, race, sex, level of mental retardation, severity scores and MESSIER scores. The severity scores were obtained from two items (2 and 4) on the Aberrant Behavior Checklist (ABC; Aman, Singh, Stewart & Fields, 1985), in order to establish, from an independent source, that the experimental groups did, in fact, engage in self-injurious or aggressive behaviors. The items rate a person's behavior on a Likert-type scale: 0 -not a problem; 1-slight problem; 2-moderately serious problem; 3-severe problem. Item 2, "Injures self," provided a rating of self-injury and item 4, "Aggressive to other patients and staff," provided a rating of aggressive behavior. For all participants the scores received on items 2 and 4 were added together, then divided by two to provide a single, composite severity score. The severity ratings by group are listed in Table 3.

The severity ratings between groups were significant $F(2,126) = 17.21$, $p < .001$ at the .05 level. A post hoc Scheffe procedure indicated that significant differences
between the control group and each of the experimental groups but that the experimental groups were not significantly different from each other. The group means of the severity ratings for the experimental groups were significantly higher compared to the group means of the severity ratings of the control group.

Severity ratings between the control group and the combined aggression and self-injurious behavior group were compared. The severity ratings between groups were significant $F(1,49) = 73.89, \ p < .001$ at the .05 level indicating that the mean of the combined aggression and self-injurious group ($M = 1.4$) was clearly higher than the mean for the control group ($M = .16$). The means of the severity ratings are listed in Table 4.

The MESSIER is an 85 item questionnaire for assessing a broad range of social skills in persons with severe and

<table>
<thead>
<tr>
<th>Groups</th>
<th>SIB</th>
<th>AGG</th>
<th>CTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M$</td>
<td>.72$^1$</td>
<td>.76$^2$</td>
<td>.15$^{12}$</td>
</tr>
<tr>
<td>$SD$</td>
<td>(.59)</td>
<td>(.68)</td>
<td>(.33)</td>
</tr>
<tr>
<td>$n$</td>
<td>39</td>
<td>43</td>
<td>47</td>
</tr>
</tbody>
</table>

Note. Matching superscripts are significant at the .05 level. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control.
profound mental retardation. The MESSIER scores included a score from each of the six subscales as follows: General Table 4

Means of Severity Ratings for the Combined Aggression and Self-Injurious Behavior Group and the Control Group

<table>
<thead>
<tr>
<th>Group</th>
<th>CTL</th>
<th>A&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.16</td>
<td>1.44*</td>
</tr>
<tr>
<td>SD</td>
<td>(.34)</td>
<td>(.73)</td>
</tr>
<tr>
<td>n</td>
<td>34</td>
<td>17</td>
</tr>
</tbody>
</table>

Note. * = significant at the .05 level; CTL = Control; A&S = Aggression and Self-Injurious Behavior.

Negative; General Positive; Negative Non-Verbal; Negative Verbal; Positive Non-Verbal; and Positive Verbal.
Results

The social skills characteristics of persons with self-injurious behavior and aggression, as measured by the MESSIER, were compared using a multivariate analysis of variance. Additionally, the social skills characteristics of persons with self-injurious behavior and aggression were compared to a control group using a multivariate analysis of variance. Persons with severe and profound mental retardation who engaged in self-injurious behavior and aggression were significantly different in their social skills characteristics. When compared to a control group, persons who engaged in self-injurious behavior or aggression evinced significant differences in social skills characteristics. A discriminant functional analysis was then conducted to identify the subscales which maximized the differences between the three groups. The General Negative and the General Positive subscales best distinguished the three groups from each other. A discriminant functional analysis also examined the ability of the MESSIER to classify cases into groups. Only 50% of the cases was classified into the correct group for persons engaging in either self-injurious behavior or aggression. The social skills characteristics of a subset of persons engaging in both aggression and self-injurious behavior were compared to
a controls. The differences between these two group were significant. A discriminant functional analysis indicated scores on the General Negative Subscale best distinguished the groups. The discriminant functional analysis also examined the ability of the MESSIER to correctly classify the combined aggression and self-injurious behavior group into the appropriate grouping. For persons engaging in both aggression and self-injurious behavior, 80% of the cases was classified into the correct group.

To evaluate the differences in social skills between groups (self-injurious behavior, aggression and controls), a one-way multivariate analysis of variance (MANOVA) was performed on the six subscales of the MESSIER as the dependent variables. The six subscales were Positive Verbal (Posver), Positive Non-Verbal (Posnon), General Positive (Genpos), Negative Verbal (Negver), Negative Non-Verbal (Negnon), General Negative (Genneg). The independent variable was group: self-injurious behavior, aggression, and control. SPSS for Windows, Version 6.1 was used to perform the MANOVA. An alpha level of .05 was used for all statistical tests. The order of entry was self-injurious behavior, aggression, and controls. Total N = 225 was reduced to 177 because of missing data. There were no outliers. Evaluation of assumptions of linearity and
homogeneity revealed no threat to multivariate analysis. Both the $F$ approximation, $F (42, 87077) = 2.530, p < .001$, and the chi-squared approximation, $X^2 (42) = 105.20, p < .001$, indicated a rejection of the hypothesis of homogeneity. A direct MANOVA resulted in an overall $F$ that was significant across groups, Wilks Lambda $(12, 338) = 7.15, p < .001$. Univariate $F$ tests of the six MESSIER subscales were all significant at $p < .001$ except the Negative Non-verbal subscale which was significant at $p < .009$.

To determine the contribution to the overall significance from each of the groups, separate MANOVAs were conducted using the MESSIER subscales as the dependent variables. The group means are listed in Table 5 for each of the MESSIER subscales.

In a comparison between the two experimental groups (see Figure 1), the means of the self-injurious behavior group were significantly different from the means of the aggression group on all subscales except the Negative Non-Verbal subscale (see Appendix A for a comprehensive listing of $F$ values and probabilities). The means of the self-injurious behavior group were significantly lower on all subscales except for the Negative Non-Verbal scale which
tended to be higher (but not significantly higher) than the mean for the aggression group (see Table 5).

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Means of MESSIER Subscales for SIB, AGG, and CTL Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subscales</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>General Negative</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>General Positive</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>Negative Non-Verbal</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>Negative Verbal</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>Positive Non-Verbal</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>Positive Verbal</td>
</tr>
<tr>
<td></td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>SD</td>
</tr>
</tbody>
</table>

*Note.* Matching superscripts are significant at the .05 level. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control.

The items of the Negative Non-Verbal subscale were examined (see Figure 2). The self-injury group had higher means on all but four items indicating higher rates of
behavior. For the self-injurious behavior group, items 51, 67, and 82 were representative of behaviors with greater ratings than for the aggression group. The aggression group was rated higher on item 62, "hits, kicks, pushes others."

The self-injurious behavior group was compared with the control group (See Figure 3). The means of the self-injurious behavior group were significantly different from

Figure 1
MESSIER Group Means for SIB and AGG

Figure 2
Negative Non-Verbal Subscale for SIB and AGG Groups
the means of the control group on all subscales except the Negative Verbal subscale (see Table 5). On all of the positive subscales, the means of the self-injurious behavior group were significantly lower than the means of the control group. On the two negative subscale that were significantly different, the means of the self-injurious behavior group were significantly lower than the means of the control group.

Figure 3
MESSIER Group Means for SIB and CTL Groups

Figure 4
Negative Verbal Subscale for SIB and CTL Groups
group. The Negative Verbal subscale (see Figure 4) was nearly equivalent to the control group ($M = 3.4$ and $M = 3.21$, respectively). On seven of the ten items of the Negative Verbal subscale, the self-injury group was rated as engaging in lower rates of behavior. In summary, when compared to the control group, the self-injurious behavior group had significantly lower positive scores and significantly higher negative scores (except as noted above).

The aggression group was compared to the control group (see Figure 5). The means of the aggression group were significantly different on all subscales except one, the

![Graph showing MESSIER Group Means for AGG and CTL](image)

**Figure 5**  
**MESSIER Group Means for AGG and CTL**  
General Positive (see Table 5). For the positive subscales, the means were higher than the control group and were significantly higher, except for the General Positive
subscale. On the negative subscales, all of the means of the aggression group were significantly higher than the means of the control group. When compared to the control group, the aggression group had significantly higher scores on both the negative and the positive subscales (except as noted above).

A direct discriminant functional analysis was performed using the scores from the six MESSIER subscales as the predictor of membership in the three groups. Predictor variables were Positive Verbal, Positive Non-Verbal, General Positive, Negative Verbal, Negative Non-verbal and General Negative. Groups were self-injurious behavior, aggression, and controls.

The approximate F test listed in Table 6 is based on Wilks Lambda and indicated significant discrimination among the three groups. The table is as follows:

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Wilks Lambda</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genneg</td>
<td>.79640</td>
<td>22.2415</td>
<td>.0000</td>
</tr>
<tr>
<td>Genpos</td>
<td>.87067</td>
<td>12.9232</td>
<td>.0000</td>
</tr>
<tr>
<td>Negnon</td>
<td>.94730</td>
<td>4.8400</td>
<td>.0090</td>
</tr>
<tr>
<td>Negver</td>
<td>.88044</td>
<td>11.8145</td>
<td>.0000</td>
</tr>
<tr>
<td>Posnon</td>
<td>.83150</td>
<td>17.6302</td>
<td>.0000</td>
</tr>
<tr>
<td>Posver</td>
<td>.84855</td>
<td>15.5284</td>
<td>.0000</td>
</tr>
</tbody>
</table>

Note. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control; Genneg = General Negative; Genpos = General Positive; Negnon = Negative Non-verbal; Negver = Negative Verbal; Posnon = Positive Non-Verbal; Posver = Positive Verbal.
the three groups (self-injurious behavior, aggression and controls) on the basis of the six MESSIER subscales combined.

Two discriminant functions were calculated, with a combined $X^2(12) = 77.62$, $p < .001$. After removal of the first function, there was still highly significant discriminating power, $X^2(5) = 21.05$, $p < .001$, indicating the presence of a second function. The two discriminant functions accounted

![Figure 6](image_url)

**Figure 6**
**Group Centroids in Primary Analysis**
for 75% and 25%, respectively, of the between-group variability.

The means of the discriminant scores for each group were plotted pairwise across the two functions (See Figure 6). For Function 1, aggression was clearly distinguished from the self-injurious and control groups which were very similar to each other. For Function 2, the three groups were nearly equal distance from each other with the control group
only slightly different from the aggression and control groups. On the basis of both discriminant functions, differences among the three groups were clear.

The loading matrix of correlations between predictor variables and discriminant functions (see Table 7) indicated that the first discriminant function was correlated most highly with scores from the General Negative, Positive Non-Verbal, and Negative Verbal scores.

Table 7
Loading Matrices from the Discriminant Functional Analysis of the SIB, AGG and CTL Groups

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Function 1</th>
<th>Function 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GenNeg</td>
<td>.73323*</td>
<td>-.59061</td>
</tr>
<tr>
<td>PosNon</td>
<td>.63152*</td>
<td>.59860</td>
</tr>
<tr>
<td>NegVer</td>
<td>.58270*</td>
<td>-.15431</td>
</tr>
<tr>
<td>GenPos</td>
<td>.48835</td>
<td>.65103*</td>
</tr>
<tr>
<td>NegNon</td>
<td>.08949</td>
<td>-.63408*</td>
</tr>
<tr>
<td>PosVer</td>
<td>.58172</td>
<td>.59511*</td>
</tr>
</tbody>
</table>

Note. * indicates largest absolute correlation between each variable and any discriminant function; SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control; GenNeg = General Negative; GenPos = General Positive; NegNon = Negative Non-Verbal; NegVer = Negative Verbal; PosNon = Positive Non-Verbal; PosVer = Positive Verbal.

The second discriminant function was correlated most highly with the General Positive, Negative Non-Verbal, and Positive Verbal scores. Relating these findings to the plot of the centroids in Figure 6 suggested that maximum spread
among the three groups was primarily based on General Negative scores with the greatest difference occurring between the aggression and self-injurious groups. The control group was distinguished from the other two groups primarily on General Positive scores. This finding is consistent with the MANOVA described earlier. In reviewing the $F$ values in Appendix A, the General Negative subscale had the highest $F$ values of all the other subscales, $Genneg = 67.24$, with the next highest subscale, Positive Non-Verbal, having only a total of 57.05. All the other subscales were lower.

Classification into groups was accomplished by combining each subject’s scores after adjusting the score by the weights and constant for each scale. Table 8 lists the weights for each scale. Fifty point 2 percent of the cases was classified correctly (see Table 9). From the self-

<table>
<thead>
<tr>
<th>Subscales</th>
<th>Grp</th>
<th>Genneg</th>
<th>Genpos</th>
<th>Negnon</th>
<th>Negver</th>
<th>Posnon</th>
<th>Posver</th>
<th>Constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIB</td>
<td>-.0204924</td>
<td>-.0171577</td>
<td>.3393479</td>
<td>-.1466958</td>
<td>.3129155</td>
<td>-.0561261</td>
<td>-5.5427063</td>
<td></td>
</tr>
<tr>
<td>AGG</td>
<td>.1276899</td>
<td>-.0806486</td>
<td>.2750514</td>
<td>-.1536483</td>
<td>.4435042</td>
<td>.0331185</td>
<td>-8.2629002</td>
<td></td>
</tr>
<tr>
<td>CTL</td>
<td>-.0962648</td>
<td>-.0185516</td>
<td>.3148476</td>
<td>-.1451525</td>
<td>.3704425</td>
<td>-.0316391</td>
<td>-6.0910342</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Grp = Group; Genneg = General Negative; Genpos = General Positive; Negnon = Negative Non-Verbal; Negver = Negative Verbal; Posnon = Positive Non-Verbal; Posver = Positive Verbal. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control.

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injurious behavior group, 41 of the 75 cases (54%) were correctly classified, whereas in the aggression and control groups, 37 (49.3%) and 35 (46.7%), respectively, were correctly classified.

To evaluate the differences in social skills between controls and the combined aggression and self-injurious behavior group a one-way multivariate analysis of variance (MANOVA) was performed on the six subscales of the MESSIER as the dependent variables. The six subscales were Positive Verbal, Positive Non-Verbal, General Positive, Negative Verbal, Negative Non-Verbal, General Negative. The independent variable was group: control and aggression and self-injurious behavior. SPSS for Windows, Version 6.1 was used to perform the MANOVA. Order of entry was controls,

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Predicted Group Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIB</td>
<td>AGG</td>
</tr>
<tr>
<td>41</td>
<td>16</td>
</tr>
<tr>
<td>54.7%</td>
<td>21.3%</td>
</tr>
<tr>
<td>AGG</td>
<td>13</td>
</tr>
<tr>
<td>17.3%</td>
<td>49.3%</td>
</tr>
<tr>
<td>26</td>
<td>14</td>
</tr>
<tr>
<td>34.7%</td>
<td>18.7%</td>
</tr>
</tbody>
</table>

Note. SIB = Self-Injurious Behavior; AGG = Aggression; CTL = Control.
then the combined aggression and self-injurious behavior group. Total $N = 102$ was reduced to 71 because of missing data. Both the $F$ approximation, $F (21, 10164) = 1.93, p < .006$, and the chi-squared approximation, $X^2 (21) = 40.74, p < .006$, indicted rejection of the hypothesis of homogeneity.

Table 10 lists the means of the control group and the combined aggression and self-injurious behavior group. A direct MANOVA resulted in an overall $F$ that was significant.

**Table 10**

<table>
<thead>
<tr>
<th>Subscales</th>
<th>CTL</th>
<th>A&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>6.58</td>
<td>15.50*</td>
</tr>
<tr>
<td>$SD$</td>
<td>(5.02)</td>
<td>(6.47)</td>
</tr>
<tr>
<td>General Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>36.82</td>
<td>35.92</td>
</tr>
<tr>
<td>$SD$</td>
<td>(18.55)</td>
<td>(14.24)</td>
</tr>
<tr>
<td>Negative Non-Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>8.29</td>
<td>15.77*</td>
</tr>
<tr>
<td>$SD$</td>
<td>(3.24)</td>
<td>(7.21)</td>
</tr>
<tr>
<td>Negative Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>3.47</td>
<td>7.77*</td>
</tr>
<tr>
<td>$SD$</td>
<td>(3.24)</td>
<td>(5.52)</td>
</tr>
<tr>
<td>Positive Non-Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>25.31</td>
<td>26.50</td>
</tr>
<tr>
<td>$SD$</td>
<td>(9.34)</td>
<td>(8.22)</td>
</tr>
<tr>
<td>Positive Verbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>9.93</td>
<td>11.85</td>
</tr>
<tr>
<td>$SD$</td>
<td>(12.72)</td>
<td>(11.42)</td>
</tr>
</tbody>
</table>

*Note.* * = significant at the .05 level; CTL = Control; A&S = Aggression and Self-Injurious Behavior.
across groups, Wilks Lambda (6, 64) = 8.12, p < .001. Univariate F tests of the six MESSIER subscales indicated that all negative subscales were significant at p < .001 but none of the positive subscales were significant (see Appendix A). The means of the negative subscales (see Figure 7) were significantly higher for the combined aggression and self-injurious group compared to the means of the control group. While not significant, the means of the combined aggression and self-injurious behavior group were also higher than the means of the control group on two of the three subscales. On only one of the subscales was the mean higher for the control group.

![Figure 7](image)

Figure 7
MESSIER Group Means for CTL and A&S

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For purposes of comparison, a graph (see Figure 8) of all four groups demonstrates the relative value of the combined aggression and self-injurious behavior group with the other three groups. When the means of both the self-injury group and aggression groups are higher than the controls, the means of the combined aggression and self-injurious group are higher than either the self-injury group or the aggression group as is the case with all three negative subscales. In contrast, when the means of the self-injury group are lower than the control group, the means of the combined aggression and self-injurious behavior group are equivalent to the control group as is the case with all three positive subscales. A direct discriminant functional
analysis was performed using the scores from the six MESSIER subscales as the predictors of membership in the two groups. Predictor variables were Positive Verbal, Positive Non-Verbal; General Positive; Negative Verbal, Negative Non-verbal, General Negative. Groups were control and the combined aggression and self-injurious behavior.

The approximate $F$ test based on Wilks Lambda indicated significant discrimination among the two groups on the basis of the six MESSIER subscales combined (see Table 11).

Table 11
Wilks Lambda and $F$ Tests of Significance for CTL and A&S Groups

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Wilks Lambda</th>
<th>$F$</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genneg</td>
<td>.62166</td>
<td>41.9932</td>
<td>.0000*</td>
</tr>
<tr>
<td>Genpos</td>
<td>.99934</td>
<td>.0455</td>
<td>.8318</td>
</tr>
<tr>
<td>Negnon</td>
<td>.75398</td>
<td>22.5148</td>
<td>.0000*</td>
</tr>
<tr>
<td>Negver</td>
<td>.80021</td>
<td>17.2276</td>
<td>.0001*</td>
</tr>
<tr>
<td>Posnon</td>
<td>.99580</td>
<td>.2908</td>
<td>.5914</td>
</tr>
<tr>
<td>Posver</td>
<td>.99422</td>
<td>.4008</td>
<td>.5288</td>
</tr>
</tbody>
</table>

Note: * = significant at .05; CTL = Control; A&S = combined Aggression and Self-Injurious Behavior; Genneg = General Negative; Genpos = General Positive; Negnon = Negative Non-verbal; Negver = Negative Verbal; Posnon = Positive Non-Verbal; Posver = Positive Verbal.

Because there were only two groups in the analysis, only one discriminant function was calculated. There was significant discriminating power in that single function, $X^2(6) = 37.35$, $p < .001$, accounting for 76% of the between-group variability.
The loading matrix of correlations between predictor variables and the discriminant function (see Table 12) indicated that the discriminant function was correlated most highly with scores from the General Negative subscale.

Classification into groups was accomplished by combining each subject's scores after adjusting the score by

Table 12
**Loading Matrices from the Discriminant Functional Analysis of the CTL and A&S Groups.**

<table>
<thead>
<tr>
<th>Subscale Function</th>
<th>Subscale</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Negative</td>
<td>.89430</td>
</tr>
<tr>
<td></td>
<td>Negative Non-Verbal</td>
<td>.65483</td>
</tr>
<tr>
<td></td>
<td>Negative Verbal</td>
<td>.57281</td>
</tr>
<tr>
<td></td>
<td>Positive Verbal</td>
<td>.08737</td>
</tr>
<tr>
<td></td>
<td>Positive Non-Verbal</td>
<td>.07442</td>
</tr>
<tr>
<td></td>
<td>General Positive</td>
<td>-.02943</td>
</tr>
</tbody>
</table>

**Note.** Variables ordered by size of correlation within function; CTL = Control; A&S = Combined Aggression and Self-Injurious Behavior.

the weights and constant for each scale. Table 13 lists the weights for each scale.

Table 13
**Classifications Weights for CTL and A&S Groups**

<table>
<thead>
<tr>
<th>Grp</th>
<th>Genneg</th>
<th>Genpos</th>
<th>Negnon</th>
<th>Negver</th>
<th>Posnon</th>
<th>Posver</th>
<th>Constant</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTL</td>
<td>.0247342</td>
<td>.0468566</td>
<td>.2304948</td>
<td>-.0758115</td>
<td>.4370709</td>
<td>-.1630558</td>
<td>-7.1825735</td>
</tr>
<tr>
<td>A&amp;S</td>
<td>.2396875</td>
<td>-.0137069</td>
<td>.3249121</td>
<td>-.0016976</td>
<td>.4673988</td>
<td>-.0831966</td>
<td>-10.5599961</td>
</tr>
</tbody>
</table>

**Note.** CTL = Control; A&S = Combined Aggression and Self-Injurious Behavior; Grp = Group; Genneg = General Negative; Genpos = General Positive; Negnon = Negative Non-verbal; Negver = Negative Verbal; Posnon = Positive Non-Verbal; Posver = Positive Verbal.
Eight point three percent of the cases overall were classified correctly (see Table 14). From the control group, 36 of the 45 cases (80.0%) were correctly classified and from the combined aggression and self-injurious behavior group 37 out of 42 cases were correctly classified. The classification rate for the experimental group was 80.8%.

Table 14
Classification Results of A&S and CTL Groups

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Predicted Group Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CTL</td>
</tr>
<tr>
<td>CTL</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>80.0%</td>
</tr>
<tr>
<td>A&amp;S</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>19.2%</td>
</tr>
</tbody>
</table>

Note. CTL = Control; A&S = Combined Aggression and Self-Injurious Behavior.

To summarize, the present study indicated significant differences in social skills profiles between the self-injurious behavior group and the aggression group. Compared to the aggression group, the self-injurious behavior group had significantly lower scores on all scales except one (Negative Non-Verbal). Significant differences were also found between the experimental groups and the control group. The self-injurious behavior group had higher scores on the negative subscales and lower scores on the positive
subscale compared to the control group. The group means were significantly different on all subscales except for the Negative Verbal subscale. Compared to the control group, the aggression group had significantly higher scores on all subscales except one (General Positive). That the aggression group had higher scores than the control group on the positive subscales was an unexpected finding. In a secondary analysis, mixed results were obtained between a group of individuals who engaged in both aggression and self-injurious behavior and a control group. The combined aggression and self-injurious behavior group had significantly higher means on the negative subscales but the differences between means on the positive subscales were not significant.

The discriminant functional analysis of the groups in the primary analysis identified two functions that separated the three groups. The aggression group was distinguished from the self-injury and control groups on scores from the General Negative subscale with the greatest differences occurring between the aggression and the self-injurious behavior group. The control group was distinguished from the experimental groups on the bases of scores from the General Positive subscale with the greatest differences occurring between the control group and the self-injurious behavior.
group. Overall, 50.2% of the cases were correctly classified. The discriminant functional analysis in the secondary analysis indicated that the groups were best distinguished by scores on the General Negative subscales. Overall, 80.3% of the cases were correctly classified in the secondary analysis.
Discussion

Persons who engage in self-injurious behavior and aggression were found to have significantly different social skills profiles as measured by the MESSIER. In addition, when compared to controls, persons who engage in self-injurious behavior or aggression were significantly different in five of six MESSIER subscales. While it might be expected that the presence of a maladaptive behavior would result in a different social skills profile when compared to a control group, this study suggested that the presence of a specific type of maladaptive behavior was associated with its own specific social skills profile.

This finding is significant finding for this population and has not been reported previously in the literature. Prior to this study, social skills were taught on an as-needed basis for each individual and individual treatments were conducted to train each new skill (Andrasik & Matson, 1984; Bedell, 1994; Bernstein, 1981; Kelly, 1981; Marchetti, & Campbell, 1990; Matson, Bamburg, Smalls, & Smiroldeo, 1997). This study, however, suggests that, as a group, persons with self-injurious behavior share many of the same deficits among them and may benefit from comprehensive treatment packages.
This study has demonstrated that self-injurious behavior and aggression effect more than one response. That is, the presence of self-injurious behavior is associated with the cluster of social skills that a person is likely to exhibit. Similarly, this study found that the presence of aggression is associated with a cluster of negative and positive behaviors. This result is consistent with other studies examining clusters of behaviors occurring together. For example, Sevin, Matson, Coe, Love, Matese, and Benavidez, (1995) reported that Pervasive Developmental Disorders may contain diagnostic subtypes based on clusters of behaviors distinct for each group. This suggests that holistic interventions are needed for this population. The development of comprehensive treatment programs designed specifically for this group would allow for more effective and efficient skills training (Gardner & Cole, 1984). Treatment packages could address the cluster of positive behaviors in persons who engage in self-injurious behavior and by increasing the rates of positive behaviors, less time would be available for engaging in the negative behaviors. Friman, Jones, Smith, Daly and Larzelere (1997) reported successful treatment outcomes in adolescent boys by increasing the ratio of positive to negative interactional behaviors. This approach may be useful in improving the
social skills of individuals with severe and profound mental retardation who engage in self-injurious behavior or aggression.

Social skills are important because they impact on every aspect of the individual's life, such as the daily routine (McFall, 1982), the likelihood of successful community placements (Pagel & Whiting, 1978; Shalock, 1986), the stability of relationships with others (Newton, Olson, Horner, Ard, 1996) and, the rates, in general, of interactions with others (Carr, Taylor, & Robinson, 1991; Hauck, Fein, Waterhouse, & Feinstein, 1995). Having established a link between specific social skills profiles and behavior, improving the social skills of these individuals will have a global effect on improved interactions with others throughout the day. Carr, Taylor and Robinson, (1991) reported that when staff worked with an individual with aberrant behavior, the breadth of instruction was more limited and typically involved those tasks associated with lower rates of behavior problems. Enhancing the positive social skills of an individual would allow for increased durations of interaction with staff and peers in more positive and meaningful ways.

Standard treatment packages that reduce rates of self-injurious behavior and aggression do not deal with the
associated social skills. That is, the rate of aggression may be reduced for an individual through implementation of reductive procedures (see Gardner & Cole, 1984) but the social skills deficits associated with aggression would remain unchanged. The use of the MESSIER to identify the individual's specific social skill profile would assist in identifying target behaviors for intervention as well as monitor ongoing progress.

When compared to the self-injury group, the aggression group had higher ratings on both positive and negative subscales, except for the Negative Non-Verbal scale. As can be seen in the graph in Figure 1, the means of the self-injurious behavior group appear to have the same trend and pattern as the aggression group, i.e., increasing when aggression means increase and decrease when aggression means decrease, except for the Negative Non-Verbal subscale. It is unclear why the Negative Non-Verbal subscale is different. Speculation into possible explanations could include: a function of the scale itself, a function of the raters, a function of the characteristics of the subjects, or a function of an unknown, mediating variable. Each is discussed below.

The psychometrics of the MESSIER were evaluated by Leblanc (1996). Leblanc (1996) reported that the convergent
validity correlations ranged from $r=.09$ to $r=.98$ (mean $r=.6$), with nine out of 10 correlations at $r=.5$ or higher. This finding suggests modest convergent validity. Also, negative non-verbal scale scores were likely to accurately reflect the group’s social skills.

Rater bias may contribute to an elevated score. Fradenburg, Harrison, and Baer (1995) reported that accuracy of raters was influenced by the presence of peers. That is, raters were more accurate if peers were in the environment and could verify the accuracy of the ratings. Arguments against rater bias having an effect on a single scale suggest that too many different raters were used in the data collection for there to be a consensus across all raters. Rater bias is not likely to be the reason for the elevated score.

A possible explanation may be that more items on this scale relate to self-injury than to aggression. Examining the items on the Negative Non-Verbal subscale (see Figure 2), the ratings for the self-injurious behavior are higher on ten of the fourteen items. The greatest disparity occurs on items 51, "Avoids eye contact," 67, "Exhibits peculiar or odd mannerisms in public," and 82, "Seems unaware of what is going on around him/her," and represent behaviors often seen in this group of individuals. This supports the idea that
the MESSIER accurately measures the social skill behaviors of the group. This study suggests that persons with self-injurious behavior are more likely to have low rates of eye-contact, be withdrawn and isolate themselves from others as well as be more likely to engage in high rates of socially unacceptable behaviors. This raises the specter of comorbidity with depression (see Libet & Lewinsohn, 1973 for a discussion of social skills in a depressed, non-retarded population). Future studies can investigate this idea further. In general, treatment packages designed to increase the rates of eye contact and rates of interactions with others is warranted.

It is possible that an elevated score exists on the Negative Non-Verbal scale because of unique characteristics of the group. Replication studies while have to be conducted to demonstrate the robustness of this finding. The implication of this finding would then suggest that behavioral assessment and treatment focusing on those characteristics may make the greatest impact for members of that group. This could lead to more effective and rapid treatment gains for these individuals and a concomitant improvement in their quality of life (Felce, & Perry, 1995). Additionally, assessment and treatment could focus on the behaviors assessed on the positive subscales. An emphasis on
teaching new, positive social skills to increase the number of positive interactions with staff and fellow residents would be beneficial (Carr, Taylor, & Robinson, 1991). For the aggression group, targeting the behaviors assessed on the negative subscales and developing treatment plans to reduce those behaviors would be of value (see Lalli, Casey, & Kelly, 1997).

It is also possible that a third, as yet, unknown mediating variable may cause the elevated scale. Possible variables include establishing operations (Adelinis, Piazza, Fisher, & Haney, 1997), antecedent conditions (Celiberti, Bobo, Kelly, Harris & Handleman, 1997), the health of the individuals (Rimmer, Braddock, & Marks, 1995), medication effects (Harrigan, & Barnhill, 1997), and psychiatric diagnosis (Libet & Lewinsohn, 1973). Future studies to evaluate each of these possible mediating variables would add support for the current findings.

In summary, it is suggested that clear and distinct profiles exist between the self-injurious behavior and the aggression group. The aggression group, as a whole, appear to have higher levels of activity, both positive and negative compared to the self-injurious behavior group. A unique characteristic of the self-injurious behavior group is an elevated score on the Negative Non-Verbal subscale.
The characteristics of the self-injurious behavior group appear to be accurately reflected in the Negative Non-Verbal subscale.

The profile of social skills characteristics for the self-injury group when compared to the control group tended to support the common sense notion of lower positive scores and higher negative scores, except for the Negative Verbal subscale. The Negative Verbal subscale was not significantly different from controls. The groups had nearly equal means (SIB: $M = 3.40$; CTL: $M = 3.21$). Examining the items on the Negative Verbal subscale (see Figure 4), the self-injury group has lower rates of behavior on seven of the ten items. Item 75, "Makes embarrassing comments," and item 80, "Makes negative statements about self," had scores approaching zero, suggesting that many of these individuals may be non-verbal. Future studies stratifying the self-injury group into verbal and non-verbal individuals to compare their associated social skills profiles would be useful in understanding more about this population.

The implications of these findings for assessment and treatment suggest that increased positive social interactions with staff and fellow residents are needed. These increased positive interactions would provide for an improved quality of life (Felce & Perry, 1995) and the
reinforcement of prosocial behaviors would compete with the incompatible negative behaviors (Marchetti & Campbell, 1990). Additionally, because the Negative Non-Verbal subscale was elevated, assessment of the behaviors represented by the scale and subsequent development of a treatment plan to reduce those behaviors should be the major focus. Once the behaviors of the elevated scale are reduced to comparable levels, then behaviors from other subscales could be targeted.

Persons who engage in aggression had higher ratings across all subscales compared to controls. While higher negative subscales would be expected, it was surprising that the positive scores were higher for the aggression group compared to the control group. Several possible explanations are offered. The higher scores may reflect higher rates of activity as seen in the Attention Deficit-Hyperactive Disorder and the Conduct Disorder populations (Gardner, & Cole, 1984; Sparrow, & Cicchetti, 1987). Higher rates of activity in general are reported in these populations and may explain the findings in this study. Aggression requires social contact and higher rates of positive social skills may represent increased rates of reinforcement from the environment conducive to increased rates of aggression. That is, it is unclear from this study
which came first, the high rates of aggression or the high rates of social skills. If the high rates of positive social skills were preeminent, aggression may have been shaped-up and reinforced as a means for obtaining desired objects and/or for escaping unwanted tasks and demands (see Iwata et al. 1982 for descriptions of functions of behavior maintained by the environment). Future studies can investigate the role of maintaining variables. Cipani and Spooner (1997) suggested that several events maintained unwanted behaviors such as inability to communicate needs and wants, behavioral momentum, differential reinforcement, absence of an alternative escape behavior and absence of errorless learning training strategies. Allen, McDonald, Dunn and Doyle (1997) suggested that staff training can reduce problematic behaviors depending on staff reactions to the problematic behaviors.

In summary, high rates of behavior are seen in other maladaptive populations in addition to aggressive populations and the environment may be maintaining these high rates of behavior. Treatments that incorporate environmental events may be effective in improving the social skills of persons who engage in aggressive behavior.

This study, as a correlational study, can not make claims about causation. It merely suggests that high rates
of negative and positive social skills were associated with the presence of aggression in persons who have severe and profound mental retardation. Future studies will need to investigate possible intervening variables. A possible future study would be to stratify the aggression group into subgroups based on the results of a functional analysis, i.e., tangible, escape, or attention (Iwata et al., 1982) and on the results of assessment for communication deficits (Carr & Durrand, 1985).

Considerable work has been done to identify functions that maintain the behavior. One such area is the communicative function of aggression (Carr & Durrand, 1985). By replacing the maladaptive behavior (aggression or self-injurious behavior) with sign language or other more appropriate communicative gestures already in the individual’s repertoire, the rates of aggression or self-injurious behavior are often dramatically reduced (for examples see Bowman, Fisher, Thompson, & Piazza, 1997; Horner, Day, Sprague, O'Brien, & Heathfield, 1991; Wacker, Steege, Northup, Sasso, Berg, Reimers, Cooper, Cigrand, & Donn, 1990). In summary, the functions of the behavior may impact on the social skills profiles.

In examining the graph of the MESSIER means (see Figure 7), it appears that the presence of both aggression and
self-injury has an additive effect on the negative subscales and an attenuating effect on the positive subscales. When the means of the self-injury and aggressive behavior groups are higher than the control group, the effect is additive. The opposite occurs, however, when looking at the positive subscales. When self-injury was lower and aggression was higher than the control group, the means of the combined aggression and self-injury group are somewhat lower. It appears as though the presence of self-injury lowered the means of the combined aggression and self-injury group. This attenuating effect may account for the non-significance between means on all the positive subscales.

The MESSIER was evaluated in terms of its ability to classify cases into the correct group. For the primary analysis with the three groups (self-injurious behavior, aggression and controls), the discriminant functional analysis identified two functions that separated the groups. The aggression group was clearly distinguished from the other two groups with the greatest distance occurring between the aggression and the self-injurious behavior groups. Scores on the General Negative subscale differentiate the self-injurious behavior and aggression groups. The second function suggested that the control group was slightly distinguished from the two experimental groups.
with the greatest distance occurring between the controls and the self-injurious behavior group based on scores from the General Positive subscale. Paclawskyj, Rush, Matson, and Cherry (1997) completed a factor analysis of the MESSIER and reported that six factors emerged. When the six factors were grouped into negative and positive behaviors, it suggested that the negative scales accounted for four out of the six factors and the positive subscales, the remaining factors. This is consistent with the findings in this study.

The implication of this finding was to add additional support for the conclusion that distinct social skills profiles exists for each group. In terms of assessment and treatment, these researchers suggested that individualized treatment plans would continue to be required now that it was clear that different groups have different needs. The aggression group, for example, may need interventions focused on reducing the high rates of negative behaviors and that the self-injurious behavior group may need interventions focused on increasing the low rates of positive behaviors.

While the MESSIER was statistically able to separate groups, it was not clinically useful in classify the cases into the groups. The variability in the scores may account for the mis-classification (Tabachnick & Fidell, 1983). That
is, persons with aggressive behavior not correctly classified, were more likely to be placed in the control group (see Table 9). On the other hand, controls misclassified were more likely to be classified in the self-injurious behavior group. This implies that these groups of persons with severe and profound mental retardation were very variable in their behaviors (Tabachnick & Fidell, 1983). Yet, despite the relatively high degree of variability across groups, distinct social skill profiles emerged.

Summary

The social skills characteristics of persons with severe and profound mental retardation who engage in self-injurious behavior and aggression have separate and distinct profiles. Persons exhibiting self-injurious behavior tended to have lower scores on both the negative and positive subscales when compared to the aggression group, with the exception noted above. When compared to a control group, the self-injury group had lower positive scores and higher negative scores (with the exception noted above) and the aggression group had higher negative scores as well as higher positive scores. It was possible that the higher positive scores for the aggression group may be due to maintaining variables in the environment.
Statistically, the MESSIER was able to predict (better than chance) group membership. Scores on the General Negative and General Positive subscales maximize the group differences. Clinically, the ability of the MESSIER to classify individuals into groups was not supported by the data from this study. Only 50% of the cases was correctly classified.

A separate group of individuals who exhibited both aggression and self-injurious behavior were compared to a control group. They had significantly higher scores on the negative subscales but were not significantly different from the control group on the positive subscales. It was likely that the attenuating effect of self-injurious behavior lower the positive scores to the point where they were equivalent to the control group. The ability of the MESSIER to classify individuals into groups was also examined with this subgroup. For the combined aggression and self-injurious behavior group, 80% of the cases was correctly classified.

It was concluded, therefore, that the presence of maladaptive behaviors not only affects the social skills of these individuals but that there were specific patterns of effects depending on the type of maladaptive behavior. Armed with that information, it seems feasible that treatment plans could be written to target these specific behavioral
excesses and deficits. This would allow for further individualization of the treatment plans, always an area of interest in attempting to improve the quality of life for individuals in this under-served population.
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### Appendix A

**Table 15**

**F values and Probabilities from Group MANOVA**

<table>
<thead>
<tr>
<th>Subscale</th>
<th>1 &amp; 3 F</th>
<th>1 &amp; 3 Prob.</th>
<th>2 &amp; 3 F</th>
<th>2 &amp; 3 Prob.</th>
<th>1 &amp; 2 F</th>
<th>1 &amp; 2 Prob.</th>
<th>Sum of F's</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genneg</td>
<td>5.46</td>
<td>.021</td>
<td>45.39</td>
<td>.000</td>
<td>16.39</td>
<td>.000</td>
<td>67.24</td>
</tr>
<tr>
<td>Genpos</td>
<td>11.36</td>
<td>.001</td>
<td>2.30</td>
<td>.132</td>
<td>29.52</td>
<td>.000</td>
<td>43.18</td>
</tr>
<tr>
<td>Negnon</td>
<td>8.83</td>
<td>.004</td>
<td>6.03</td>
<td>.016</td>
<td>.25</td>
<td>.619</td>
<td>15.11</td>
</tr>
<tr>
<td>Negver</td>
<td>.09</td>
<td>.755</td>
<td>16.31</td>
<td>.000</td>
<td>13.22</td>
<td>.000</td>
<td>29.62</td>
</tr>
<tr>
<td>Posnon</td>
<td>10.07</td>
<td>.002</td>
<td>7.49</td>
<td>.007</td>
<td>39.49</td>
<td>.000</td>
<td>57.05</td>
</tr>
<tr>
<td>Posver</td>
<td>12.49</td>
<td>.001</td>
<td>4.22</td>
<td>.042</td>
<td>38.73</td>
<td>.000</td>
<td>55.44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subscale</th>
<th>3 &amp; 4 F</th>
<th>3 &amp; 4 Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genneg</td>
<td>41.99</td>
<td>.000</td>
</tr>
<tr>
<td>Genpos</td>
<td>.04</td>
<td>.832</td>
</tr>
<tr>
<td>Negnon</td>
<td>22.51</td>
<td>.000</td>
</tr>
<tr>
<td>Negver</td>
<td>17.23</td>
<td>.000</td>
</tr>
<tr>
<td>Posnon</td>
<td>.29</td>
<td>.591</td>
</tr>
<tr>
<td>Posver</td>
<td>.40</td>
<td>.529</td>
</tr>
</tbody>
</table>

**Note.** Alpha = .05; SIB = Self-Injurious Behavior, AGG = Aggression, CTL = Control, A&S = Aggression and Self-Injurious Behavior; 1 = Self-Injurious Behavior; 2 = Aggression; 3 = Control; 4 = Aggression and Self-Injurious Behavior; Prob. = Probability at .05 level; Posver = Positive Verbal, Posnon = Positive Non-Verbal, Genpos = General Positive, Negver = Negative Verbal, Negnon = Negative Non-verbal, Genneg = General Negative.
Vita

Dee Duncan received his bachelor of arts degree from the University of Utah where he majored in psychology. He later attended North Dakota State University, Fargo, North Dakota, where he earned a master of science degree in psychology focusing on neuropsychology and developmental disabilities. Following graduation from N.D.S.U., he accepted a position with the Kennedy Institute of the Johns Hopkins Medical Institutions in Baltimore, Maryland, where he worked on the inpatient unit treating persons with severe and profound mental retardation who engaged in self-injurious behavior and aggression. After two years at the Kennedy Institute, he entered the psychology program at Louisiana State University to learn more about developmental disabilities and to earn a doctor of philosophy degree. His research interests include developmental disabilities, mental illness and pediatric feeding disorders.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Dee Duncan

Major Field: Psychology

Title of Dissertation: Relationship of Self-Injurious Behavior and Aggression to Social Skills in Persons with Severe and Profound Mental Retardation

EXAMINING COMMITTEE:

Date of Examination: October 22, 1997