SOCIAL SKILLS OF CHILDREN WITH CEREBRAL PALSY

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Fifty-two children with cerebral palsy in a hospital for crippled children were assessed by Takenshiki Social Maturity Scale (TSMS), Motor Age Test, and WISC-R. Factor analysis of 11 behavior domain scores on TSMS identified three independent factors: Factor 1, representing interpersonal skills and accounting for 71% of total variance; Factors 2 and 3 indicating self-care skills (9%) and locomotor skills (6%), respectively. Significant correlations were found between Factor 1 score (interpersonal skills) and chronological age, between Factor 2 score (self-care skills) and upper-extremity motor age, and between Factor 3 score (locomotor skills) and lower-extremity motor age. Two-year follow-up of 20 children staying at the hospital revealed no significant changes in scores of the first two factors on TSMS: 10 younger children with ages of 12 years or below improved their scores, while 10 elder children over 12 years failed to improve. These results suggest that special intervention programs are needed to facilitate the interpersonal aspect of social skills of children with cerebral palsy.

The acquisition of social skills has recently become one of the major concerns in the development both of handicapped and of non-handicapped children (Matson and Schroeder, 1983; Rubin, 1983). Delays in acquisition may lead to behavioral problems such as psychosocial immaturity, anxiety-withdrawal and other emotional disorders. According to Rutter and his colleagues (Rutter et al., 1970; Seidel et al., 1975), such maladaptive behavior is characteristics of many handicapped children, especially of those who with disorders of the central nervous system.

Despite the long history of research on cerebral palsy children, their social skills have not yet been fully explored. This is partly because cerebral palsy is the name given to the disorder of movement and posture due to non-progressive pathology of the immature brain (Brett, 1983), and thereby attention tends to be mainly directed at maximizing residual motor function. However, the evidence

Received for publication August 2, 1985.
that many adults with cerebral palsy remain socially inactive (O’Reilly, 1975) indicates the need to understand and to promote their social skills.

Although there is no agreement on the external criteria for social skills (Anderson and Messick, 1974; Zigler and Trickett, 1978; Bellack, 1979), a wide range of assessment procedures has been used: naturalistic observations, role-play tests, sociometric techniques, and behavioral inventories. Each method has certain strengths and limitations with respect to assessing social skills. Behavioral inventories such as the Vineland Social Maturity Scale (Doll, 1953) and the AAMD Adaptive Behavior Scale (Nihira et al., 1974) provide a global assessment of social behavior including major activities of daily living.

The present study aimed to assess social skills of children with cerebral palsy, using a traditional inventory for social maturity. The term ‘social skills,’ as defined in this study, refers to the ability to perform adequately a variety of social tasks. Firstly we attempted to analyze factor structure of items and to identify factor(s) relevant to skills producing and sustaining cooperative relationships. Next, we examined possible relations of the derived factors to motor and cognitive skills. Finally, changes of scores for each factor after 2 years were investigated to provide information on the outcome of hospital care of children with cerebral palsy.

METHODS

Subjects. The subjects were 52 children with cerebral palsy, 28 boys and 24 girls, in the Miyagi Prefectural Hospital for Crippled Children. Their ages ranged from 7 to 16 years, with a mean of 11 years. Of these 52 children, 34 were spastic, 9 athetoid, and 9 mixed type. The spastic children received topographical diagnoses of diplegia or quadriplegia with the exception of one of hemiplegia. The distributions of age and sex in the three physiological types were comparable. The length of hospital stay ranged from 1 to 105 months with a mean of 42 months.

Twenty of the 52 children, 10 boys and 10 girls, were re-examined 2 years later. The remaining 32 children were discharged owing to their families moving to other prefectures. Of those who were followed up, 14 were spastic, 3 athetoid, and 3 mixed type. Their mean age at the time of the 2-year follow-up was 12 years, ranging from 9 to 16 years. The length of hospital stay ranged from 29 to 109 months with a mean of 67 months.

Test battery. The Takenshiki Social Maturity Scale (TSMS), designed to assess social maturity of children with an age range of 3 to 6 years and over (Suzuki, 1961), was used to obtain ratings of an individual’s social skills. This scale, similar to the Vineland Social Maturity Scale developed by Doll (1953), consists of a set of 180 items covering 11 behavior domains: Occupation, Locomotion, Communication, Socialization, Spontaneity, Self-control, Cleanliness, Toileting, Dressing, Bedtime-operation, and Eating (Appendix).
The Motor Age Test (MAT) was employed to assess the developmental levels of motor skills of the upper extremities, and of the trunk and lower extremities (JOHNSON et al., 1951). The motor tasks of MAT were selected and arranged on the basis of Gesell's studies. The total scores of the upper and the lower extremities were separately calculated, and each of the total scores directly represented the motor age in months. Possible maximum score of upper-extremity motor age was 72.0 months, equal to that of lower-extremity motor age. Japanese Standard Edition of the Wechsler Intelligence Scale for Children—Revised (WISC-R) (KODAMA et al., 1978) was used for assessing cognitive skills.

Procedure. TSMS, MAT and WISC-R were administered to 52 children between August and September, 1981. Only TSMS was re-administered to 20 children 2 years after the initial assessment. Nurses well acquainted with the day-to-day behavior of subjects filled out the TSMS forms. Physical therapists, occupational therapists, and clinical psychologists were responsible for carrying out MAT and WISC-R.

RESULTS

Factor structure of TSMS

To determine factor structure of TSMS, a principal factor analysis with varimax rotation was applied to the raw scores of 11 behavior domains for the entire sample. Table 1 presents the means and SDs of 11 domain scores, together with the varimax rotated factor loadings greater than 0.6 and the estimates of communality. Three orthogonal factors were extracted, with Factors 1, 2 and 3 accounting for 71.0%, 9.4% and 6.4% of the total variance, respectively. The

<table>
<thead>
<tr>
<th>Behavior domain</th>
<th>Max. score</th>
<th>Mean (SD)</th>
<th>Rotated factor loadingsᵃ</th>
<th>Commu-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Occupation</td>
<td>20</td>
<td>10.9 (7.1)</td>
<td>0.790</td>
<td>0.895</td>
</tr>
<tr>
<td>Locomotion</td>
<td>20</td>
<td>6.4 (5.8)</td>
<td>0.741</td>
<td>0.382</td>
</tr>
<tr>
<td>Communication</td>
<td>20</td>
<td>15.9 (5.0)</td>
<td>0.873</td>
<td>0.811</td>
</tr>
<tr>
<td>Socialization</td>
<td>20</td>
<td>16.1 (4.8)</td>
<td>0.811</td>
<td>0.834</td>
</tr>
<tr>
<td>Spontaneity</td>
<td>20</td>
<td>15.6 (5.8)</td>
<td>0.873</td>
<td>0.811</td>
</tr>
<tr>
<td>Self-control</td>
<td>20</td>
<td>16.5 (4.6)</td>
<td>0.817</td>
<td>0.834</td>
</tr>
<tr>
<td>Cleanliness</td>
<td>10</td>
<td>7.5 (3.5)</td>
<td>0.864</td>
<td></td>
</tr>
<tr>
<td>Toileting</td>
<td>10</td>
<td>8.1 (2.3)</td>
<td>0.812</td>
<td></td>
</tr>
<tr>
<td>Dressing</td>
<td>10</td>
<td>7.8 (3.2)</td>
<td>0.726</td>
<td></td>
</tr>
<tr>
<td>Bedtime-operation</td>
<td>10</td>
<td>9.2 (1.8)</td>
<td>0.833</td>
<td></td>
</tr>
<tr>
<td>Eating</td>
<td>20</td>
<td>14.6 (5.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per cent of total variance</td>
<td></td>
<td></td>
<td>71.0</td>
<td>9.4</td>
</tr>
</tbody>
</table>

ᵃ Only items with loadings greater than 0.6 are listed.
behavior domain having the highest loading on Factor 1 was Socialization, followed by Self-control, Bedtime-operation, Spontaneity and Communication. Major loadings on Factor 2 were Cleanliness, Eating, Dressing, and the like. Factor 3 consisted of only one domain, Locomotion. The communalities for 11 domains were sufficiently high, ranging from 0.802 to 0.938. To develop the factor-derived measures of TSMS, we defined the following three subscales: subscale 1, including all domains with loadings greater than 0.6 on Factor 1, subscales 2 and 3, being defined in the same manner as Factors 2 and 3, respectively. These three subscales respectively covered interpersonal, self-care, and locomotor skills in this study.

Relationship between MAT, WISC-R and TSMS

Table 2 shows the mean scores on MAT and WISC-R, and the mean per cent scores of 3 subscales on TSMS. The upper-extremity and lower-extremity motor ages were 4:01 (years: months) and 1:08, respectively. Verbal and Performance IQs corresponding to the overall means of Verbal and Performance Scaled Scores were 65 and 45, respectively. All subscales on WISC-R were far from reaching the 6-year level. The estimated social age from the manual of TSMS, on the other hand, was 4:09 years, with a relatively high per cent score on subscale 1 (interpersonal skills) in spite of a low score on subscale 3 (locomotor skills). Since mean chronological age was over 10 years, delays in the acquisition of motor, cognitive, and social skills were obvious.

To examine whether each factor on TSMS would be parallel to that of motor and cognitive skills, correlation analyses were performed. Table 3 gives simple correlation ($r$), partial correlation ($r'$), and multiple correlation ($R$) coefficients between subscale scores on TSMS and scores on MAT and WISC-R, including demographic variables such as sex, chronological age, physiological type of cerebral palsy, and length of hospital stay. Although several significant correlations were found, there was only one significant partial correlation for each of the three subscale scores on TSMS: chronological age for subscale 1 (interpersonal skills); the upper-extremity motor age for subscale 2 (self-care skills); and the lower-
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Table 3. Correlation (r), partial correlation (r'), and multiple correlation (R) coefficients between subscale scores on TSMS and scores on MAT and WISC-R, including demographic variables (N=52).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subscales on TSMS</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1: Interpersonal</td>
<td>2: Self-care</td>
<td>3: Locomotor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>r</td>
<td>r'</td>
<td>r</td>
<td>r'</td>
<td>r</td>
</tr>
<tr>
<td>Sexa</td>
<td>-0.19</td>
<td>-0.07</td>
<td>-0.09</td>
<td>-0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Chronological age</td>
<td>0.42**</td>
<td>0.33*</td>
<td>0.31*</td>
<td>0.03</td>
<td>0.21</td>
</tr>
<tr>
<td>Typesb</td>
<td>0.10</td>
<td>-0.09</td>
<td>0.47**</td>
<td>-0.12</td>
<td>0.20</td>
</tr>
<tr>
<td>Hospital stayc</td>
<td>0.22</td>
<td>0.02</td>
<td>0.06</td>
<td>0.05</td>
<td>-0.20</td>
</tr>
<tr>
<td>Motor age (U)d</td>
<td>0.50**</td>
<td>0.24</td>
<td>0.85**</td>
<td>0.67**</td>
<td>0.49**</td>
</tr>
<tr>
<td>Motor age (L)e</td>
<td>0.25</td>
<td>0.01</td>
<td>0.36**</td>
<td>0.06</td>
<td>0.68**</td>
</tr>
<tr>
<td>Verbal Score</td>
<td>0.45**</td>
<td>0.20</td>
<td>0.38**</td>
<td>0.21</td>
<td>0.40**</td>
</tr>
<tr>
<td>Performance Score</td>
<td>0.35*</td>
<td>0.12</td>
<td>0.31*</td>
<td>-0.13</td>
<td>0.46**</td>
</tr>
<tr>
<td>R</td>
<td>0.707**</td>
<td></td>
<td>0.867**</td>
<td></td>
<td>0.766**</td>
</tr>
<tr>
<td>R² (contribution)</td>
<td>0.499</td>
<td></td>
<td>0.751</td>
<td></td>
<td>0.587</td>
</tr>
</tbody>
</table>

a female = 1; male = 0.
b spastic = 1; others = 0.
c length in months.
d upper-extremities.
e lower-extremities.
* p < 0.05; ** p < 0.01.

Table 4. Difference between 1st and 3rd year's subscale scores on TSMS (N=20).

<table>
<thead>
<tr>
<th>Group</th>
<th>1: Interpersonal</th>
<th>2: Self-care</th>
<th>3: Locomotor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Younger*a</td>
<td>10</td>
<td>3.3</td>
<td>15.4</td>
</tr>
<tr>
<td>Elder*b</td>
<td>10</td>
<td>-9.7</td>
<td>11.3</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>-3.2</td>
<td>17.7</td>
</tr>
</tbody>
</table>

a children with ages of 12 years or below.
b children with ages over 12 years.

extremity motor age for subscale 3 (locomotor skills). Multiple regression analyses confirmed that each subscale on TSMS had only one significant predictor, the same as above described, and analysis of variance showed a significant regression at the 0.01 level for all subscales. The largest contribution ratio was obtained for subscale 2, followed by subscales 3 and 1.

Two-year follow-up

Changes of subscale scores on TSMS after two years were examined in twenty of 52 children. No significant differences were found in all subscale scores (Table 4), that is, most children failed to improve their scores over two years. However, it appeared that locomotor skills tended to increase slightly, and interpersonal
A significant negative correlation was found between the difference score on subscale 2, subtracting the subscale score of the initial assessment from that of the follow-up one, and chronological age \( r = -0.57, p < 0.01 \), indicating age as a limiting factor in the acquisition of new skills. A relatively high but not significant negative correlation was found between the difference score on subscale 1 and chronological age \( r = -0.42, p < 0.10 \). Also, the length of hospital stay tended to affect negatively the new acquisition of interpersonal and self-care skills, while sex and the type of cerebral palsy had no influence on the acquisition of those skills.

Since the influence of chronological age on the acquisition of interpersonal skills was evident, 20 children were classified into two age-groups; a younger group consisting of 10 children aged 12 years or below (mean: 10 years) and an elder group consisting of 10 children aged over 12 years (mean: 14 years). The distributions of the type and sex were comparable, but the elder group stayed significantly longer at the hospital (mean: 87 months) than the younger group (mean: 47 months) \( t(18)=5.01, p < 0.01 \).

All subscale scores of the younger group increased, ranging from 3.3 to 8.8 per cent over two years, whilst those of the elder group decreased, with the exception of subscale 3 (Table 4). The difference score of the younger group was significantly larger than that of the elder group on both subscales 1 and 2 \( t(18)=2.14, t(18)=2.34, ps < 0.05 \).

**DISCUSSION**

The present study demonstrated that: (1) interpersonal, self-care, and locomotor skills were empirically derived as independent factors from 11 raw scores on the *Takenshiki* Social Maturity Scale (TSMS) in hospitalized children with cerebral palsy; (2) the first factor labelled interpersonal skills, representing 'social skills' in a face-value sense, shared 71% of total variance; (3) although self-care and locomotor skills were significantly related to motor ages of the upper and the lower extremity, interpersonal skills had no significant relationship to any variables examined except for chronological age; and (4) no improvements in TSMS were observed after two years in many children, in elder children over the age of 12 years in particular, and the changes in scores of both interpersonal and self-care skills were negatively correlated with chronological age.

**Validity of social skills measurement**

There is no general agreement as to which method optimally represents children's social skills (ANDERSON and MESSICK, 1974; ZIGLER and TRICKETT, 1978; BELACK, 1979). Conventional inventories on social maturity (e.g., DOLL, 1953) or on adaptive behavior (NIHIRA et al., 1974) seem to be subjective to some extent...
but are more easily applicable and interpretable than other behavioral methods such as sociometric techniques or direct observations. TSMS, used in the present study, offered an assessment of various skills, not only interpersonal ones but also self-care and locomotor skills. Those skills, with the exception of interpersonal ones are not ‘social’ in a strict sense, although possible independence is of great importance for multiply handicapped children. Thus, a three-factor model proposed in the present study seems suitable to account for and to understand the interpersonal aspect of social skills of children with cerebral palsy.

**Relationship between motor, cognitive and social skills**

DENHOF and FELDMAN (1981) note that, in rehabilitation of cerebral palsied children, the basic, ultimate goal is to be included in peer oriented social activities. The present study implied the possibility of facilitating their interpersonal skills as distinct from the levels of motor or cognitive skills. Children with cerebral palsy would become more responsive and cooperative if an appropriate intervention program to train their interpersonal skills was provided. In fact, a significant improvement in social skills of multiply handicapped preschool children including the cerebral palsied was reported, despite the absence of changes in motor and cognitive skills (KAMINER and CHINITZ, 1982). This appears to be well in accord with the present results in respect of the relative independence of interpersonal skills from motor and cognitive skills. On the other hand, the present study indicated a closely tied relation between self-care skills and motor age of the upper extremities, and between locomotor skills and motor age of the lower extremities. Cognitive skills, assessed by WISC-R, were not strongly related to any subscales of social skills.

It is not true that promotion of motor or cognitive skills is a prerequisite for further acquisition of interpersonal skills. In other words, it is not possible to presume that, by improving motor or cognitive skills, improvements in interpersonal skills should follow.

**Sex, age, and type of cerebral palsy and social skills**

Although it is widely believed that girls are more cooperative and less aggressive than boys, the present study has shown no sex difference to exist in the scores of all factors on TSMS. In contrast, chronological age appeared to play an important role in acquiring interpersonal skills. The initial assessment demonstrated that interpersonal skills increased with age, while the follow-up assessment revealed that the increase in interpersonal skills was negatively correlated with age. Children over 12 years old were likely to exhibit behavioral regression. It should be noted that it was not the length of hospital stay but the chronological age which was strongly related to this phenomenon.

Studies less concerned with individual variability were often inadequate for considering a wide spectrum of cerebral palsied children (VINING et al., 1976).
However, the physiological type of cerebral palsy such as spastic, athetoid or mixed, was not a major variable influencing children's social skills.

Hospital stay versus home stay

No conclusions could be drawn from this study about the strength and weakness of hospital care of children with cerebral palsy. However, hospital care has been the target of much criticism, which appears to be largely directed at the limits of an individual's social experience in such segregated environments.

The children used for the present study were all admitted to hospital with the best of intentions. In spite of this, their interpersonal skills revealed no improvement as a whole, the elder children in particular. Locomotor skills, by contrast, improved consistently both in the younger and the elder children. Although a prolonged hospital stay might affect children's interpersonal behavior, this postulate was not confirmed statistically in the present study. Rather, as pointed out by Kleiferg and Galligan (1983), the issue is not institutionalization versus deinstitutionalization but custodial versus therapeutic care.

In conclusion, the observed delays in the acquisition of interpersonal aspects of social skills should serve as a warning to today's care of children with cerebral palsy. A knowledge of whether these delays are definitely related to a specificity of cerebral palsy or to non-specific handicapping conditions in general, is the crux of the planning of rehabilitation strategy.

We are grateful to Drs. T. Takahashi, T. Suzuki, and A. Morone, the Miyagi Prefectural Hospital for Crippled Children, for allowing us to study children in their care, and also to the staff of the hospital whose cooperation made this study possible.

This study was supported in part by a project grant from the Ministry of Health and Welfare, Japan.

REFERENCES

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APPENDIX

Summary of 11 behavior domains of TSMS

1. Occupation (20 items)
   Performance of useful tasks: to transfer objects; to use tools; to help in household tasks; etc.

2. Locomotion (20 items)
   Moving from place to place: to walk upstairs and downstairs unassisted; to go to school unassisted; to walk around home town alone; etc.

3. Communication (20 items)
   Communicative skills: to say names; to account own experience; to make minor purchases; to write short letters; etc.

4. Socialization (20 items)
   Participation in social activities: to take part in games; to obey rules; to plan games, trips, or outdoor sports; etc.

5. Spontaneity (20 items)
   Initiating own activities, not forced or suggested by others: to straighten up toys or books; to keep promises; to fulfil a leadership role; etc.

6. Self-control (20 items)
   Control of own behavior: to take care of little children; to avoid dangers; to learn good manners; etc.

7. Cleanliness (10 items)
   Personal hygiene and appearance: to wash hands and face; bathing; oral
hygiene; to care for hair and nails; etc.

8. Toileting (10 items)
   Control of urination and defecation: to go to toilet alone; to perform necessary operations in use of a lavatory; no daytime accidents; etc.

9. Dressing (10 items)
   Dressing and undressing oneself: to pull off socks; to put on clothes; to button coat; etc.

10. Bedtime-operation (10 items)
    Bedtime operations and manners: to go to bed early and get up early; to turn out light; etc.

11. Eating (20 items)
    Feeding oneself: to drink from cup or glass; to eat with hashi (chopsticks); to help self at table; to behave properly while eating; etc.