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Initial dyadic peer interaction of ADHD and normal children

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Abstract

The present study assesses the nature of the behavior of ADHD children in an initial social encounter with a peer. Eight pairs each of previously unacquainted ADHD/normal and normal/normal children were videotaped as they interacted in a free-play setting for 30 minutes. All ADHD subjects were currently receiving psychostimulant medication. As compared to the normal/normal dyads, the ADHD/normal dyads engaged in more solitary play as well as less associative play. The ADHD/normal dyads also had a greater latency to reach rule-governed associative play and engaged in less affective verbalization than the normal/normal dyads. Sequential analyses revealed that the normal/normal dyads, as compared to the ADHD/normal pairs, were significantly more likely to shift from solitary interactive play to constructive associative play as well as from constructive associative play to solitary interactive play. Also, the ADHD/normal dyads shifted more frequently to solitary interactive play from rough and tumble associative play than did the normal/normal dyads. These results indicate that ADHD children's difficulties in social relationships appear to be primarily the result of attentional problems associated with their childhood psychological disorder, rather than being the result of social skills deficits.

Introduction

Numerous studies have shown that children with Attention Deficit Hyperactivity Disorder (ADHD) are rejected by their peers (Carlson, Lahey, Frame, Walker, & Hynd, 1987; Milich & Landau, 1982; Pelham & Milich, 1984). This rejection continues even after ADHD children begin receiving psychostimulant medication (Pelham & Bender, 1982). Barkley and Cunningham's (1979) theory of the reciprocal cycle postulates that medication is ineffective in improving the social relations of ADHD children because of a social skills deficit that these children acquire as a result of their inattentiveness to social processes. However, attempts at social skills training with ADHD children, alone or in combination with medication, have also failed to produce positive changes in their peer interactions (Pelham & Bender, 1982; Rie, Rie, Steward, & Ambuel, 1976; Pelham, Schnedler, Bologna, Contreras, 1980).

A possible explanation for the ineffectiveness of social skills training programs for ADHD children is that these programs have lacked an empirical basis to support the target behaviors that are chosen to be taught to the children. Putallaz and Gottman (1983) believe that the failure of social skills training programs often stems from the infrequent use of empirical knowledge in selecting target behaviors. Documentation of the ways in which ADHD children differ behaviorally from normal children in peer interactions is needed so that future social skills training programs can be implemented with an improved foundation in empirical research.

Some studies do exist that examine the behaviors of ADHD children in comparison to normal controls in social encounters, but these studies assess behavior at a simple frequency level. For example, several studies have indicated that ADHD children display higher frequencies of high rate behavior (Klein & Young, 1979; Pelham & Bender, 1982; Whalen, Henker, Collins, McAuliffe, & Vaux, 1979) as well as aggression (Clark, Cheyne, Cunningham, & Siegel, 1987). However, to truly understand the full complexity of a social interaction, analyses that are temporal in nature are needed (Gottman, 1983).

Only one study to date has examined the peer interactions of ADHD children in a sequential fashion (Clark, Cheyne, Cunningham, & Siegel, 1987). Their results revealed two patterns of interaction that distinguished dyads containing one ADHD child and one normal child from dyads containing two normal children. The ADHD/normal dyads were more likely than the normal/normal dyads to engage in a sequence termed Retreat, or social withdrawal following aggression. Also, the ADHD/normal dyads were less likely to show a pattern of reciprocal verbal interaction than were the

normal/normal dyads.

The aim of the present is to attempt to replicate the findings of previous researchers who examined the peer interactions of ADHD children using analyses of frequencies of behavior as well as to provide further knowledge of the sequential patterns of these interactions. Both frequency and sequential analyses are needed to gain a more complete understanding of the social interactions of ADHD children with their peers.

The present study employs a design that draws on the paradigms of several previous studies. Cunningham and his colleagues (Cunningham & Siegel, 1987; Clark et al., 1987) have conducted studies that involve two groups of dyads, one group containing dyads with two normal children and the other group containing dyads with one normal child and one ADHD child; the current study will utilize the same groupings. This design allows for the comparison of behavior at both the dyadic and individual level.

Following the design of a study conducted by Newcomb and Meister (1985), pairs of unacquainted children will interact in an analogue free play setting. An initial encounter between unfamiliar peers was chosen for study for two reasons. First, Pelham and Bender (1982) found that ADHD children were rejected by their peers after only an initial encounter; the current study will probe into the behavioral differences displayed by ADHD children that lead to their rejection after such a brief amount of time. Pelham and Milich (1984) have stressed the importance of a paradigm containing the use of unacquainted peers to determine the behaviors that cause social rejection. Second, unfamiliarity of peers eliminates the reputation effects that often play an important role in social rejection (Bukowski & Newcomb, 1984).

The current study utilizes a design that requires all ADHD subjects to receive the dosage of methylphenidate regularly prescribed by their physician two hours prior to the start of the play session. Previous studies of the social interaction of ADHD children have removed the children from their medication (Clark et al., 1987; Cunningham et al., 1987; Cunningham, Siegel, & Offord, 1985). Medicating the ADHD subjects, particularly employing the dosage that they would regularly receive when interacting with peers, will increase the ecological validity of the study.

In summary, this design involves a comparison of an initial interaction in a free play setting between members of normal/normal dyads and between members of medicated ADHD/normal dyads. This combination of paradigms drawn from previous studies allows for the in-depth exploration of the ways in which ADHD children differ behaviorally from normal children.

Although this study is exploratory in nature, some hypotheses regarding frequency of behavior can be based on previous research in this area. It is predicted that the ADHD/normal dyads will engage in higher rates of solitary play and lower rates of associative play than the normal/normal dyads due to their attentional deficit. Clark et al. (1987) found that ADHD/normal dyads participated in less joint activity than normal/normal dyads. Also, Dodge (1983) found that children who are rejected after an initial encounter engage in less cooperative play than those who are not rejected.

It is predicted that the ADHD/normal dyads will display a higher rate of negative verbal interactions than the normal/normal dyads, in accordance with the findings of Klein and Young (1979). However, the ADHD/normal dyads are not expected to differ from the normal/normal dyads on frequency of positive verbal interactions (Klein & Young, 1979; Cunningham & Siegel, 1987). This prediction follows the findings of Grenell, Glass, and Katz (1987) who report that ADHD children lack a social knowledge of ways in which to handle conflict and thus avoid negative interactions, but that this social knowledge deficit is not evident in the area of social initiation, a form of positive interaction.

Predictions regarding the sequential patterns of the ADHD/normal dyads as compared to the controls are few, due to the paucity of research in this area containing sequential analyses. However, one prediction does seem plausible. Newcomb and Meister (1985) found that children high in popularity, who are presumed to be highly socially skilled, evidenced a "social script" in their initial meeting. This social script commences with a greeting or introduction and moves toward common ground activity through an exchange of play information. Although the ADHD children in the study are predicted to be able to initiate interaction in an initial encounter, it is hypothesized that they will evidence an absence of this structured, script-oriented behavior. The ADHD symptoms of inattention, impulsivity, and hyperactivity will preclude a child with the disorder from adhering to the structure of a social script.

Method

Subjects

This study involved 32 male children between the ages of 7 and twelve. Twenty-four of the children were normal, and eight were diagnosed as having ADHD. To be included in the study, an ADHD child needed scores of 15 or higher on the Hyperactivity Index of both the Parent and Teacher versions of the Conners' Behavior Checklist. ADHD subjects were recruited from

Children's Hospital, Richmond, VA. Parents of all normal subjects also completed the Conners' Behavior Checklist, and thus the normal children can be screened for a lack of ADHD symptoms.

The design of the study consisted of two groups of dyads, the members of which were matched to within one year of each other in age. One group contained eight dyads of unacquainted boys in which both were normal, and the other contained eight dyads of unacquainted boys in which one was normal and the other met the criteria of the study for having ADHD. All ADHD subjects received the dosage of methylphenidate regularly prescribed by their physician two hours prior to the start of the play session.

Procedure

Each dyad spent 30 minutes in an analogue free play setting. They were instructed that they could play with or do whatever they wanted while they were in the play room, which was equipped with age- and sex-appropriate toys. Toys that would be suitable for use in each of the play duration codes were equally represented in the room. For example, some of the toys available included paper and crayons (solitary noninteractive play and solitary interactive play), beanbags (often used by the subjects in rough and tumble associative play), puzzles and legos (constructive associative play), and Nerf basketball and Connect 4 (rule-governed associative play). The play sessions were videotaped from behind a one-way mirror. Subjects were unaware that they were being observed until the end of the play session.

Measures and Reliability

All tapes were coded by seven undergraduate assistants using two coding schemes, one assessing the play duration of the interaction and the other assessing the verbal content of the interaction. Reliability was assessed on 31% of the tapes for both coding schemes.

The play duration coding scheme originally consisted of 13 codes. The first six codes are encompassed in the following three definitions:

Unoccupied--Child is alone at a distance from peer and appears to be doing nothing. "Distance" refers to the psychological field of the child as well as physical distance. Child and peer are not talking.

Solitary Play--The child is alone and is engaged in a unique and independent play activity. Child and peer are not talking.

Wait and Hover--Child is in proximity of peer but is observing and not interacting with peer. Child and peer are not talking.

These codes, with their percentage of agreement given in parentheses, are as follows: Target Unoccupied/Peer Unoccupied (.71), Target Unoccupied/Peer in Solitary Play (No percentage of agreement due to a very low frequency of occurrence), Target in Solitary Play/Peer Unoccupied (No percentage of agreement due to very low frequency of occurrency), Target in Solitary Play/Peer in Solitary Play (.99), Target in Solitary Play/Peer in Wait and Hover (No percentage of agreement due to very low frequency of occurrence), and Target in Wait and Hover/Peer in Solitary Play (No percentage of agreement due to very low frequency of occurrency).

The last seven codes are defined as follows, with percentage of agreement given in parentheses:

Parallel Play--While in the vicinity of a peer, the child is engaged in an independent play activity. The play activity is similar to that of the peer. The child and peer are not talking (No percentage of agreement due to very low frequency of occurrence).

Solitary Interactive Play--Child and peer are engaged in distinctly separate play activities while talking (.78).

Rough and Tumble Associative Play--The child is engaged in vigorous physical play activity with peer (.60).

Functional Associative Play--Child is engaged with peer, but this association does not involve the manipulation of an object. Nor is this association characterized by dramatization (.44).

Constructive Associative Play--Child is engaged in a play activity with peer that includes the appropriate and/or creative manipulation of an object or objects (.81).

Dramatic/Pretend Associative Play--Child is engaged in a play activity with peer that includes the dramatization of make believe roles and/or characters (.33).

Rule-Governed Associative Play--Child is playing a game or sport with peer. The play is goal oriented, so that winning becomes an objective of the play (.92).

This scheme produced a kappa of .78.

Due to low occurrence and low percentage of agreement of some of the duration codes, codes were lumped to produce a five code scheme, with definitions as follows:

Solitary Noninteractive Play--Child and peer are engaged in distinctly separate play activities (or lack of activity) and are not talking.

Solitary Interactive Play--Child and peer are engaged in distinctly separate play activities while talking.

Rough and Tumble Associative Play--The child is engaged in vigorous physical play activity with

peer while talking.

Constructive Associative Play--Child and peer are engaged jointly in a play activity while talking. The play activity may or may not involve the manipulation of object(s), and it may or may not involve dramatization.

Rule-Governed Associative Play--Child is playing a game or sport with peer while talking. The play is goal oriented, so that winning becomes an objective of the play.

The kappa for this condensed coding scheme, used in all data analyses, was .83. The combinations of codes that resulted in this five code scheme, as well as the percentage of agreement for each of the five duration codes, are listed in Table 1.

The verbal coding scheme consisted of 17 codes, defined as follows. The percentage of agreement for each code is given in parentheses.

Greeting or Introduction)--Child greets peer verbally or gesturally or may provide his/her name (1.00).

Direct Request--Child makes a direct request to join peer at play (No percentage of agreement due to a very low frequency of occurrence).

Invitation--Child invites peer to join him/her at play (.80).

Activity Conversation--Child provides or requests information about an activity (.95).

Personal Surface Information Exchange--Child provides or requests information regarding self or peer that is related to school or sports (.91).

Personal Intimate Information Exchange--Child provides or requests information about self, family, or peers (.88).

Tease/Humiliate--Child annoys, pesters, mocks, or makes fun of peer (.62).

Accusation--Child gives or receives blame or fault (No percentage of agreement due to very low frequency of occurrence).

Rebuttal--Child makes a verbal statement or expression of disagreement to a condition/rule or request stated by peer (.22).

Reasonable Command--Child makes a direct, reasonable and clearly stated request of a peer. The verbal or nonverbal command must clearly specify the behavior expected from the peer to whom the command is directed (.72).

Unreasonable Command--Child makes a hostile directive toward peer that may involve aversive consequences if compliance is not immediate, direct or implied threat, and/or humiliation.

Aversive consequences may be indicated by the tone of voice as well as by the content of the statement (No percentage of agreement due to very low frequency of occurrence).

Laugh--Child laughs in an agreeable manner (.99).

Positive Exclamation--Child makes a positive vocal outburst which is not directed at peer (.64).

Negative Exclamation)--Child makes a negative vocal outburst which is not directed at peer (.75).

Attention Directing--Child attempts to redirect or get the attention of peer (.81).

Positive Reinforcement--Child provides interest and/or positive verbalizations to peer. Positive reinforcing behavior demonstrates approval which may be gestural or verbal in nature and is specifically directed at the behavior, appearance, or personal characteristics of peer (.57).

Noncommunicative Verbalization--Child engages in noise making, singing, or guttural sounds that are not specifically for attention directing (.90).

The kappa for the verbal coding scheme was .88.

Results

Play Duration Data Analyses

A MANOVA conducted on the percentage of time spent in each of the five duration codes revealed no significant differences between the ADHD/normal dyads and the normal/normal dyads, $F(5,10) = 1.75$, $p < .3$. Also, no differences were found when the five duration codes were examined with univariate analyses.

The codes were then lumped to two categories, solitary (solitary noninteractive play and solitary interactive play) and associative (rough and tumble associative play, constructive associative play, and rule-governed associative play). A MANOVA revealed significant differences between the ADHD/normal dyads and the normal/normal dyads, $F(2,13) = 2.89$, $p < .1$. ANOVA's revealed that the ADHD/normal dyads spent a significantly greater amount of time in solitary play than the normal/normal dyads, $F(1,14) = 4.84$, $p < .05$. Also, the ADHD/normal dyads spent an amount of time in associative play that was marginally smaller than that of the normal/normal dyads, $F(1,14) = 4.53$, $p < .06$. As illustrated in Figure 1, the interaction between group and type of play was significant, $F(1,14) = 4.69$, $p < .05$.

Several analyses were run in an attempt to explain this interaction. It was hypothesized that the ADHD/normal dyads would evidence a greater number of shifts between solitary play and associative play, as a result of their lack of ability to maintain associative play. However, no differences were found. ANOVA's were then used to compare the mean duration time of the

episodes of solitary and associative play for each of the groups. It was hypothesized that the ADHD/normal dyads would have a significantly longer mean duration in solitary play and a significantly shorter mean duration in associative play; however, no differences were found. However, a Chi-square analysis of the mean duration data showed a pattern in which four of the ADHD/normal dyads evidenced a mean duration in solitary play of greater than two minutes, while none of the normal/normal dyads spent a mean duration of greater than two minutes in solitary play, x^2 (1) = 5.34, $p < .05$.

Using ANOVA, the ADHD/normal dyads (mean of 17 minutes and 21.4 seconds) were found to have a significantly longer latency to rule-governed play than the normal/normal dyads (mean of 3 minutes and 7.4 seconds), F (1,14) = 4.04, $p < .05$. Prior to analysis, these data were transformed using a log transformation due to a violation of homogeneity of variance.

Z-score comparisons were used to examine the conditional probabilities of shifting from one duration code to another for each of the two groups. The normal/normal dyads were found to be significantly more likely to shift from solitary interactive play to constructive associative play, z = 2.60, $p < .01$, and from rough and tumble associative play to constructive associative play, z = 3.14, $p < .01$, than between any other combination of the five play duration codes. No single combination of the five play durations was significantly more likely to occur than any other for the ADHD/normal dyads.

A between-groups comparison of the conditional probabilities of shifting from one duration code to another was also performed using a z-score technique. The normal/normal dyads were significantly more likely than the ADHD/normal dyads to shift from solitary interactive play to constructive associative play, $z = 2.89$, $p < .01$, and from constructive associative play to solitary interactive play, $z = 4.09$, $p < .01$.

A Chi-square test was performed to examine the type of play which followed rough and tumble associative play. Although both groups shifted from rough and tumble associative play to constructive play (62.5% of the shifts for the ADHD/normal dyads and 85.7% for the normal/normal dyads) more frequently than from rough and tumble associative play to solitary interactive play (37.5% for the ADHD/normal dyads and 14.3% for the normal/normal dyads), the greater discrepancy between the two shifts was found for the normal/normal dyads as opposed to the ADHD/normal dyads, $x^2 = 14.02$, $p < .001$.

Verbal Data Analyses

Univariate between-groups analyses were performed on each of the 17 verbal codes. This data was transformed using a log transformation due to a violation of homogeneity of variance. As illustrated in Figure 2,the ADHD/normal dyads elicited significantly fewer positive exclamations, $F(1,13) = 8.17$, $p < .05$, and fewer negative exclamations, $F(1,13) = 10.20$, $p < .01$, than the normal/normal dyads. Affective verbalization (a combination of the codes for laugh, positive exclamation, and negative exclamation) occurred significantly less frequently in the ADHD/normal dyads than in the normal/normal dyads, $F(1,14) = 5.33$, $p < .05$. The ADHD/normal dyads evidenced a level of activity conversation that was marginally lower than that of the normal/normal dyads, $F(1,14) = 3.22$, $p < .1$. No frequency differences were found for any of the other verbal codes.

Discussion

The goal of this study was to determine the ways in which ADHD children differ behaviorally from normal children in an initial interaction. The behavioral differences that we found seem to result more from the actual attentional deficit of ADHD children than from any clearly identifiable social skills deficit. The finding that the ADHD/normal dyads engaged in more solitary play and less associative play than the normal/normal dyads is the strongest support for the role of an attentional deficit in the peer interactions of ADHD children. These dyads appeared unable to maintain an associative interaction, an idea that is in accordance with the research of Whalen, Henker, Collins, McAuliffe, and Vaux, (1979), which states that ADHD children lack the ability to maintain a goal orientation. This result supports the findings of Clark et al.(1987), who found that ADHD children participate in less joint activity than do normal children, as well as offering indirect support for Dodge's (1983) finding that children who are rejected in an initial encounter participate in less cooperative activity than those who are not rejected.

The greater latency to rule-governed play that the ADHD/normal dyads demonstrated is also indicative of their attentional deficit and lack of goal orientation (Whalen et al., 1979). Game preparation and the establishment of rules are tasks that require a great deal of concentration, and the ADHD/normal dyads appear unable to focus their attention with enough intensity to actually reach a stage of rule-governed play until very late in the play sessions.

The within groups analyses of the conditional probabilities of shifting from one play duration to another show the normal/normal dyads to have been most likely to shift from solitary interactive

play or rough and tumble associative play to constructive associative play. These shifts represent a progression from a lower level of play to a higher level of play. The finding that the ADHD/normal dyads were no more likely to display one shift between duration codes than any other indicates the absence of a progression from lower to higher levels of play in these dyads, again possibly a result of the attentional deficit of the ADHD children.

The normal/normal dyads were more likely than the ADHD/normal dyads to shift from solitary interactive play to constructive associative play and from constructive associative play to solitary interactive play. At first this finding would appear to counter the previously discussed findings. However, the ability of the normal/normal dyads to alternate between solitary and associative play while still spending a large majority (81%) of their time in associative play is indicative of their greater attentional skill. The normal/normal dyads had the focus and goal orientation to be able to slip momentarily back into solitary play without actually interrupting the flow of their associative play. It is just such a skill that the ADHD children lack, and thus the interactions of the ADHD/normal dyads contained a much lower level of associative play.

The finding that the ADHD/normal dyads more frequently shifted to solitary interactive play from rough and tumble associative play than did the normal/normal dyads is in direct support of Clark and his colleagues' (Clark et al., 1987) finding that ADHD/normal dyads demonstrate more social withdrawal following aggression than do normal/normal dyads. This result may be due to the lack of knowledge of how to handle conflict on the part of ADHD children (Grenell, Glass, & Katz, 1987) or from their greater tendency to form an attributional bias of hostile intent toward their peers (Milich & Dodge, 1984).

The verbal data analyses revealed few differences between the two groups of dyads. The higher level of affective verbalization and activity conversation elicited by the normal/normal dyads may well be simply a result of the higher rate of associative play of these dyads. Associative play would appear to require more activity conversation than would solitary play, and anecdotal observation reveals that much of the affective verbalization of dyads occurs during rule-governed associative play.

There is not a strong indication of greater amounts of negative verbal interaction in the ADHD/normal dyads as opposed to the normal/normal dyads. This finding is in opposition to the findings of Cunningham & Siegel (1987), who found that ADHD/normal dyads engaged in more controlling interaction than did normal/normal dyads; it also refutes the results of a study conducted

by King and Young (1981), which state that ADHD boys disagree with their peers more than do normal boys.

The lack of a difference in number of positive verbal interactions (greeting or introduction, invitation, reasonable command, positive reinforcement) was supported. Indirect support for this result can be seen in the findings of King and Young (1981) which suggest that ADHD children do not lack interpersonal communication skills, but that they may not apply their skills consistently across all situations. Also, Cunningham and Siegel (1987) failed to find a difference in number of positive interactions between ADHD/normal dyads and normal/normal dyads.

The lack of a difference in positive or negative verbal interactions between the ADHD/normal dyads and the normal/normal dyads opposes Barkley and Cunningham's theory that the peer relations problems of ADHD children are the result of a social skills deficit acquired through lack of attentiveness to social behavior. Frequency analyses of the verbal data indicate that the ADHD/normal dyads are interacting verbally in a manner that is quite similar to that of the normal/normal dyads.

Sequential analyses of the verbal data have yet to be conducted. Thus, it is not possible to state whether or not the ADHD/normal dyads differed from the normal/normal dyads in their ability to follow a social script in an initial interaction. Additionally, further differences in the verbal behavior of the ADHD/normal dyads and the normal/normal dyads may be revealed through these analyses.

These results indicate that the rejection that ADHD children experience after only an initial interaction with a peer stem from their attentional problems more than from a deficit of social skills. Further research needs to be conducted on the role of the attentional deficit of ADHD children on their peer interactions. Additionally, studies need to be performed to assess the behavioral differences that ADHD children display throughout the process of friendship acquisition, as opposed to during only an initial encounter. Research of this sort would provide the needed empirical base for the future development of interventions into the peer relations of ADHD children.

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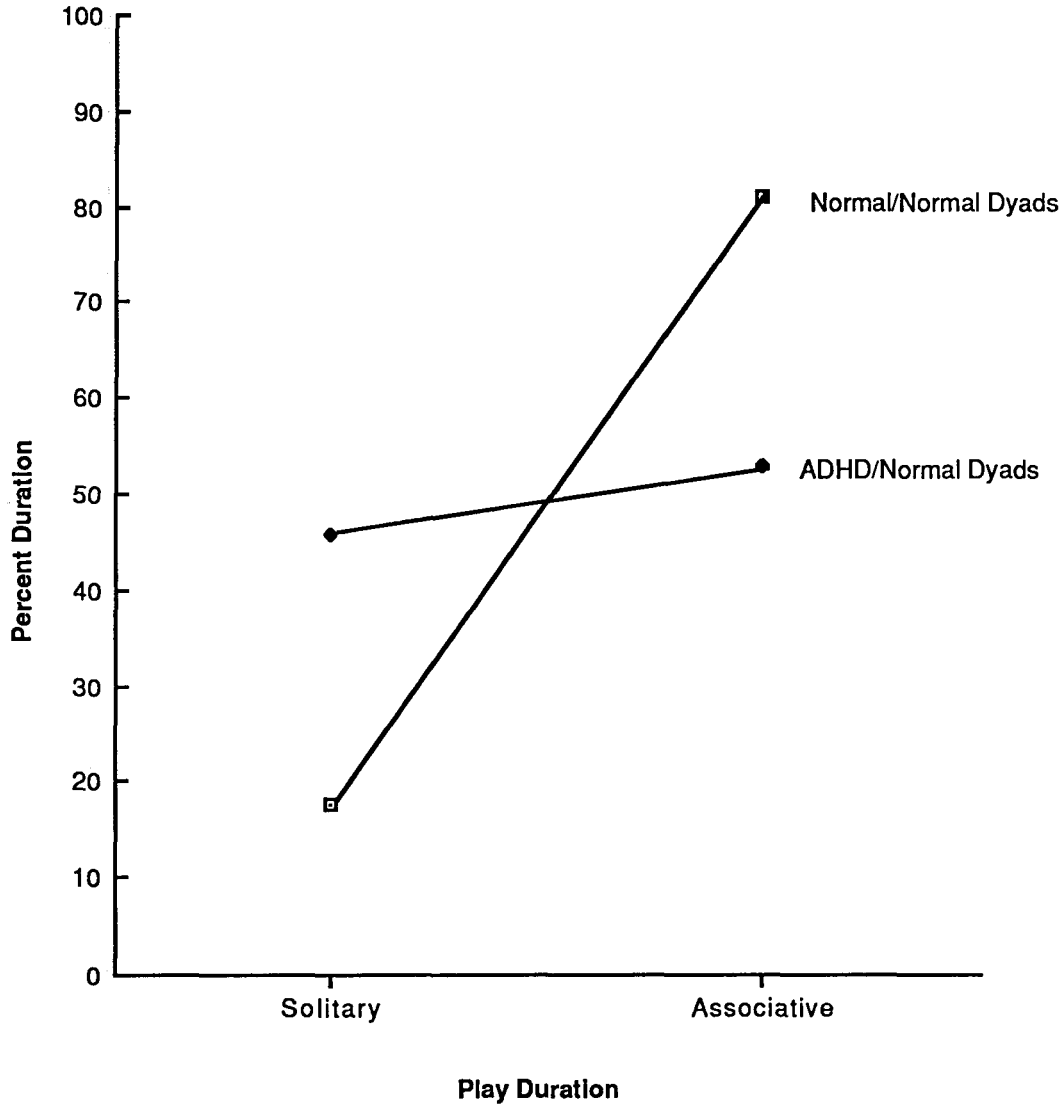
Table 1

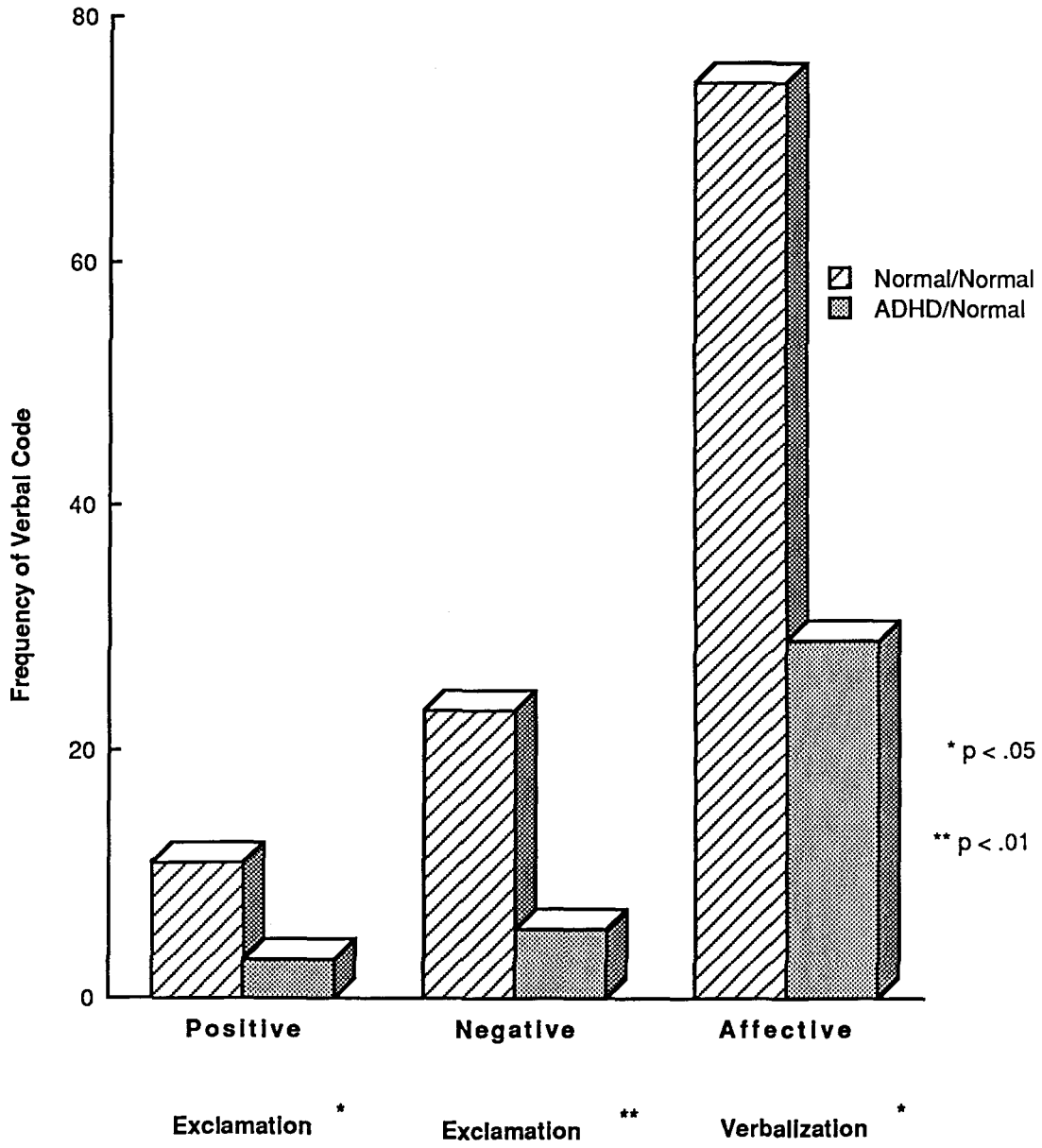
Duration Code	**Percentage of Agreement**
Solitary Noninteractive Play (Target Unoccupied/Peer Unoccupied, Target Unoccupied/Peer in Solitary Play, Target in Solitary Play/Peer Unoccupied, Target in Solitary Play/ Peer in Solitary Play, Target in Solitary Play/Peer in Wait and Hover, Target in Wait and Hover/Peer in Solitary Play, Parallel Play)	.97
Solitary Interactive Play (Solitary Interactive Play)	.78
Rough and Tumble Associative Play (Rough and Tumble Associative Play)	.60
Constructive Associative Play (Functional Associative Play, Constructive Associative Play, Dramatic/Pretend Associative Play)	.84
Rule-Governed Associative Play (Rule-Governed Associative Play)	.92

Figure Captions

Figure 1. Percentage of play duration time spent in solitary and associative play for the ADHD/normal and the normal/normal dyads.

Figure 2. Frequency of positive exclamation, negative exclamation, and affective verbalization for the ADHD/normal and the normal/normal dyads.


100
90
80
70
60
50
40
30
20
10
0
Percent Duration
Normal/Normal Dyads
ADHD/Normal Dyads
Solitary
Associative
Play Duration


80
60
40
20
0
Frequency of Verbal Code
Normal/Normal
ADHD/Normal
* p < .05
** p < .01
Positive
Negative
Affective
Exclamation *
Exclamation **
Verbalization *