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Relationship between aggressive behavior, depressed mood, and other disruptive behavior in Puerto Rican children diagnosed with Attention Deficit and Disruptive Behaviors Disorders

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Objective: The present study was directed at examining the relationship between aggressive behavior, depressed mood, other disruptive behaviors in children diagnosed with ADHD or ODD disorders in Puerto Rico.

Methods: One hundred seventy six (176) students (127 males and 49 females) from 12 public elementary schools in the San Juan Area of Puerto Rico participated in the study. The participants were divided into a group of ADHD children who exhibited aggressive behavior, a group of ADHD children that did not show aggressive behavior, and a normal group. Several self-report measures were administered to the children and teachers.

Results: Our results indicate that the best predictor of aggressive behavior was the hyperactivity and impulsiveness for both ADHD males and females. In addition, depressed mood in both males and females was also a significant predictor of aggressive behavior in Puerto Rican ADHD children. However, in females the social problems variable was also found to be a significant grouping variable.

Conclusion: The first conclusion of these results is that inattentiveness does not appear to be a relevant factor in ADHD Puerto Rican children who exhibit aggressive behavior. Second, we need to be cognizant to the fact that Puerto Rican ADHD children do exhibit high co-morbidity for aggressive behavior, depressed mood, and social problems. Thus, our diagnostic and treatment approaches with ADHD Puerto Rican children need to include an assessment of the social environment of the child and its effect on his emotional state, in particular his or her mood.

Key words: Attention deficit hyperactivity disorder, Oppositional defiant disorder, Depression

Aggression can be defined as "deliberate actions directed towards other people or objects, with some intention to destroy or injure the target" (1), p.785). The term known as externalizing behaviors is used to describe a set of disruptive behaviors that include aggression and impulsiveness that occur during childhood. These behaviors are referred collectively by Diagnostic Statistical Manual- Fourth Edition (DSM-IV) (2) criteria as Attention Deficit and Disruptive Behaviors Disorders. The three subgroups of externalizing disorders include the Oppositional Defiant Disorder (ODD), the Attention Deficit Hyperactivity Disorder (ADHD), and the Conduct Disorder (CD).

ADHD children have been found (3) to have a pattern of high level of aggressiveness are at higher risk of developing psychological, academic, emotional, and social difficulties than children with ADHD without a pattern of aggressiveness. This study (3) found that 60% to 76% of the aggressive ADHD children (n=154) also qualified for an ODD. A study in Puerto Rico (4) found that 93% of the Puerto Rican children having ADHD also had comorbidity with Oppositional Defiant or Conduct Disorder.

Also in Puerto Rico, Bauermeister, and his associates (4) performed a factor analysis on teacher ratings of symptoms in a sample of children 6 to 16 years (n=614) which yielded two factors: Inattention and Hyperactive-Impulsivity. Subsequent cluster analyses ended at five clusters. These clusters were: 1) Hyperactive (characterized by high hyperactivity-impulsivity and moderately high inattention scores), 2) Inattentive (very high inattention but very low hyperactivity-impulsivity scores), 3) Inattentive-Hyperactive (high scores on both

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Inattention and Hyperactivity-impulsivity), 4) Normal (scores of both factors that approximate the total sample means), and 5) Highly adapted (had scores on both factors that were lower than the total sample). The authors found that the children in the first three clusters showed more clinical impairments than children did in the Normal and Highly adapted cluster. Some of these clusters are related with symptoms of aggressiveness. The inattentive-hyperactive children were rated by teachers as significantly more aggressive, self-destructive and showing more behavioral problems than the inattentive, normal, and highly adapted groups.

Barkley (5) argues in his theory of the etiology of ADHD that self-regulation is the most important component in explaining ADHD. With self-regulation, he refers to "any response or chain of responses, by the individual that alters the probability of their subsequent response to an event and ... a later consequence related to that event" (p. 232). In addition, cognitive components related to executive functions of self-regulation may also lead to behavioral inhibition associated with ADHD. According to Barkley (5), behavioral inhibition includes three areas: (1) inhibiting an initial automatic response to an event, (2) delaying an ongoing response or response pattern in order to stop and think about possible consequences, and (3) protecting this period of delay from other events that can affect the outcome or decision making. Preventing this initial automatic response to an event is vital in establishing self-control, especially when a person's experiences shape the way he or she thinks or perceives his or her environment.

Moreover, Barkley (5) concludes, "it is widely accepted by scientists studying ADHD children that they display a greater degree of difficulties with oppositional and defiant behavior, aggressiveness and conduct problems..."(p. 142). He goes on to hypothesized that this type of oppositional and aggressive behavior are also the result of "cognitive and attention/inhibitory deficits typical of ADHD" (p. 142). Barkley (5) suggests that ADHD children who also exhibit oppositional defiant and aggressive do tend to have a greater likelihood to experience social problems like problems with the law, truancy etc.

Bauermeister and his associates (6) conducted another study in Puerto Rico with 119 children, ages six to eleven years, directed at assessing in part the relationship between ADHD and oppositional defiant, aggressive, and delinquent behavior. They identified three groups of children in their analyses: those with high scores of inattention only, those with a combination of inattention and hyperactivity-impulsivity and with no diagnosis. The authors found that mothers tended to rate inattentive and hyperactive-impulsive children as showing more oppositional defiant behaviors, externalizing behaviors and

attention problems than inattentive children and the normal group. In this study, teachers rated inattentive and hyperactive-impulsive children as having more oppositional defiant, aggressive, and delinquent behaviors than the inattentive children and the normal group. This latter group corresponds to the ADHD-Combined Type as described in the DSM-IV.

However, Bauermeister and his associates (6) did not assess directly the relationship between impulsiveness, hyperactivity and inattention, aggressive behavior and other emotional symptoms in ADHD children like depressed mood. Considerable data indicate that, particularly in clinic-based samples, children with ADHD are more likely to meet diagnostic criteria for one or more mood disorders than are comparison children (7). Children with comorbid ADHD and depressive symptoms also appear to be at higher risk for poor outcomes (e.g., suicidality). Moreover, in community samples, ADHD has been associated with elevated levels of depressive symptoms (8).

First and his associates (9) gave differential diagnosis decision trees for aggressive behavior, behavior problems in a child, and the mental disorder categories most commonly seen in disruptive and impulse control syndromes. The clinical observation and research studies also, suggest that emotional self-control may be problematic for children with ADHD (5). The possibility that the commonly noted association of ADHD with defiant and hostile behavior may, at least in part, stem from a deficiency in emotional self-regulation in those with ADHD. These findings merely suggest rather than confirm a link between ADHD and emotional self-regulation and tend to imply that the poorest emotion modulation may be within the aggressive sub-group of ADHD children. However, after reviewing the aforementioned literature, the relationship between ADHD, ODD/CD, other non-disruptive diagnoses and non disruptive disorders and depressed mood has not been studied with Puerto Rican children. Thus, the goal of the present study was to evaluate the relationship between aggressive behavior, depressed mood, other disruptive behaviors in children diagnosed with ADHD or ODD disorders in Puerto Rico.

Methods

Participants. One hundred seventy six (176) students (127 males and 49 females) from 12 public elementary schools in the San Juan area of Puerto Rico participated in the study. The participants were classified in three groups as follows:

ADHD with Aggressive Behavior Group (ADHD-AB). This group included 81 children of 12 public schools, 62

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males, and 19 females, between the ages of 9 and 13 who were diagnosed as ADHD-Combined Type referred by their teachers for aggressive behavior. The mean age for this group was 10.78 with a standard deviation of .73. The children were diagnosed as ADHD-Combined Type by trained doctoral clinical psychology students using the DSM-IV criteria of the American Psychiatric Association (APA, 2000). Besides the DSM-IV ADHD criteria, participants had to meet three of the following criteria in order to be included in this group: bullying, threatening or intimidating others, initiating physical fights, using a weapon that can cause serious physical harm to others, and being physically cruel to people or animals. However, the diagnoses of CD and ODD were considered exclusion criteria for the present study.

ADHD Group. This group included 40 children (29 males and 11 females) who were referred as having a diagnosis of ADHD-Combined Type, following DSM-IV criteria and diagnosed in a similar manner as the previous group. In addition, children in this group did not meet the criteria for aggressive behavior. The age range for this group was 9 to 13 years of age with a mean age of 10.60 and a standard deviation of 1.26. These children were selected from other public schools and were matched in socioeconomic level of the ADHD-AB.

Normal Group. This group included 55 children (36 boys and 19 girls) between the ages of 9 and 13 who did not meet the criteria for the aforementioned disorders. The mean age for this group was 10.67 with a standard deviation of 1.14. These children were selected from all the schools from which children of the other two groups were selected and matched in socioeconomic level of the other groups.

Instruments. The following instruments were administered to all participants:

Children Depression Inventory (CDI). The CDI is a self-report scale consisting of 27 items related to depression. The scale was adapted for children and youths by Kovacs (10). Scores of 0-11 are considered as absence of depression. Scores of 12-18 are considered mild depression and scores of 19 or more severe depression. The scale was translated and adapted for the Puerto Rican culture by Bernal, Rosselló, and Martinez (11). The scale has shown an internal consistency of .82 and an internal consistency of .79 (11).

Youth Self Report (YSR) (Spanish version for children). This measure was developed by Achenbach & Edelbrock (12). This version includes descriptions about the child competencies, behavioral and emotional problems as perceived by the child's mother or father. The internal consistency of the scale is of .65. This instrument was translated and adapted for Puerto Rican children by the Puerto Rico Child Psychiatric Epidemiology Study (13).

Bauermeister School Behavior Inventory (BSBI) (14). This inventory consists of six scales (for male children) and five (for female children) completed by the teachers that evaluate anxiety symptoms, social alienation, depression, irritability-hostility, distraction-motivation and activity-impulsiveness. In addition, the inventory has three global dimensions that include insufficient/excessive control and a scale for total problems. Internal consistency fluctuates between .74 and .96; test-re-test reliability (four-week period) fluctuated between .52 a .89. This instrument was developed, validated, and standardized for the Puerto Rican population.

Socio-demographic and developmental history interview. The questionnaire used in the Children Psychiatric Epidemiological Project developed at the Medical Sciences Campus of the University of Puerto Rico (13) was administered. This questionnaire provides socio-demographic and developmental information about the child as provided by the child's mother or father.

Procedure. Approval was obtained from the Internal Review Board of Carlos Albizu University for this study. After obtaining the required informed consents from each child and teacher that participated in the present study, the CDI and the YSR were administered to the children. The BSBI was administered to the teachers. The aforementioned scales were then scored and the following statistical analyses were performed.

Statistics. A multiple regression analysis was performed using the stepwise method entering the Irritability/Hostility Scale of the BSBI as the dependent measure. This measure was determined to be an objective measure of aggressive tendencies in children since it was completed by the teachers. The score in all the rest of the scales aforementioned were entered as predictors. Separate discriminant analyses were then performed with the scores in all the aforementioned scales for males and females. In the discriminant analysis with the males' data, the grouping variable was the presence of aggressive behavior in children, namely, children with aggressive behaviors and without aggressive behaviors. The discriminant function analysis was performed in a stepwise manner with all the BSBI and YSR scales. In the discriminant analysis with the females' data, the grouping variable was also the presence of aggressive behavior. Finally, one way analyses and Sheffé comparisons were performed were performed in order to evaluate any significant differences between the three diagnostic groups.

Results

The results of the regression analysis with the males' data showed that the only significant predictors were the

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Activity/Impulsivity and Depression Scales of the BSBI in the two significant models that were obtained. The results of the regression analysis with the females' data showed that the only significant predictors were the Activity/ Impulsivity Scale of the BSBI and the Depression with Social Withdrawal Scale of the BSBI. A

Table 1. Summary of Regression Analyses for Males and Females

		Males				Females		
Model	R	R^2	F	dfs	R	R^2	F	dfs
1	.521*	.271	42.43	1,114	.655*	.443	30.2	1,38
2	.562*	.315	26.04	2,113	.734*	.539	21.6	2,37

Note. Model 1 has the Activity/Impulsivity Scale of the BSBI as its predictor. Model 2 has the Activity/Impulsivity and Depression Scales in Boys and the Activity/Impulsivity and Depression with Social Withdrawal Scales of the BSBI in Girls as their corresponding predictors.
* p<.001

Table 2. Beta Weights and Standard Errors for the BSBI Scales in Each Model

	Model 1			Model 2				
	A			A			B	
Sample	β	SE		β	SE		β	SE
Males	.374*	.057		.335*	.058		.612**	.227
Females	.484*	.088		.532*	.083		.46**	.166

Note. For males and females A = Activity Impulsivity. For males B = Depression; for females B = Depression/Social Withdrawal.
* p<.001
** p≤.01

summary of the regression analysis is presented in Table 1 and 2.

The results of the discriminant analysis with the males scores showed that the Activity/Impulsivity Scale of the BSBI was the only measure entered that was found to be significant predicting membership in the groups. In addition, the results show that 73.1% of the cases were correctly classified. A summary of the discriminant analysis for males is presented in Table 3. The

Table 3. Discriminant Function Predicting Presence of Aggressive Behavior

Canonical Discriminant Function	Males	Females
Wilks' λ	.783	.613
Canonical Correlation	.466	.622
$\chi^2(df)$	27.812*	18.078*

Note. Cases with Missing Values were excluded from the analysis.
* p≤.01

discriminant function analysis was again performed in a stepwise manner with all the BSBI and YSR scales. In step 1, the Activity/Impulsivity Scale of the BSBI was the only measure entered that was found to be significant predicting membership in the groups. In step 2, the Activity/Impulsivity Scale of the BSBI and the Social problems Scale of the YSR were the only measures entered that was found to be a significant predictor of membership in the groups. In terms of the classification statistics, 80.5% of the cases were correctly classified. A summary of the discriminant analysis for females is presented in Table 3.

In the one-way analyses of variance with the scores in each measure, significant differences between groups were

Table 4. ANOVA Results Comparing the Scores of Male Children in the Three Experimental Groups

Scale	Mean Scores and Standard Deviations			F	SIG.
	Impulsive-Aggressive Group (n = 62)	ADHD Group (n = 29)	Normal Group (n = 36)		
Children's Depression Inventory	14.56 (SD=5.81)	14.10 (SD=7.10)	13.86 (SD=7.01)	.145	.865
Social Withdrawal Scale-BSBI	11.17 (SD=3.61)	13.46 (SD=6.00)	12.03 (SD=5.04)	2.17	.119
Depression Scale-BSBI	11.57 (SD=4.20)	10.86 (SD=3.18)	8.42 (SD=2.56)	8.81	*.001
Anxiety Scale-BSBI	12.65 (SD=7.76)	12.64 (SD=6.92)	9.86 (SD=3.97)	2.22	.113
Irritability-Hostility Scale-BSBI	28.84 (SD=9.89)	18.93 (SD=9.02)	17.89 (SD=6.63)	21.05	*.001
Distraction-Motivation-Scale-BSBI	29.02 (SD=10.60)	29.54 (SD=9.86)	16.83 (SD=6.37)	22.03	*.001
Activity-Impulsiveness Scale-BSBI	35.87 (SD=14.76)	30.36 (SD=12.36)	17.64 (SD=3.81)	25.80	*.001
Depression Scale-YSR	7.98 (SD=5.10)	7.31 (SD=4.83)	6.94 (SD=5.20)	.515	.599
Social Problems Scale-YSR	4.72 (SD=2.56)	4.72 (SD=2.70)	4.47 (SD=2.04)	.137	.872
Delinquent Behavior Scale-YSR	3.98 (SD=2.86)	3.41 (SD=2.18)	4.47 (SD=3.50)	1.05	.353
Aggression Scale-YSR	11.29 (SD=6.02)	9.10 (SD=6.02)	10.31 (SD=7.38)	1.17	.315
Other Problems Scale-YSR	10.35 (SD=3.91)	10.07 (SD=4.01)	9.53 (SD=4.02)	.496	.610

*p≤.003

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obtained for the Irritability-Hostility, Distraction-Motivation, and Activity-Impulsiveness Scales of the BSBI in both males and females. In males, significant differences were found in the Depression Scale of the BSBI. Scheffé comparisons showed that both impulsive-aggressive and ADHD children scored higher in the Depression Scale of the BSBI. Scheffé comparisons also showed that, while both the ADHD and ADHD-AB groups scored higher than the normal group in the Distraction-Motivation Scale of the BSBI, the ADHD-AB scored higher in the Irritability-Hostility and Activity-Impulsiveness Scales of the BSBI than the other two groups.

A summary of the one way analyses for boys and girls are presented in Tables 4 and 5. Table 6 summarizes the

Table 6. Summary of Significant Scheffé Analyses Comparing the Three Experimental Groups

Scale	Group	p
CASQ-P	Impulsive-Aggressive vs. Normal	*.001
Irritability-Hostility Scale-BSBI	Impulsive-Aggressive vs. Normal	*.001
	Impulsive-Aggressive vs. ADHD	*.001
Distractibility Scale-BSBI	Impulsive-Aggressive vs. Normal	*.001
Impulsiveness Scale-BSBI	Impulsive-Aggressive vs. Normal	*.001
Insufficient Control Scale-BSBI	Impulsive-Aggressive vs. Normal	*.001

*$p \leq .003$

results of the Scheffé significant comparisons between the three experimental groups.

Table 5. ANOVA Results Comparing the Scores of Female Children in the Three Experimental Groups

Scale	Mean Scores and Standard Deviations			F	SIG.
	Impulsive-Aggressive Group (n = 19)	ADHD Group (n = 11)	Normal Group (n = 19)		
Children's Depression Inventory	14.05 (SD=8.49)	17.64 (SD=8.94)	16.37 (SD=7.85)	.726	.489
Social Withdrawal and Depression Scale-BSBI	13.54 (SD=9.15)	10.40 (SD=4.01)	14.32 (SD=7.59)	.946	.398
Anxiety Scale-BSBI	13.08 (SD=8.36)	13.90 (SD=6.52)	11.37 (SD=5.68)	.527	.595
Irritability-Hostility Scale-BSBI	35.17 (SD=9.80)	19.50 (SD=5.58)	16.47 (SD=5.64)	26.91	*.001
Distraction-Motivation-Scale-BSBI	31.17 (SD=7.99)	31.50 (SD=10.82)	17.74 (SD=8.01)	12.28	*.001
Activity-Impulsiveness Scale-BSBI	40.67 (SD=16.28)	28.60 (SD=10.24)	17.58 (SD=8.35)	14.68	*.001
Depression Scale-YSR	9.47 (SD=4.75)	8.36 (SD=4.74)	9.68 (SD=6.39)	.219	.804
Social Problems Scale-YSR	6.05 (SD=2.88)	5.09 (SD=1.76)	4.74 (SD=2.21)	1.48	.238
Delinquent Behavior Scale-YSR	4.21 (SD=2.14)	3.27 (SD=1.85)	3.79 (SD=2.12)	.718	.493
Aggression Scale-YSR	11.42 (SD=6.54)	8.00 (SD=4.49)	9.42 (SD=5.28)	1.37	.264
Other Problems Scale-YSR	12.58 (SD=4.90)	8.54 (SD=2.88)	10.16 (SD=4.73)	3.10	.055

*$p \leq .003$

Discussion

Our results indicate that the best predictors of aggressive behavior were impulsiveness and hyperactivity, as measured by the Activity/Impulsivity Scale of the BSBI for both ADHD males and females Puerto Rican children. Also, the best grouping variable that classified children as aggressive was impulsiveness and hyperactivity, measured by the Activity/Impulsivity Scale of the BSBI, for both males and females. However, in females the perception of social problems, measured by the Social Problem Scale of the YSR, was also found to be a significant grouping variable. In addition, the teachers rated the ADHD-AB male and female groups as more impulsive/hyperactive and irritable, as measured by the Activity/Impulsivity and Irritability Scales of the BSBI, than the non-aggressive ADHD and the normal groups.

Taken together, these findings provide evidence that Puerto Rican children appear to behave differently from children reported in studies in the continental U.S. (3). For instance, Shelton and his associates (3) found that all three factors related to ADHD, namely, inattentiveness, hyperactivity, and impulsivity were related to aggressive behavior in ADHD children. Our present study suggests that, of these three factors, only impulsiveness and hyperactivity appear to be consistently related to aggressive behavior, not inattentiveness in Puerto Rican children. As was discussed above, only measures of impulsivity and hyperactivity were found to be good predictor variables for

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aggressive behavior in Puerto Rican children. These results are more consistent with Barkley's (5) latest formulation of his model in terms of the emphasis on the role of poor self-regulation, reflected in high impulsiveness and hyperactivity in the development of ADHD. Barkley (5) suggests that this impulsivity and deficits in self-regulation may lead to the onset of aggressive behavior in ADHD children. No cultural differences between Puerto Rican and continental USA children were found that could explain these results. In fact, these results could be used to validate its applicability of Barkley's model with Puerto Rican children.

The finding that depressed mood did predict significantly aggressive behavior in children is also consistent with Barkley's (5) suggestion that there is a high comorbidity of depressed mood with ADHD. Barkley's (5) prediction that ADHD children have a high incidence of social adversity is partially supported again by the finding that in the female children a good predictor of aggressive behavior was perception of social problems. One possible explanation for this pattern of results with Puerto Rican children could be framed within the social cognitive model. A social cognitive model takes into consideration children's social cognition, that is, how they perceive their social environment and how they respond to the perceived problems in that environment (1). Depression in children has been associated with the perception of their environment as hostile and threatening, instead of an environment that promotes the development of empathy, assertiveness, and confidence (15). Thus, instead of these Puerto Rican children perceiving a society that establishes a foundation for the growth of positive traits, including skill in reasoning and communication, they might develop depressive cognitions related to a sense of rejection and frustration from that hostile and threatening environment. Thus, in turn these depressive cognitions might lead to aggressive behaviors to defend the children from this perceived hostile and threatening environment.

The main limitation of the present study was the limited number of participants. Thus, future research needs to validate these results with a larger sample. Finally, more precise diagnostic classifications that follow more systematized and established diagnostic procedures are needed to further guarantee the appropriate assignment to the diagnostic groups, which should improve the generalizability of these results.

Conclusions

The main conclusions of these results are the following. First, inattentiveness does not appear to be a relevant factor in ADHD Puerto Rican children who exhibit aggressive behavior. Thus, the clinical implication of this finding is that inattentiveness does not need to be assessed with these children and the assessment should focused exclusively on self-regulation skills as suggested by Barkley (5). Second, we need to be cognizant to the fact that Puerto Rican ADHD children do exhibit high co-morbidity for aggressive behavior, depressed mood, and social problems. Thus, our diagnostic and treatment approaches with ADHD Puerto Rican children need to include an assessment of the social environment of the child and its effect on his emotional state, in particular his or her mood. Thus, the assessment techniques need to be comprehensive with particular attention to the child's social environment and how it might be affecting his or her mood. In conclusion, we need to conceptualize ADHD as a multidimensional and multi-factorial disorder that needs to be assessed and intervene in a similar comprehensive manner.

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