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Running Head: RISK FACTORS FOR CHALLENGING BEHAVIOR

Analysis of risk factors and early predictors of challenging behavior for children with

autism spectrum disorder

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Abstract

The current study evaluated risk factors for the occurrence, frequency and severity of challenging behavior among a sample of individuals with a diagnosis of autism, under the age of eighteen, in Ireland. Age, gender, hours of intervention received, age at diagnosis, presence of challenging behavior at diagnosis and treatment type at diagnosis were not found to be significant predictors for the frequency or severity of challenging behavior. The participants' IQ was found to be a significant predictor of the frequency and severity of the behaviors measured. Lower IQ predicted greater frequencies of stereotyped behavior, aggression and self-injurious behavior along with increased severity of stereotyped behavior and self-injurious behavior. The intervention participants were currently receiving was not significant in predicting the frequency of challenging behavior, nor the severity of aggressive or self-injurious behaviors. However, this variable was a significant predictor of severity of stereotyped behaviors with individuals currently in Applied Behavior Analysis interventions presenting with more severe stereotyped behavior than those currently in "eclectic" interventions. Additional findings and implications in relation to these variables are discussed.

Keywords: Autism, challenging behavior, risk factors, IQ, stereotyped behavior, aggression, self-injurious behavior

Analysis of Risk Factors and Early Predictors of Challenging Behavior for Children

with Autism Spectrum Disorder

Research on the prevalence of challenging behavior among individuals with intellectual disabilities has established a prevalence rate of 10-15% (Holden & Gitlesen, 2006; Emerson et al., 2001a). Challenging behavior includes aggression, self-injurious behaviors, stereotypies and other destructive or disruptive behaviors. In particular, investigation of specific factors associated with the presence of challenging behavior has determined that those individuals with a diagnosis of autism will be more at risk for developing challenging behaviors (Holden & Gitlesen, 2006). This is not surprising given the social and communicative deficits which are core to the disorder. In an investigation of self-injurious behavior (SIB) among children with autism, Baghdadli, Pascal, Grisi and Aussilloux (2003) found that 50% of their 222 participants experienced SIB and 14.6% had severe SIB.

Negative implications on an individual's life coincide with the presence of challenging behavior. Physical consequences may be apparent in the form of physical injury to themselves, staff or others around them. Emerson et al., (2001b) describe the physical outcomes of SIB as including secondary infections, physical malformation of the face or limbs, loss of sight or hearing, additional neurological damage and even death. Such risks for the physical well-being of the individual, and those around them, impact on the individual's socialization and integration potential. Emerson et al., (2001b) regard those with challenging behavior as at risk of social exclusion. Academic, developmental and adaptive behavior may also be affected, in that challenging behaviors interfere with learning and development (Holden & Gitlesen, 2006). Finally, Matson and Nebel-Schwalm (2007) make reference to the

long-term outcome for an individual with persisting, severe challenging behavior, suggesting bleak consequences and long-term inpatient care.

Emerson (2001) defined challenging behavior as "culturally abnormal behavior(s) of such intensity, frequency or duration that the physical safety of the person or others is likely to be placed in serious jeopardy or behavior which is likely to seriously limit use of, or result in the person being denied access to, ordinary community facilities" (p.3.). Despite its debilitating effects, more extensive research is needed in order to ascertain the most effective and efficient methods of intervening. Baghdadli et al., (2003) maintain that research on prevalence of SIB's, risk factors, outcomes and treatments is insufficient to date. Specifically, there is a lack of such information regarding children with SIB.

Matson and Nebel-Schwalm (2007) propose a lack of research in the areas of best assessment of challenging behavior in children with ASD, development of scaling methods for challenging behavior, co-morbidity as an influential variable, goals of assessment and systematic means of assessment, treatment priorities and risk factors. Further, they suggest that research in the area of risk factors would be beneficial in terms of identifying those who are most likely to develop challenging behavior and establishing the degree of difficulty in treating specific children's behaviors. Essentially, the authors recognise these factors as significant in determining how early assessment and intervention needs to occur, how intensive intervention may need to be and what types of treatment strategies may be necessary.

Research to date in relation to risk factors associated with challenging behavior, has implicated a number of variables. Holden and Gitlesen (2006) carried out a total population study of challenging behavior in Norway. They found a prevalence of 11.1% for people with mental retardation. Challenging behavior was

independent of gender. It was associated with age and autism but not with syndromes and increased with severity of mental retardation. One third of people with challenging behavior lived with their natural families and had less communication and social skills.

Emerson et al., (2001a) conducted a total population study in England to assess the prevalence of challenging behavior and its associated variables. They found that challenging behavior was present in 10-15% of people with mental retardation. Approximately two-thirds of those with problem behavior were male and nearly two-thirds were adolescents or young adults. Those with severe challenging behavior needed greater levels of assistance in eating, dressing and washing and had more restricted expressive and receptive communication.

Baghdadli et al., (2003) evaluated risk factors for self-injurious behaviors among children with autism. Results indicated that 50% of the children experienced SIB and 14.6% had severe SIB. Risk factors included chronological age, associated perinatal condition, higher degree of autism and a higher daily living skills delay. Parental class, sex and epilepsy were also assessed but not found to be associated.

Murphy, Healy and Leader (2009) assessed risk factors associated with challenging behavior among children with autism in Ireland. Over 82% of the participants displayed challenging behavior. Age was not found to be a risk factor, while level of intellectual functioning was associated with severity of SIB. Type of intervention received by the participants was not associated with prevalence of challenging behavior. However, those receiving Applied Behavior Analysis displayed a higher frequency of stereotypy and showed higher levels of aggression. There was a much greater number of participants in Applied Behavior Analysis

interventions (67.5%), limiting representation of challenging behavior among participants in alternative interventions.

The present study incorporates many of these variables with the intent to evaluate age, gender, IQ, hours of intervention received and type of intervention received in relation to the presence, frequency and severity of challenging behavior among participants with autism. In addition, the participant's age at diagnosis, presence of challenging behavior at diagnosis, intervention being received at diagnosis and current intervention will be investigated to establish whether these variables have an effect on the same dependent variables. Research investigating these additional factors would be beneficial in order to ascertain their relationship with the development of challenging behavior among children with ASD.

Early identification of ASD is crucial so that children can receive the most appropriate and effective intervention. Early identification and intensive, early intervention during the toddler and preschool years improves outcomes for most children with autism (Filipek, et al., 2000). The current study aims to identify the age at which each participant was diagnosed and how this is related to the presence, frequency and severity of SIB, aggressive and stereotypic behavior for each, considering also whether challenging behavior was present at diagnosis.

Early intervention is necessary but which intervention should be implemented after diagnosis is still an issue which attracts much dispute. Many therapies and treatments are implemented with children with ASD but not one in particular which has decidedly won the support and commitment from all treatment providers for children with autism. Some of the available treatments include TEACCH, elimination diets, Facilitated Communication, Sensory-integration, DIR, medical treatments,

"eclectic" interventions and early intensive behavioral intervention. The current study

will evaluate intervention type for associations with challenging behavior.

Given the predicted persistence of challenging behavior throughout an

individual's life (Emerson et al., 2001b), an expansion of research evaluating

challenging behavior and its associated variables is necessary in order to ascertain

best practices which are of most benefit and least harm to the individual concerned.

The present study aims to evaluate age, IQ, gender, hours of intervention received,

age at diagnosis, presence of challenging behavior at diagnosis, treatment type at

diagnosis and current treatment type in order to contribute to and expand the existing

research evaluating risk factors for the presence of challenging behavior.

Method

Participants

Information was collected for a total number of 174 participants with a

diagnosis of autism (in accordance with DSM-IV-TR criteria). The mean age of the

sample was 8 years (SD = 2.38) ranging from 3 to 14 years. The mean age at

diagnosis was 3 years (SD = 0.91) and ranged from 1 to 5 years. Eighty-two percent

(n = 144) were males and 17.2% (n = 30) were females. A measure of intelligence

was obtained for 110 participants, 91 males and 19 females. An average level of

functioning was found for 14.3% (n = 13) of the male participants and 26.3% (n = 5)

of the female participants. A Mild intellectual disability was reported for 39.6% (n =

36) of males and 47.4% (n = 9) of female participants. A moderate intellectual

disability was reported for 25.3% (n = 23) of males and 15.8% (n = 3) of females.

Two percent (n = 2) of males had a profound intellectual disability while no female

participants had a profound intellectual disability and 18.7% (n = 17) and 10.5% (n

=2) of females had a severe intellectual disability.

Applied Behavior Analysis (ABA) programs and "eclectic" approaches (numerous interventions applied across the school day) were the only two interventions which were reported as current interventions. Seventy-one point three percent (n = 124) of participants were in the ABA group while 28.7% (n = 50) were in the "eclectic" group. Interventions at diagnosis were reported to be ABA programs, "eclectic", no intervention, pre-school, Montessori or mainstream for 97.7% (n = 170) of the participants. Thirty-nine point four percent (n = 67) of the participants received ABA interventions at diagnosis; 34.7% (n = 59) received "eclectic" interventions at diagnosis; 2.4% (n = 4) received no intervention at diagnosis; and 23.5% (n = 40) went to preschool, Montessori or mainstream. Of these 170 participants 27.1% (n = 46) had since moved from "eclectic" to ABA interventions; 35.3% had began in an ABA program and remained in an ABA program; 8.2% (n =14) had moved from preschool, Montessori or mainstream to an ABA intervention; 2.4% (n = 4) had moved from no intervention to an "eclectic" program; 7.6% (n = 13) had began in "eclectic" interventions and stayed in "eclectic" interventions; 15.3% had moved from preschool, Montessori or mainstream to "eclectic" interventions; and 4.1% (n = 7) had moved from ABA interventions to "eclectic".

Information collected

The Behavior problems Inventory (BPI-01; Rojahn, Matson, Lott, Esbensen & Small, 2001) was completed for each participant. The BPI is a 52-item respondent-based behavior rating instrument for self-injurious, stereotypic and aggressive/destructive behavior. Items are rated on a frequency scale and a severity scale. There are 15 items pertaining to self-injurious behavior, 24 items for stereotyped behaviors and 11 items for aggressive behaviors. These items consist of examples of topographies of behaviors that occur and an option to choose never (0),

monthly (1), weekly (2), daily (3) or hourly (4) on the frequency scale and slight (1), moderate (2) or severe (3) on the severity scale. There is also a residual item for behaviors that were not listed under each category of behavior. These items are scored on the basis that they have been observed during the past two months. The scored numbers relevant to the frequency and severity of each of the behaviors are added to get a total frequency and severity rating on self-injurious, stereotyped and aggressive behaviors. Within each category of behavior, a generic definition relevant to all items in this category was also provided. Self-injurious behavior was defined as behavior that causes damage to the person's own body and occurs repeatedly in the same way over and over again in a way that is characteristic for that person. Stereotyped behavior was defined as behavior that looks unusual, strange or inappropriate, is a voluntary act, occurs repeatedly in the same way and is characteristic for that person but do not cause physical damage. Aggressive or destructive behavior was defined as behavior that involves offensive actions or a deliberate attack directed toward other individuals or objects, occurs repeatedly and is characteristic for that person. This rating scale also provides a section to complete regarding participants' age, gender and IQ. Rojahn et al. (2001) found the BPI to be a reliable and valid behavior rating instrument for problem behaviors for participants with intellectual disabilities and developmental disabilities.

An additional section, which provided information on the participants' age at diagnosis, whether challenging behavior was present at diagnosis or not, what the participants' intervention was at diagnosis, their current intervention, hours of intervention received per week and the length of time in their current intervention, was also distributed along with each rating scale.

Informants

Rating scales were distributed to staff members who worked with or taught the participants. They were required to have worked with the participant for at least one year and were identified as having good knowledge of the participant.

Results

The prevalence of challenging behavior in the sample was 93.7% (n = 163). The prevalence of self-injurious behaviors was 48.9% (n = 85). Ninety-two percent (n = 160) of the participants were reported to have stereotyped behaviors while 56.3% (n = 98) had aggressive behaviors. Thirty-five point six percent (n = 62) were reported to have all three behaviors. Only 6.3% (n = 11) of the total sample were reported to have no challenging behavior.

----- (Insert Table 1 here) -----

A standard multiple regression was used to assess the ability of a model including age, gender, age at diagnosis, presence of challenging behavior at diagnosis, IQ, hours in intervention per week, length of time in current intervention and current intervention type to predict the frequency of stereotyped behaviors. Total variance explained by the model as a whole was 19.2%, $F (8, 101) = 4.2$, $p<.001$. Only IQ was statistically significant as an individual predictor of frequency of stereotyped behaviors (beta = .438, $p<.001$). There was a positive correlation between frequency of stereotyped behaviors and IQ, $r = .460$, $n = 110$, $p < .001$. Higher IQ was associated with lower frequency of stereotypy.

A standard multiple regression was carried out with the same predictor variables to evaluate their ability to predict severity of stereotyped behaviors. Total variance explained by the model as a whole for severity of stereotypy was 22.3%, $F (8, 101) = 4.9$, $p < .001$. IQ and current intervention were statistically significant in

predicting severity of stereotyped behaviors with IQ recording a higher beta value (beta = .39, p < .001) than current intervention (beta = .24, p < .05). There was a positive correlation between IQ and severity of stereotyped behaviors, r = .476, n = 110, p < .001. Higher IQ was associated with lower severity of stereotyped behaviors. There was a positive correlation between current intervention and severity of stereotyped behaviors, p = .396, n =173, p < .001. More severe stereotyped behaviors were associated with ABA interventions and less severe were associated with "eclectic" interventions.

Standard multiple regressions were conducted with the same predictor variables to assess their ability to predict severity and frequency of aggressive behaviors. The total variance explained by the model for both of these criterion variables was not significant. However, IQ was significant as an individual predictor of frequency of aggressive behaviors (beta = .259, p < .05) with both variables having a small positive correlation r = .263, n = 110, p = .005. Higher IQ was associated with a lower frequency of aggressive behaviors.

Standard multiple regressions were conducted again with the same predictor variables to evaluate their ability to predict frequency and severity of self-injurious behaviors. The total variance explained by the model for frequency of self-injurious behavior was 11.8%, F (8, 101) 2.81, p < .05 with IQ again being the only statistically significant individual predictor (beta = .391, P = .001) and having a positive correlation with frequency of self-injurious behavior, r = .403, n = 110, p = .001. The total variance explained by the model for severity of self-injurious behaviors was 9%, F (8, 100) = 2.4, p < .05 with IQ still the only statistically significant individual predictor (beta = .279, p < .05) with a positive correlation with severity of self-

injurious behavior, r = .358, n = 109, p < .001. Higher IQ was associated with lower frequency and severity of self-injurious behaviors.

Kruskal-Wallis tests were conducted to evaluate the differences in frequency and severity of self-injurious, aggressive and stereotyped behaviors across the four groups of participants representing intervention type at diagnosis. These tests revealed a significant difference in frequency of self-injurious behavior, χ2 (3, n = 170) = 7.87, p < .05; severity of self-injurious behavior, χ2 (3, n = 168) = 8.55, p < .05; frequency of stereotyped behaviors, χ2 (3, n = 170) = 16.88, p < .05; severity of stereotyped behaviors, χ2 (3, n = 169) = 15.12, p < .05. For all of these, the mean ranks showed that participants who began in "eclectic" interventions at diagnosis scored higher on the frequency and severity of stereotyped and self-injurious behaviors. Table 2 illustrates the mean ranks for frequency of self-injurious behaviors which were similar to the results for all dependent variables.

----- (Insert Table 2 here) -----

Kruskal-Wallis tests were conducted to evaluate the differences in frequency and severity of self-injurious, aggressive and stereotyped behaviors across the seven groups of participants representing the variable "intervention at diagnosis and current intervention" (what intervention the participant was receiving at diagnosis and what intervention they had moved to and receiving currently). These tests revealed a significant difference in frequency of self-injurious behavior, χ2 (6, n = 170) = 21.6, p < .05; severity of self-injurious behavior, χ2 (6, n = 168) = 26.9, p < .05; frequency of aggressive behaviors χ2 (6, n = 170) = 20.92, p < .05; severity of aggressive behaviors, χ2 (6, n = 169) = 23.25, p < .05; frequency of stereotyped behaviors, χ2 (6, n = 170) = 41.12, p < .05; severity of stereotyped behaviors, χ2 (6, n = 169) = 52.29, p < .05. For all of these, the mean ranks showed that participants who had begun in

"eclectic" interventions and moved to ABA interventions had the highest rank and score on all of the dependent variables. Those who had moved from ABA interventions to "eclectic" had the lowest. Table 3 illustrates the mean ranks for severity of stereotyped behaviors which were similar to the results for all dependent variables.

----- (Insert Table 3 here) -----

Independent-samples t-tests were carried out to compare scores on frequency and severity of self-injurious, aggressive and stereotyped behaviors between the only two interventions reported as being used currently - "eclectic" interventions and ABA interventions. They revealed significant differences in frequency of self-injurious behaviors for "eclectic" programs (M = 1.24, SD = 2.7) and ABA programs (M = 3.87, SD = 4.74), t(172) = 3.68, p < .001; severity of self-injurious behaviors for "eclectic" interventions (M = .5, SD = 1.33) and ABA interventions(M = 2.75, SD = 3.63), t(170) = 4.17, p < .001; frequency of aggressive behaviors for "eclectic" interventions (M = 2.44, SD = 4.7) and ABA interventions (M = 5.16, SD = 7.06), t (172) = 2.51, p < .05: severity of aggression for "eclectic" interventions (M = 1.3, SD = 2.93) and ABA interventions(M = 3.79, SD = 4.80), t (171) = 3.38, p <.05; frequency of stereotypy for "eclectic" interventions (M = 8.4, SD = 9.45) and ABA interventions (M = 20.33, SD = 17.03), t(172) = 4.67, p < .001; severity of stereotypy for "eclectic" interventions (M = 3.71, SD = 4.61) and ABA interventions(M = 10.95, SD = 8.48), t (171) = 5.64, p< .001.

A Chi-square test for independence indicated a significant association between the presence of challenging behavior at diagnosis and current intervention, $\chi2$ (1, n = 173) = 32.26, p < .001, phi = .45. With regards to participants who had challenging behavior at diagnosis, 11.9% were currently in "eclectic" interventions and 88.1%

were in ABA. Of participants who did not have challenging behavior at diagnosis,

52.8% were currently in "eclectic" interventions while 47.2% were in ABA.

A Chi-square test for independence indicated a significant association between

the presence of challenging behavior at diagnosis and intervention at diagnosis, χ2 (4,

n = 169) = 28.94, p < .001, phi = .41. Of those who did have challenging behavior at

diagnosis, 39% received "eclectic" intervention at diagnosis; 49% received ABA

interventions, 11% went to preschool, Montessori or mainstream and 0% had no

intervention. Of those who did not have challenging behavior at diagnosis, 27.5%

received "eclectic" interventions; 26% received ABA programs; 40% went to

preschool, Montessori or mainstream and 5.8% had no intervention.

A Chi-square test for independence also indicated a significant association

between presence of challenging behavior at diagnosis and change in intervention

type, χ2 (6, n = 169) = 47.91, p < .001, phi = .532. Table 4 illustrates the changes in

interventions made and percentage of participants in each group in relation to the

presence of challenging behavior at diagnosis.

----- (Insert Table 4 here) -----

Discussion

Similar to previous findings (Murphy et al., 2009), 93.7% of the participants

(n = 174) engaged in either self-injurious, aggressive or stereotyped behaviors. The

finding that 48.9% (n = 85) of participants engaged in self-injurious behaviors is

similar to Baghdadli et al., (2003) who found a prevalence of 50% for self-injurious

behaviors among 222 children with autistic disorders. The prevalence of stereotyped

behaviors was nearly as high as the prevalence of challenging behaviors for the total

sample (92%, n = 160) demonstrating that stereotyped behaviors were the most

frequently occurring behavior within this sample. In fact, of the 93.7% who engaged

in challenging behavior, only 3 did not engage in stereotyped behaviors. Stereotypy can be extremely inhibitory in the development of adaptive behavior, play skills and the acquisition of even simple discrimination tasks (Cunningham & Schreibman, 2007). Practitioners should be aware of such a high prevalence of stereotyped behaviors among children with autism and its repercussions, so that development of such behaviors can be prevented or decreased. Aggressive behaviors were also quite prevalent with 56.3% (n = 98) engaging in such behavior.

Age, gender, age at diagnosis, presence of challenging behavior at diagnosis, IQ, hours in intervention per week, length of time in current intervention and current intervention type were analyzed to predict frequency and severity of self-injurious, aggressive and stereotyped behaviors using multiple regression analysis. As a whole the model was successful in explaining 19.2% of the variance for frequency of stereotyped behaviors, 22.3% of the variance for severity of stereotyped behaviors, 11.8% of the variance for frequency of self-injurious behaviors and 9% of the variance for severity of self-injurious behaviors. It was not significant for predicting severity and frequency of aggressive behaviors.

The only two predictor variables that were significant individually were IQ and current intervention. IQ was found to be a significant predictor of frequency and severity of stereotyped and self-injurious behaviors and frequency of aggressive behaviors. This is consistent with previous research. Holden and Gitlesen (2006) reported that challenging behavior increased with severity of intellectual disability. The participants' current intervention significantly contributed to the severity of stereotyped behaviors. More severe stereotyped behaviors were associated with ABA interventions whereas less severe were associated with "eclectic" interventions.

Consistent with previous findings gender was not found to predict severity or frequency of challenging behavior. Baghdadli et al., (2003) found that gender was not a risk factor for self-injurious behavior. Similarly, Holden and Gitlesen (2006) found that gender was not associated with challenging behavior.

In contrast with previous studies, age was not a significant predictor of severity or frequency of challenging behavior. Baghdadli et al., (2003) found that self-injurious behaviors were associated with younger children. Holden and Gitlesen (2006) found a clear association between age and challenging behavior with an increasing prevalence among participants between 10 and 20 years and highest in people between 20 and 30 years. The current sample ranged in age from 3 to 14 (Mean = 8 years). A sample consisting of participants with this age range may not show the same diversity in levels of challenging behavior.

The mean age at diagnosis for this sample was 3 years. This variable, along with the presence of challenging behavior at diagnosis, hours of intervention received or length of time in current intervention, did not contribute uniquely to the variance in severity or frequency of challenging behavior.

Because intervention at diagnosis was not an appropriate variable to include in multiple regression analysis, Kruskal-Wallis tests were conducted to evaluate differences in frequency and severity of challenging behaviors among participants with regard to type of intervention received at diagnosis. Results showed that those who received "eclectic" interventions at diagnosis scored significantly higher on the frequency and severity of self-injurious and stereotyped behaviors.

 Kruskal-Wallis tests were conducted to evaluate differences in frequency and severity of challenging behaviors among participants with regard to change in intervention received (intervention at diagnosis and current intervention). Results

showed significant differences in frequency and severity of self-injurious, aggressive and stereotyped behaviors with those who had moved from "eclectic" interventions at diagnosis to ABA interventions currently having the highest rank score for all. Those who had moved from ABA to "eclectic" interventions scored the lowest.

Howard, Sparkman, Cohen, Green and Stanislaw (2005) maintain that effective early intervention can produce lasting neurobiological as well as behavioral changes as early experiences play a critical role in shaping brain architecture as well as brain function. Research has indicated in numerous studies that early intensive behavioral intervention is highly effective and much more so than an "eclectic" approach (Remington, Hastings, Kovshoff, Espinosa & Jahr, 2007; Zachor, Ben-Itzchak, Rabinovich & Lahat, 2007; Eikeseth, Smith, Jahr & Eldevik, 2002; Howard et al., 2005). Matson and Smith (2008) maintain that to date enough behaviorally oriented EIBI studies have been conducted to suggest that not only is it effective but as a congregate group of learning based methods, it stands alone as the only effective treatment for young children with ASD. With regard to challenging behavior alone, the results of the present study showed that those who received "eclectic" intervention at diagnosis scored significantly higher on severity and frequency of self-injurious and stereotyped behavior than those who received ABA at diagnosis. This further emphasizes the impact of early intensive behavioral interventions for children with autism.

Because research to date has found early intensive behavioral intervention to be the most successful relative to other interventions, the association between ABA as participants' current intervention and more severe stereotyped behaviors in this sample was surprising. For this reason, further analyses were conducted. T-tests were carried out to ascertain the differences in mean frequency and severity of

challenging behavior between the ABA and "eclectic" groups with regard to current intervention being received. Mean scores were significantly higher for all dependent variables in the ABA group suggesting that challenging behavior occurs at a higher frequency and more severely among participants currently receiving ABA. Although the participants' current intervention was a significant predictor of severity of stereotyped behavior using multiple regression, and the mean severity and frequency of challenging behavior was higher for ABA groups, we should be cautious in considering it a risk factor. Instead, these results suggest a likelihood of an association between an individuals' demonstration of challenging behavior and the subsequent provision of ABA as the recommended intervention.

In order to assess these results further, chi-square tests for independence were conducted to assess associations between whether challenging behavior was present at diagnosis and the intervention that participants currently received. The results showed a significant association, with 88.1% of participants who had challenging behavior at diagnosis now receiving ABA and only 11.9% in "eclectic" interventions. Fifty-two percent of participants who did not have challenging behavior at diagnosis were now receiving "eclectic" whereas, 47.2% were receiving ABA interventions.

Chi-square tests also showed significant associations between the presence of challenging behavior at diagnosis and the intervention participants received at diagnosis. Forty-nine percent of those who had challenging behavior at diagnosis received ABA while 39% received "eclectic" interventions. Of those who did not have challenging behavior at diagnosis, 26% received ABA while 27.5% received "eclectic" interventions. Results showed similar findings in relation to associations between the presence of challenging behavior at diagnosis and a subsequent change in intervention from that at diagnosis to present. Thirty-four percent of participants who

presented with challenging behavior at diagnosis had moved from "eclectic" to ABA interventions while 15.9% of those who did not have challenging behavior at diagnosis made the same change.

Overall, an association between the presence of challenging behavior at diagnosis and subsequent provision of ABA was demonstrated. This indicates that ABA is associated with the ability to decrease challenging behavior. Theses results are not surprising as this method of teaching is empirically validated and has been demonstrated to be highly effective in managing challenging behavior (e.g., Foxx & Meindl, 2007; Foxx & Garito, 2007). Research has determined that behavioral interventions, which focus on the particular behavior in question and its function, can be very successful in decreasing problem behaviors. Function-based interventions are more likely to facilitate the acquisition of more appropriate communicative and adaptive skills. However, it should be noted that early intensive behavioral interventions are not focused primarily on the decrease of challenging behavior but on each individuals' developmental needs and goals e.g., increasing verbal behavior, increasing social skills, and self-management skills etc.

In conclusion, using standard multiple regressions, the total variance explained by the model tested was significant for frequency and severity of stereotyped and self-injurious behavior but not for aggressive behaviors. Higher IQ is associated with lower frequency and severity of challenging behavior. More severe stereotyped behaviors were found to be associated with ABA interventions with further analyses indicating an association between the presence of challenging behavior and subsequent provision of ABA. Participants who received "eclectic" interventions at diagnosis scored highest for frequency and severity of challenging behavior. These

findings are important factors to take into consideration when attempting to prevent or reduce the emergence of challenging behavior among children with autism.

Further research regarding challenging behavior and associated variables is warranted among children with autism but also among individuals with intellectual disabilities and samples with more extensive ranges of age. Variables other than those included in this study should be assessed. Emerson, Kiernan, Turner, Hatton and Alborz (2000) investigated psychiatric symptoms as a risk factor for challenging behavior for 320 people with learning disabilities and found that increasing severity of challenging behavior was associated with increased prevalence of psychiatric symptoms. Co-morbidity of autism and other diagnoses could be evaluated as a predictor of severity and frequency of challenging behavior. As a measure of intellectual functioning may be difficult to obtain for some children with more severe characteristics of autism, future research could include a measure of autism severity in order to analyze it as a risk factor for challenging behavior.

Given the associated repercussions and the persistence with which challenging behavior occurs, further research would be invaluable in order to identify those who are at risk for the development of challenging behavior. Such research will impact on greater preventative measures and the identification of the most appropriate and scientifically-based interventions in the treatment of such behavior.

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