The Effect of Animal-Assisted Therapy on Prosocial Behaviors in Children with Autism Spectrum Disorders and Developmental Delay: A Pilot Study

Emma Mitchell

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The Effect of Animal-Assisted Therapy on Prosocial Behaviors in Children with Autism Spectrum Disorders and Developmental Delay: A Pilot Study

Emma Mitchell

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Dr. Lauren Quetsch and Dr. Michele Kilmer

April 21, 2023
Acknowledgements

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This endeavor would not have been possible without Emily-Anne del Rosario and Harlee Onovbiona, graduate students in the FCI lab. They generously gave of their time and knowledge to guide me in this project. They both deserve the utmost praise for their involvement.

A special thank you must be extended to Gryffin (pictured below). Gryffin is a black Labrador trained in the American Kennel Club Service Dog Training certification program. Our Animal Assisted Therapy sessions would not have been possible without his efforts.

Finally, I would like to thank the members of my thesis committee: Dr. Kate Chapman and Dr. Johanna Thomas. Their willingness to devote their time and knowledge to serve on my thesis committee has allowed me to complete this project, and I am extremely appreciative.
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The Effect of Animal Assisted Therapy on Prosocial Behaviors in Children with Autism Spectrum Disorders and Developmental Delay: A Pilot Study

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by difficulties in social interaction, nonverbal communication, and repetitive patterns (American Psychiatric Association [APA], 2013). Indeed, autistic individuals have been shown to have greater challenges with developing, maintaining, and understanding social relationships which can persist over their lifetime. Early intervention services are recommended for autistic children when they are young to help promote positive skills to enhance their functioning within society and increase their wellbeing over time. This is an especially pressing issue as ASD rates are rising – with the latest data now suggesting 1 in 36 children have the disorder (Centers for Disease Control and Prevention, 2023).

Several evidence-based treatment modalities are available for addressing symptoms related to ASD but interest in the use of animals to improve prosocial experiences and behavioral management has recently gained traction (e.g., animal assisted interventions; Nieforth, et al., 2021; Politte et al., 2015). This interest has been sparked due to findings suggesting that animal-assisted therapy (AAT) may enhance the quality of life for autistic youth by reducing stress and behavior problems and improving motor skills and communication (Nieforth et al., 2021). However, research investigating the use of animals, specifically canines, in clinical settings to promote prosocial behaviors in children who are at risk for developmental delay (DD) or ASD is in its infancy, leading to many gaps in evidence-based practice in the implementation of AAT and in the care of the canine (Flynn et al., 2020). The human-animal interaction between canines and children with DD and ASD along with canine care recommendations must be investigated to best understand the effect of AAT on child prosocial behavior.
Formal utilization of animals in therapy started nearly a century ago when Boris Levinson and others began working to establish protocols and interventions including animals in more diverse settings. Animal-assisted intervention (AAI) is the therapeutic use of a living animal as part of a patient’s plan of care (Shen et al., 2018). More specifically, AAT refers to a subset of AAI that consists of strategic planning by the healthcare professional to provide deliberate interventions aimed to support therapy goals through purposeful and direct interactions with animals (Flynn et al., 2020). AAT provides a further effective interaction between the patient and the animal through the support of specific goals of therapy. Since its creation, AAI has become increasingly prevalent in schools, pediatric hospitals, and pediatric out-patient care (Fynne et al., 2019).

Evidence indicates that AAT supports childhood development by addressing behavioral concerns, improving emotional and social competence, increasing youth attention span, promoting self-regulation and self-soothing, facilitating socialization and interaction opportunities, and providing an increase in motivation to participate in therapy sessions (Balluerka et al., 2014, 2015; Flynn et al., 2020; Stefanini et al., 2016). AAT also provides the care team and patient with flexibility in treatment options because interventions can be implemented in different locations and are designed to meet a variety of treatment goals specific to the patient (Compitus, 2019). Furthermore, study participants often report that AAT has enhanced the concept that therapy is a safe space and facilitates interaction opportunities between the clinician and patient (Dunlop & Tsantefski, 2018; Maharaj, 2016).

While studies incorporating AAT in pediatric therapy settings have begun only recently, evidence from recent initiatives point to the success of AAT for pediatric patients with mental health concerns. Improvement in communication, mood, hopefulness, and family satisfaction
were found in adolescent psychiatric inpatient participants when AAT was incorporated alongside traditional therapeutic approaches (Sams et al., 2016). Also, hospitalized pediatric patients who were given AAT reported greater feelings of joy, satisfaction, and a decrease in pain (Lindström Nilsson et al., 2020). Most importantly, AAT supports behavioral management of autistic children (Yap et al., 2017). AAT can be an effective therapeutic intervention to enhance prosocial behaviors in autistic children as this method promotes psychological, emotional, and physical support. Within the ASD pediatric population, AAT resulted in significant improvement in communication and social interaction skills (Ávila-Álvarez et al., 2020).

Unfortunately, the lack of standardized approaches utilizing validated instruments to assess qualitative and quantitative data has hindered the use of AAT in pediatrics. Inconsistency of interventions and the absence of any standardized protocols has led to inconclusive results and has reduced the understanding of possible benefits associated with AAT implementation (Flynn et al., 2020; O’Haire, 2016). Flynn and colleagues recommended future studies address weaknesses in research methodology to provide a more accurate depiction of AAT implementation in pediatric settings (Flynn et al., 2020).

The lack of accurate analysis of human-animal interaction during sessions among the pediatric population is another crucial gap in data identified by Flynn et al. (2020). Consequentially, the process by which AAT affects therapeutic progress and long-term prognosis is not well understood. Studies must not only focus on the impact of therapy on pediatric patients but also on that of the canine, providing a more wholistic, accurate approach to applied AAT along with a clearer understanding of the process by which therapy is effective (Flynn et al., 2020).
Research Objective: To Assess the Effect of AAT on Development and Social-emotional Adaptative Functioning for Children with ASD or DD Enrolled in AAT

The problem statement for this objective is that AAT is being utilized to address adaptive and social-emotional functioning in children with DD and ASD despite the paucity of literature detailing evidence-based practices for AAT in this population. Therefore, the purpose of this objective is to examine the short-term effect of AAT on adaptive functioning and social-emotional behaviors in children at risk for ASD and DD using validated instruments.

The Patient, Intervention, Comparison, Outcome, and Time (PICOT) question for this objective is:

- In children, ages 2 to 18 years, at-risk for ASD and DD, how does AAT affect adaptive functioning and social/emotional behaviors during the 12-week therapy program?

Method

Sample

A convenience sample of four pediatric patients participated in the study (Table 1). For the purposes of anonymity, participants were given the following pseudonyms: Frank, Hunter, Naomi, and Thomas. Inclusion criteria for this study consisted of pediatric patients, ages 2 to 18 years, who were enrolled in the University of Arkansas Access for Autism (A4A) program for developmental and behavioral concerns. Participants who were afraid of canines or whose behavior was too erratic or unpredictable to safely interact with the canine were excluded from the study. Participants in the AAT program attended weekly 30-minute therapy sessions targeted at addressing deficiencies in adaptive functioning and social-emotional behaviors with a canine who underwent training in the American Kennel Club Service Dog Training certification.
program. During therapy sessions, the facilitator played games or engaged in tasks with participants to facilitate interaction and verbal or non-verbal communication. Additionally, youths’ caregivers simultaneously learned the therapeutic strategies to practice at home each week and returned to the AAT sessions to report on the child’s progress.

Protocol

This study is a smaller exploration of a larger study where 8 pediatric participants were split evenly and randomly assigned to one of two groups: Group A and Group B. Group A participants received AAT for the first 12 weeks of the study, then received 12 weeks of traditional therapy (with AAT) offered at the A4A clinic. Conversely, Group B participants received traditional therapy for the first 12 weeks of the program followed by 12 weeks of AAT, allowing researchers to compare the effect between the two groups. Validated and well-established screening and developmental assessments were administered at the beginning, during, and at the end of the 12-week AAT and traditional therapy sessions.

The larger study used a mixed-methods design to evaluate four research objectives to fully explore the effects of AAT sessions on both the canine and participant. Objective one investigated measures that ensured protection of the canine before, during, and after AAT as well as during training. Objective two examined human-animal interaction during AAT sessions between the canine and children at risk for developmental delay and ASD. Objective three assessed the effect of AAT on development and social-emotional adaptative functioning while enrolled in the 12-week AAT program. Objective four was used to determine the sustainability of effects gained during AAT on development, adaptive, and social-emotional functioning after completion of the AAT program. The present research examined the results for objective two.
For the present study, the research team planned to explore outcomes for objective two (i.e., human-animal interactions during AAT sessions between the canine and children) for participants from both Groups A \( (n = 4) \) and B \( (n = 4) \); however, due to technical difficulties, there was not complete video footage for all eight participants. Indeed, only the progress of the four participants in Group B was measured throughout their AAT sessions. Further, the handler sustained an injury during the implementation of this study. Because of this, only a portion of the sessions were conducted with Group B. Unfortunately, this meant the total number of sessions recorded and available to analyze were limited. Specifically, three sessions were coded for participants Hunter, Naomi, and Thomas, and four sessions were coded for participant Frank.

Participants’ behavior and human-canine interaction was recorded on video technology. Recordings were slated to be taken at every therapy session. Successful video recordings were reviewed by members of the research team and coded to produce quantifiable data.

Approval from the University of Arkansas’s Institutional Animal Care and Use Committee was obtained in Fall 2021. Dr. Kilmer began attending training classes with the canine shortly after. The canine completed therapy dog training in the summer of 2022. Honors students began meeting weekly to practice canine training techniques with the participating canine in the Spring 2022 semester. IRB approval was obtained in Spring 2022. The program was implemented starting in May 2022 and concluded in November 2022. Data analysis was completed in March 2023.

**Measures**

**O’HAIRE Behavior Coding for Human-Animal Interaction Research System**

The O’HAIRE Behavior Coding for Human-Animal Interaction Research (O’HAIRE; O’Haire et al., 2017) was used to objectively note human-animal bonding. The O’HAIRE coding
system encompasses observable human behavior categories, including 1) Interactive Behaviors (Social Communication and Environmental Interaction), 2) Emotional Display (Facial and Verbal), and 3) Interfering Behaviors (Aggression, Overactivity, Isolation). Each AAT session was measured for fifteen human behaviors while interacting with the canine (see Appendix A). Three 1-minute segments were randomly selected from the beginning, middle, and end of each session. The 1-minute segments were divided into 10-second intervals, and each behavior was coded as “present” or “not present” within each interval.

3AAT Human-Animal Interaction Observation Scale

The 3AAT Human-Animal Interaction Observation Scale was developed by John Hopkins University. The research team was granted special permission for its use in the present study. The 3AAT Human-Animal Interaction Observation Scale was used to objectively assess the bonding of the canine and participant. The 3AAT Observation Scale examines physical contact between the canine and participant by exploring the child initiating physical contact with the canine. Each video was watched in its entirety and a total frequency tally was collected for each child-initiated physical contact with the canine during the AAT session.

Planned Data Analysis

To compare changes over time for each of the participants on the O-HAIRE and 3AAT behavioral coding assessments, t-tests were run. All assumptions of the analyses were met unless otherwise stated. Further, graphs were created of participant behavioral codes over time to visualize any changes.

Coding of the O-HAIRE and 3AAT was completed by a team of advanced undergraduate research assistants. Coders had to undergo an extensive certification process before engaging in data analyses. All research assistants met certification and then worked collaboratively to
confirm codes and discuss uncertain codes prior to finalization of the dataset. Coders met weekly to discuss every code in the dataset. Any disagreements between coders were discussed as a group to ensure reliability. In turn, all codes in the final dataset had a reliability of $\alpha = 1.0$.

**Results**

**O’Haire Coding System**

T-tests were conducted to assess if participants’ prosocial behaviors significantly changed over the course of the 12 AAT sessions. T-tests were conducted for each of the following behaviors: Talk, Gesture, Look, Touch, Affection, and Prosocial. Analyses were not conducted for codes of Aggression, Overactivity, and Isolation as no children displayed these behaviors during any of the recorded videos. Furthermore, data was not analyzed for Emotional Display because not enough data was collected to make comparisons. The results showed that there were significant positive differences for both participants Thomas ($t(4) = 6.934, p = 0.020$) and Frank ($t(4) = 4.973, p = 0.016$) for Talk, wherein Talk increased throughout the sessions. T-tests could not be computed for Hunter and Naomi because the standard deviation was 0. The measurement for Look showed a significant positive difference for Frank ($t(4) = 4.523, p = 0.020$), but there was no significant difference for the other participants. For Touch, there was a significant positive increase for Frank ($t(4) = 8.490, p = 0.003$). There were no significant differences for the Gesture, Affection, or Prosocial behaviors for any of the participants ($ps > .05$). See Table 2.

**3AAT Human-Animal Interaction Observation Scale**

To analyze the frequency of human-animal interaction, t-tests were conducted to determine if results of any participant differed significantly over the completed sessions. Results of the t-tests revealed that frequency of the interaction was significant for Frank ($t(4) = 3.849, p$
EFFECT OF AAT ON CHILDREN WITH AUTISM

= 0.031). Frequency of interaction was not significant for Hunter, Naomi, or Thomas (ps > .05).
See Table 3.

Discussion

The goal of the present study was to explore the effect of animal-assisted therapy on adaptive functioning and social-emotional behaviors during the AAT program. The study’s results found no significant difference in prosocial behaviors in two of the participants, Hunter and Naomi. Additionally, Thomas only experienced a significant difference for the Talk prosocial behavior. However, Frank showed a significant difference in Talk, Look, and Touch behaviors. Further, Frank showed a significant difference in frequency of human-animal interaction, while no significant change was found with the other participants.

The results of the study did not support overwhelming significant changes in youth adaptive functioning and social-emotional behaviors while engaged in AAT. Instead, the study may suggest individual differences between each participant. Indeed, research indicates that autistic children vary on a number of important individual factors which can impact their adaptive functioning or social-emotional skills such as behavior problems, age, expressive language, and cognitive level (Hus et al., 2012). Importantly, Frank reported a significant difference in almost every measure, which suggests bonding and a heightened comfort level with the animal, which has been previously reported in studies of AAT with children with disabilities (Ries, 2013). Lack of significant difference with the other three participants could be attributed to a variety of factors, including non-speaking tendencies, uneasiness when interacting with animals, or lack of comfort in therapy settings (Fine, 2010).

Since our study is the first to explore the effects of AAT on social-emotional behaviors using validated instruments, it is possible that the methods used did not accurately describe the
differences reported in participants over time. Additional or alternative methods may be more useful when further exploring AAT research. For example, qualitative data could be useful to collect in future studies. Qualitative data explores nuances in individual experiences that may be missed with standardized questionnaires, especially in novel interventions or unique populations (Halcomb, 2016). Indeed, the current observational codes were unable to measure items such as openness and willingness to interact with the canine which could have impacted study outcomes. Anecdotally, the research coders noted a change in behavior and openness to the canine as the sessions progressed, which was not captured by the current assessment methods utilized. For example, Frank showed promising results from AAT, and it was suggested that he may benefit from getting a service animal of his own.

While the present study had a number of strengths, it was not without notable limitations. One of the largest limitations was the severe impact of technical complications that came from malfunctioning cameras. Originally, the study was created to compare participants in AAT and traditional therapy to determine if there was a significant difference in prosocial behaviors and interaction with the presence of a canine. First, a new recording system technology was installed within the clinical setting; however, continued delays in its launch prevented the cameras from being ready in time for the study’s initiation. Second, backup camcorders were purchased which were lower quality resolution than the in-room cameras and had a much smaller screen to capture the child as they moved around the room with the canine. In many cases, the child’s face could not be seen limiting the coding of several behaviors. Lastly, a portion of the sessions were also not recorded because the camcorders that were ordered as backup continuously failed to remain on throughout the session. Due to these extreme circumstances, we were unable to make this comparison. Furthermore, data for the study may have shown a significant difference if we had
been able to record sessions consistently. Future studies should expand on the number of
sessions recorded, as well as compare groups in AAT to groups in traditional therapy settings.

Since this was a pilot study, a small sample size was collected. We were able to
demonstrate behaviors over time in graphical representations – which is a common mechanism
for behavioral change in single subject research, especially for autistic samples (Ledford, 2019).
However, a larger sample size may provide a wider range of participants and a more even
distribution of behaviors (Dallery & Raiff, 2014). Furthermore, larger samples may allow
researchers to control for certain variables (e.g., child IQ, speaking ability) that may influence
the observed outcomes of AAT. If we had fully utilized a single subject design, the research team
would have ideally established baseline data before initiating AAT sessions. Future research may
consider studies with larger sample sizes or with a more highly structured single subject design.

Regardless, the present study is the first to explore the use of O-HAIRE and 3AAT
coding systems together. Previous research showed a lack of standardized protocols, which led to
unsecure results (Flynn et al., 2020; O’Haire, 2016). This study combined two systems, both
with clear coding criteria, to ensure the results would be standardized between participants.
Furthermore, it shed light on the impact that canine interaction can have on a child’s prosocial
behavior during therapy sessions – especially for individuals such as Frank. Additionally,
previous studies lacked accurate analysis of human-animal interaction during session (Flynn et
al., 2020). The research team was highly trained to ensure reliability in both the O-HAIRE and
3AAT coding systems (O’Haire, 2016).

Future research should continue investigating the effects of AAT on prosocial behavior in
pediatric samples. Canine-child bidirectional interactions may help explain how children respond
to AAT as well as the needs of the canines. Larger studies or more controlled samples may help
determine which children are best served by AAT. Moreover, qualitative interviews may help explore new ways AAT impact youth that are not captured in quantitative assessments.

Furthermore, openness and willingness to canines or AAT specifically may be worth measuring as they may be potential indicators of behavior change.

In conclusion, our study found significant differences in the prosocial behaviors and human-animal interaction levels for one participant, Frank. While our study did not clearly demonstrate success across all four participants, it is important to consider other factors that may have impacted youth behavior or may have improved but were not measured. Given that AAT research is in its infancy, there is much yet to be accomplished in this field as providers determine if efforts to integrate AAT into their programs is worth the time, effort, and expense.
References


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https://onlinenursing.duq.edu/blog/formulating-a-picot-question/#:~:text=The%20word%20PICOT%20is%20a,phrased%20to%20elicit%20an%20answer.


Stefanini, M. C., Martino, A., Bacci, B., & Tani, F. (2016). The effect of animal-assisted therapy on emotional and behavioral symptoms in children and adolescents hospitalized for acute...

https://doi.org/10.1016/j.eujim.2016.03.001

Table 1

Descriptives of Sample

<table>
<thead>
<tr>
<th></th>
<th>Hunter</th>
<th>Frank</th>
<th>Naomi</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>3 years and 4 months</td>
<td>10 years and 5 months</td>
<td>4 years and 7 months</td>
<td>7 years and 5 months</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td>White – Not Hispanic/Latinx</td>
<td>White – Not Hispanic/Latinx</td>
<td>White – Hispanic/Latinx</td>
<td>White – Not Hispanic/Latinx</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td><strong>Caregiver</strong></td>
<td>Mother</td>
<td>Father</td>
<td>Mother</td>
<td>Mother</td>
</tr>
<tr>
<td><strong>Language - Used</strong></td>
<td>Non-speaking</td>
<td>English</td>
<td>Spanish</td>
<td>English</td>
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</tbody>
</table>
Table 2

*Participant Within Group Comparisons of O’HAIRE Behavioral Codes Over Time*

<table>
<thead>
<tr>
<th></th>
<th>Hunter</th>
<th></th>
<th></th>
<th>Naomi</th>
<th></th>
<th></th>
<th>Thomas</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pre</td>
<td>post</td>
<td>t</td>
<td>pre</td>
<td>post</td>
<td>t</td>
<td>pre</td>
<td>post</td>
<td>t</td>
</tr>
<tr>
<td>Talk</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>9</td>
<td>18</td>
<td>0.16*</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Gesture</td>
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<td>0</td>
<td>-</td>
<td>0</td>
<td>13</td>
<td>.178</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Look</td>
<td>28</td>
<td>12</td>
<td>.091</td>
<td>14</td>
<td>33</td>
<td>0.02*</td>
<td>10</td>
<td>17</td>
<td>.099</td>
</tr>
<tr>
<td>Touch</td>
<td>11</td>
<td>4</td>
<td>.093</td>
<td>15</td>
<td>19</td>
<td>.003*</td>
<td>5</td>
<td>19</td>
<td>.094</td>
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<tr>
<td>Affection</td>
<td>2</td>
<td>0</td>
<td>.423</td>
<td>2</td>
<td>2</td>
<td>.080</td>
<td>4</td>
<td>0</td>
<td>.300</td>
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<tr>
<td>Prosocial</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>.340</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes. *p<.05, **p<.01, ***p<.001
Table 3

*Participant Within Group Comparisons of 3AAT Behavioral Codes Over Time*

<table>
<thead>
<tr>
<th></th>
<th>Hunter</th>
<th></th>
<th></th>
<th>Frank</th>
<th></th>
<th></th>
<th>Naomi</th>
<th></th>
<th></th>
<th>Thomas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pre</td>
<td>post</td>
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<td>pre</td>
<td>post</td>
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<td>pre</td>
<td>post</td>
<td>t</td>
<td>pre</td>
<td>post</td>
</tr>
<tr>
<td>Interaction</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>17</td>
<td>45</td>
<td>.031*</td>
<td>27</td>
<td>1</td>
<td>.263</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

*Notes. *p*<.05, **p**<.01, ***p***<.001*
Appendix A

O’HAIRE Behavior Coding for Human-Animal Interaction Research System Codes

<table>
<thead>
<tr>
<th>Interactive Behaviors</th>
<th>Environmental Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Communication</td>
<td></td>
</tr>
<tr>
<td>Talk: verbal communications</td>
<td>Touch: physical touch</td>
</tr>
<tr>
<td>Gesture: communicative movement of the body</td>
<td>Affection: physical affection, emotional warmth</td>
</tr>
<tr>
<td>Look: looking at a specific target</td>
<td>Prosocial: purposefully helpful behavior</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotional Display</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Verbal: statements about positive emotion or positive experiences and compliments</td>
<td>Verbal: statements about negative emotions or negative experience and complaints</td>
</tr>
<tr>
<td>Facial: smiling, laughing</td>
<td>Facial: frowning, whining, crying, tantrums</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interfering Behaviors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggression: potentially harmful behavior</td>
<td>Overactivity: fidgety, overactive behavior</td>
</tr>
</tbody>
</table>