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Kylie M. Short

Western New England University

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Peer Attention for Problem Behavior of Persons with Intellectual Disabilities:
Prevalence and Relevance

Kylie M. Short

Western New England University

Author Note

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Correspondence concerning this article should be addressed to Kylie Short, The New England Center for Children, 33 Turnpike Road, Southborough, MA 01772.

Email: Krshort@necc.org

Abstract

Studies have shown that peer attention can maintain problem behavior in typically developing children; however, very little research has been conducted on the effects of contingent peer attention on problem behavior in individuals diagnosed with autism or related intellectual disabilities. The purpose of the current study was to evaluate the prevalence and function of peer attention that occurs following problem behavior in individuals diagnosed with intellectual disabilities. Reported prevalence was investigated through teacher report on the delivery and receipt of peer attention. Observed prevalence was investigated through a descriptive assessment. The function of peer attention was assessed using modified functional analyses. Peer attention was commonly reported and observed, however, peer attention was not identified as a maintaining variable for problem behavior.

Key words: Attention, descriptive assessment, functional analysis, indirect assessment, intellectual disabilities, peer

Peer Attention for Problem Behavior of Persons with Intellectual Disabilities: Prevalence and Relevance

Individuals with intellectual disabilities may engage in problem behavior that is maintained by access to socially mediated consequences, such as attention from others (e.g., Hanley, Iwata, & McCord, 2003). Adult attention as a consequence for problem behavior has been the subject of a significant amount of research. However, there is little research on the role of peer attention in maintaining problem behavior in individuals diagnosed with intellectual disabilities. If individuals diagnosed with intellectual disabilities engage in problem behavior that is sensitive to contingent peer attention as reinforcement, a treatment such as teaching a functional communication response to gain teacher attention, while the teacher places problem behavior on extinction, may fail in an environment in which peer attention continues to be delivered. Functionally this would result in a treatment consisting of differential reinforcement of an alternative response without extinction. Previous research on differential reinforcement of an alternative response without extinction has shown that these interventions often fail (Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998).

Broadly, an investigation of peer attention as a possible reinforcer for problem behavior in individuals diagnosed with intellectual disabilities might speak to at least three issues: how often caregivers report peer attention following problem behavior, how often positive contingencies exist, in which peer attention is more likely following problem behavior, and how often peer attention functions as reinforcement for problem behavior. Research in the first two areas would help describe the social environments surrounding children with intellectual disabilities. If peer attention is not occurring on a regular basis, it may not be a concern even if it

does function as reinforcement. Research in the third area would provide information about whether contingent peer attention, when it occurs, should be a clinical concern.

Although functional analyses have been used to investigate the possibility of peer attention maintaining problem behavior (Broussard & Northup, 1997; Flood, Wilder, Flood, & Mesuda, 2002; Grauvogel-MacAleese & Wallace, 2010; Jones, Drew, & Weber, 2000; Lewis & Sugai, 1996; Northup et al., 1995 & 1997; and Skinner, Veerkamp, & Andra, 2009), no indirect assessments have been conducted on the prevalence of caregiver reports of peer attention as a consequence for problem behavior. Indirect assessments are questionnaires or interviews in which caregivers report the situations in which behavior occurs and common consequences for the behavior. Previous studies that included indirect assessments have found that attention is a commonly reported consequence for problem behavior (Healy, Brett, & Leader, 2013; Matson, Bamburg, Cherry, & Paclawskyj, 1999; Tarbox et al, 2009). However, none of these studies have included questions regarding peer attention, so the prevalence of reports of contingent peer attention is unknown.

Descriptive assessments are useful in investigating the prevalence of a phenomenon because they consist of direct observation of behavior without manipulation of environmental variables. Research involving descriptive assessments has shown that attention is a common consequence for problem behavior. Thompson and Iwata (2001) conducted a descriptive assessment of the problem behavior of adults with intellectual disabilities in a state residential facility and reported that attention from caregivers was observed following problem behavior for 24 of the 27 participants (88.9%). However, they reported that peer attention was not a common consequence and was observed on only three occasions. The results of this study suggest that peer attention is uncommon in a population of adults in a residential facility, however it is

unknown if peer attention is common following problem behavior in children diagnosed with intellectual disabilities in school environments.

Functional analyses entail systematic manipulation of variables to identify the reinforcers that maintain behavior. The role of attention as a maintaining variable for problem behavior in individuals with intellectual disabilities has been extensively studied within the functional analysis literature. Hanley, Iwata, and McCord (2003) reviewed literature published through 2000 on the use of functional analysis. Beavers, Iwata, and Lerman (2013) extended this review through 2012. In combination, the authors identified 918 data sets depicting results of functional analyses. Behavioral maintenance was attributed to automatic reinforcement in 16.3% of data sets, social negative contingencies in 32.2%, and social positive contingencies in 32.7%. Specifically, 21.7% of the data sets showed behavior maintained by attention. In combination, these reviews cite only five articles of the 435 articles reviewed (Broussard & Northup, 1997; Lewis & Sugai, 1996; and Northup et al., 1995 & 1997; Roantree & Kennedy, 2012) in which peer attention was a potential source of reinforcement, indicating that the role of peer attention as a maintaining variable for problem behavior is relatively understudied.

Research on the role of peer attention as reinforcement for problem behavior has mainly focused on individuals that are not diagnosed with intellectual disabilities (Broussard & Northup, 1997; Flood, Wilder, Flood, & Mesuda, 2002; Grauvogel-MacAleese & Wallace, 2010; Jones, Drew, & Weber, 2000; Lewis & Sugai, 1996; Northup et al., 1995 & 1997; and Skinner, Veerkamp, & Andra, 2009). For example, Northup et al. (1995) evaluated the effects of peer attention on the disruptive behavior of three children diagnosed with attention deficit hyperactivity disorder (ADHD). The study included two conditions: a therapist attention condition and a peer attention condition. In the therapist attention condition, contingent on

disruptive behavior, the therapist delivered a reprimand. In the peer attention condition, contingent on disruptive behavior, a peer confederate delivered attention. The highest rate of disruptive behavior was observed in the peer attention condition for all three participants.

Although there have been a handful of studies investigating the role of peer attention in maintaining the problem behavior of typically developing individuals, there is only one study that evaluated the effects of peer attention as a consequence for problem behavior in individuals diagnosed with intellectual disabilities. Roantree and Kennedy (2012) evaluated the effects of contingent peer attention on the inappropriate social behavior of three individuals diagnosed with Asperger's syndrome. The functional analysis included a peer attention condition, an escape-social condition, and a control condition. In the peer attention condition, contingent on inappropriate social behavior, the peer provided 30 s of attention. In the escape-social condition, the therapist asked the target student conversational questions. Contingent on appropriate responses, the peer briefly interacted with the target student and, contingent on inappropriate responses, the therapist postponed conversational questions for 30 s. In the control condition, the target student and the peer were instructed to eat their lunch quietly. Contingent on any interaction, the therapist reminded the students to be quiet. Although this study was the first and only to be conducted on the role of peer attention in maintaining problem behavior in individuals diagnosed with intellectual disabilities, the control condition was problematic. In the control condition, the therapist delivered reprimands for both appropriate and inappropriate interactions between the target student and the peer. Therefore, it is possible that the lower rate of inappropriate social behavior in this condition could be a result of positive punishment in the form of reprimands. Because this is an under researched area, the role of peer attention in maintaining problem behavior in individuals with intellectual disabilities is unknown.

The current study had three objectives. The first objective was to evaluate how often teachers of individuals diagnosed with intellectual disabilities report that their students receive attention from their peers following problem behavior. The second objective was to evaluate the prevalence of contingencies between problem behavior and peer attention in a population of children diagnosed with intellectual disabilities using direct observation. The third objective was to experimentally evaluate the effects of contingent peer attention on problem behavior in individuals diagnosed with intellectual disabilities.

Study 1: Indirect Assessment

Method

The purpose of the indirect assessment was to determine the reported prevalence and topographies of peer attention as a consequence for problem behavior in individuals diagnosed with intellectual disabilities.

Participants and setting. Teachers that worked at a residential school for individuals diagnosed with intellectual disabilities ages three through 22 (see Table 1 for participant information) completed the indirect assessment. At this school, multiple teachers worked with each student; because of this, we asked multiple teachers to answer the questionnaire for each student. In total, 221 teachers completed the questionnaire on the behavior of students they worked with on a daily basis. Questionnaires about the behavior of 156 students were completed. On average, for each student, the questionnaire was completed by 10.5 teachers (range of 5-17 teachers per student). All teachers, at minimum, had a bachelor's degree and some basic training on behavioral principles. During a regularly scheduled weekly meeting, teachers that worked with the students for a minimum of three months completed the questionnaire regarding the behavior of each of the students with whom they worked.

Procedure. Previously published closed-ended indirect assessments have not included questions specifically evaluating the relation between peer attention and problem behavior. Because evaluating peer attention was our main goal, we created a closed-ended indirect questionnaire that asked specifically about peer attention. In addition to the closed-ended portion of the indirect assessment, it also included an open-ended question about the topographies of peer attention that were reported. The first author or a trained data collector attended a weekly team meeting for each classroom at the school. The data collector read a script to ensure that instructions were provided in a consistent manner across all team meetings. The data collector explained that we were asking teachers for their opinions about attention being delivered and received between students in their classroom, that participation was voluntary, that participants could remain anonymous, and that the questionnaires should be completed independently. The written questionnaire consisted of two questions regarding the behavior of each student in that particular classroom. First, did they (teachers) think that the student typically delivered attention during or following their peers engaging in problem behavior? Second, did they (teachers) think that the student typically received attention from their peers during or after engaging in problem behavior? In addition, if it was reported that the student delivered or received attention, there was an area for the staff to describe the topography. The data collector explained that, for the purposes of this study, peer attention was defined as any attention for which another student was the delivery agent. In addition, examples of peer attention (e.g., orienting, laughing, clapping, pointing, statements about behavior, etc.) were provided. The number of individuals (students) on which each respondent (teacher) reported varied based on the number of students that the teacher worked with on a day to day basis.

Reliability

Reliability was calculated by comparing reports for each student across respondents. For each student, a respondent could report peer attention being either delivered or not delivered following problem behavior. We divided the most commonly reported consequence (peer attention or no peer attention) by the total number of reports. For example, if four teachers reported that a student received attention following problem behavior and six teachers reported that the student did not receive attention following problem behavior then the reliability would be 60% (six reports of no attention divided by 10 total reports). Using this method of calculating reliability the minimum agreement score possible is 50%. Across students the mean reliability for attention being delivered was 80.9% (range 50% -100%). Across students the mean reliability for peer attention being received by individual students was 79.2% (range 50% - 100%).

Results and discussion

The top graph of Figure 1 shows the percentage of teachers who reported that peer attention was delivered contingent upon problem behavior. Attention from peers is a commonly reported phenomenon for individuals diagnosed with intellectual disabilities. For 90% (141/156) of the students, at least one teacher reported that the student delivered attention to peers engaging in problem behavior (gray shading). For 24% (37/156) of the students, all of the teachers reported that the student delivered attention to peers when they engaged in problem behavior (dark gray shading). For 10% (15/156) of the students, all of the teachers reported that the student did not deliver attention to peers engaging in problem behavior (no shading). The bottom graph of Figure 1 shows the percentage of teachers that reported that peer attention was received by individual students contingent upon problem behavior. Although the participants are the same across the two graphs, the data are ordered from highest to lowest score and student

numbers are not held constant (i.e., student 1 in the top panel is not the same participant as student 1 in the bottom panel). For 93% (145/156) of the students, at least one teacher, reported that the student received attention following problem behavior (gray shading). For 15% (24/156) of the students, all teachers reported that the student received attention following problem behavior (dark gray shading). For 7% (11/156) of the students, all teachers reported that the student did not receive attention following problem behavior (no shading).

A Pearson product-moment correlation coefficient was computed to assess the relation between a teacher reporting peer attention being delivered and received. There was a small positive correlation between the two variables, $r = .25$. Figure 2 shows a scatterplot of the relation between teachers reporting that peer attention was delivered and received for all students. Although the correlation was positive, it was weak and the data pattern showed no systematic relation between reported peer attention delivery and receipt. Individuals that were commonly reported to deliver attention were not necessarily commonly reported to receive attention. We also completed an analysis of reported topographies of peer attention. Not all teachers that participated in the questionnaire included a description of the topography. Figure 3 shows the proportion of reported topographies of peer attention. Orienting was the most commonly reported topography (.38), followed by laughing (.22), vocals (.17), imitative problem behavior (.17), moving away from target student (.02), covering ears (.01), clapping (<.01), and stereotypy (<.01).

Study 2: Descriptive Assessment

Method

Study 1 showed that teachers commonly reported the occurrence of peer attention but it is not clear how often peer attention actually occurred following problem behavior. The purpose of

the descriptive assessment was to evaluate the prevalence of contingencies between peer attention and problem behavior, identify common topographies of peer attention, and identify topographies of problem behavior that were followed by peer attention in a population of individuals diagnosed with intellectual disabilities.

Participants. The participants (Table 1) and peers included in the descriptive assessment were individuals (ages 3-22) diagnosed with intellectual disabilities who attended a residential school. Some of the Study 2 participants also participated in Study 1; however, others did not. Participant inclusion was determined by either record review or staff nomination. Participants identified by record review were required to engage in an average of 10 instances of at least one topography problem behavior (aggression, SIB, bolting, flopping, loud vocals, or property destruction) on a daily basis. In cases in which problem behavior rate data were unavailable, inclusion was based on staff reports indicating frequent problem behavior.

Setting and procedure. Observations were 10 min in duration and were conducted in various environments (e.g., residential common rooms, student's classroom, etc.). The students were observed engaging in several different activities including academic work, leisure skills, and meals. The teacher-to-student ratio ranged from 1:1 to 1:3. Teachers were instructed to implement regular programming throughout the observation.

Data were collected when there was at least one peer in the environment with the target student. Target students were seated with either their back or side to a wall so that all peers in the environment were in their line of sight. If a peer moved out of the target student's line of site, data collection on peer attention delivered by that peer was discontinued until he or she returned to the target student's line of site. The data collector stood behind or to the side of the target student and collected data on both the problem behavior of the target student and attention

delivered by peers. If a participant or all the peers left the room for less than 5 min the timer for the observation was paused until the participant returned. If they left the room for more than 5 min the session was discontinued. The observation was discontinued if all peers left the environment, if the target student left the environment, or if the environment was no longer safe due to problem behavior. Sessions shorter than 3 min were discarded.

Data were collected in real time on the occurrence of each topography of the target student's problem behavior (aggression, property destruction, SIB, bolting or flopping, and loud or inappropriate vocals). Aggression was defined as any actual or attempted instance of hitting, kicking, scratching, or pinching another individual. Property destruction was defined as any sweeping, kicking, or banging of materials not intended as part of their functional use. SIB was defined as any forceful contact, which had the potential to cause injury, between the student's hand and body and any instance of contact between the student's body and the environment from more than 10 cm. Bolting was defined as any instance of students moving more than 1 m from their teacher without permission. Flopping was defined as any instance in which the student dropped his or her weight to the ground (lying, sitting, or on their knees) and refused to stand up within 3 s of a cue to standup. Loud vocalizations were defined as any instance of yelling, screaming, or talking above conversation level that was not prompted by the teacher. Inappropriate vocalizations were defined as any instances of cursing, bodily function conversation, or talking about inflicting harm on another individual.

Data were collected on topographies of peer attention including orienting, imitative problem behavior, laughing, and touching. These topographies were defined based on informal observations prior to the descriptive assessment. Orienting was defined as any of the following responses: turning body or head 90 degrees to face target student, lifting chin 45 degrees in the

direction of the target student, gesturing towards student, or handing something to target student. If the peer was already looking at the target student when he or she engaged in problem behavior, this would be counted as orienting only if the peer gestured towards the student or handed the student an item. Imitative problem behavior was defined as the peer engaging in the same topography of problem behavior as the target student within 20 s of the student's problem behavior. Verbal attention would have been recorded, however, the peers did not provide any verbal attention during any of the observations. Data were not collected on attention provided from adults in the environment because we were specifically trying to describe the relation between problem behavior and peer attention.

Data collection. All data were collected live using a laptop computer. We used continuous data collection in which each instance of problem behavior and attention delivery was recorded in real time. A minimum of four observations and a maximum of 10 observations were completed for each student. Data collection was discontinued when either 10 instances of problem behavior were observed within at least four observations or 10 total observations were completed, whichever came first. A total of 219 observations were completed during the descriptive assessment. The number of observations varied from four to 11 per participant because of the observed frequency of problem behavior. One additional observation was completed for one participant for intrerobserver agreement (IOA) purposes. The total duration of observations per student ranged from 25 min and 42 s to 97 min and 23 s, and frequency of problem behavior ranged from 0 to 186 instances. The mean duration per observation was 9 min, 22 s (range, 3 min, 6 s-10 min).

Data analysis. All data collection and analysis was completed using computer software. Data were analyzed to determine the unconditional probability of peer attention occurring during

the session and the probability of peer attention given problem behavior (Vollmer, Borrero, Wright, Van Camp, & Lalli, 2001). Unlike Vollmer et al., calculation of the unconditional probability included all possible intervals (i.e., intervals following each second of the entirety of the observation), rather than a sample of possible intervals to avoid sampling error impacting the unconditional probability values.

Although data were collected in real time, on a second-by-second basis, all probability calculations used 20-s intervals (Lerman & Iwata, 1993). Problem behavior intervals were those 20-s intervals following each instance of problem behavior. Problem behavior and peer attention were scored as contiguous if the peer attention occurred within 20 s of problem behavior. The probability of peer attention given problem behavior (Equation 1) was calculated by dividing the number of problem behavior intervals containing peer attention by the total number of problem behavior intervals. $P(\text{peer attention}|\text{problem behavior}) =$

$$\frac{\text{problem behavior intervals containing peer attention}}{\text{problem behavior intervals}} \quad (1)$$

The probability of attention (Equation 2) was calculated by dividing the number of intervals containing attention by the total number of intervals in the session.

$$P(\text{attention}) = \frac{\text{intervals with attention}}{\text{total intervals in the session}} \quad (2)$$

IOA. IOA was calculated for target student problem behavior and peer attention. IOA was assessed for a mean of 30% (range, 27% to 50%) of sessions across participants. The observation was divided into 10-s bins, the number of responses and events scored was tallied within each bin, the respective tallies for responses and events within each bin were compared across observers. An exact agreement method was used, such that bins in which tallies were the same for respective responses or events were counted as a 1 for those responses or events, and bins in which the tallies differed were counted as a 0. The scores for each bin were averaged for

each response and event to generate our IOA score for the sessions. The mean IOA values were 99.4% (range, 78.7% to 100%) for SIB, 99.6% (range, 90.2% to 100%) for property destruction, 99.0% (range, 85.2% to 100%) for loud or inappropriate vocals, 99.9% (range, 98.4% to 100%) for aggression, and 99.9% (range, 95.8% to 100%) for bolting/flopping. The mean IOA values for peer attention were 97% (range, 85% to 100%) for orienting, 99.8% (range, 94.4% to 100%) for laughing, 99.9% (range, 98.4% to 100%) for imitative problem behavior, and 100% for vocals and touching.

Results and Discussion

Figure 4 shows the conditional to unconditional probability data. The leftmost bars show the mean data for all participants. The mean probability of peer attention given problem behavior was .33 and the mean unconditional probability of attention was .12. The probability of attention following problem behavior was greater than the probability of attention for 15 of the 30 participants. For 7 of the 30 participants there was only a minimal (less than .02) difference between the conditional and unconditional probability. For 8 of the 30 participants the unconditional probability of attention was greater than the conditional probability of attention.

The results for the analysis of peer attention topographies are shown in Figure 5. The most common topography of peer attention was orienting (.81), followed by imitative problem behavior (.11), laughing (.04), and touching (<.01). Vocal forms of attention were not observed. The probability of attention across observed forms of problem behavior is shown in the bottom graph in Figure 5. Aggression was the topography of problem behavior that had the highest probability of being followed by peer attention ($P=.81$). Peer directed aggression was blocked by teachers and observed in only 1 of the 30 participants. Attention was also observed following bolting/flopping ($P=.50$), SIB ($P=.45$), loud or inappropriate vocals ($P=.26$), and property

destruction ($P=.14$). In summary, peer attention was more likely to follow problem behavior than to occur unconditionally for the majority of the participants. The most common topography to of peer attention was orienting towards the target student.

We found a positive contingency between problem behavior and peer attention, the conditional probability of peer attention was greater than the unconditional probability. Peer attention occurred following problem behavior 31% of the time. This positive contingency suggests further investigation of the function of peer attention with regards to problem behavior is warranted. If peer attention acts as a reinforcer our data indicate that contra-therapeutic contingencies may be common.

Study 3: Functional Analysis

Methods

The purpose of the functional analysis was to evaluate the effects of contingent peer attention on problem behavior in our participants. The effects of both peer and therapist attention were tested to determine if problem behavior was differentially sensitive to peer attention. For example, it may be possible that both therapist and peer attention functioned as reinforcers. If this were the case it may be important to use an intervention that addressed attention from either a peer or a therapist.

Participants. The functional analysis was completed with a subset of the participants from the indirect assessment and descriptive assessment (Table 1). Target students were selected for Study 3 if they still attended the school at the time of the functional analysis and if a positive contingency between problem behavior and peer attention was observed during the descriptive assessment. All students except Ginny were diagnosed with autism. Ginny was diagnosed with Smith-Magenis syndrome. Peers were identified based on student availability. Except for peer 2

and peer 3 for Chelsea, the individuals in the student dyads knew each other for an average of 2 years and 8 months (range 6 months to 4 years). For Chelsea, student dyad 1 knew each other for 6 months prior to the functional analysis, however, student dyads 2 and 3 did not know each other prior to the functional analysis.

Setting and procedure. All sessions were 5 min in duration and were conducted in a classroom or a research room. The rooms contained a table, chairs, leisure materials, and common academic materials. Data were collected on the same topographies of problem behavior as in the indirect and descriptive assessments with two modifications to address the alone condition. During the alone sessions, the definitions of bolting and flopping were modified so they no longer included a therapist presence. Bolting was defined as any instance of the student moving more than 1 m from a place he stood for at least 3 s and flopping was defined as any instance in which the student dropped his weight to the ground (lying, sitting, or on their knees) for 3 s or more. During this analysis, consequences were provided for several topographies of problem behavior. The effects of peer attention on problem behavior were assessed in this fashion to determine if any of the response topographies were sensitive to contingent peer attention. Data for each topography were plotted both in aggregate and separately to identify cases of only a subset of topographies being affected by peer attention as a consequence (Derby et al., 1994).

Therapist attention (TA) condition. Chelsea, Hank, Jackie, Donald, Ginny, Alana, and Bobby were exposed to the TA condition. In the TA condition, only the target student and the therapist were in the room. Contingent on problem behavior, the therapist provided attention in the form of a reprimand. No consequences were provided for any other responses. This

condition served as a test condition to determine if therapist attention functioned as reinforcement for student problem behavior.

Therapist differential reinforcement of an alternative response (TDRA) condition.

Chelsea, Hank, Jackie, Donald, Ginny, Alana, and Bobby were exposed to the TDRA condition. In the TDRA condition, only the target student and the therapist were in the room. A card was placed on the student's desk. If the target student either touched a card or initiated conversation with the therapist the therapist would talk to the target student until the target student stopped interacting with her for 5 s. Forced exposure to the consequence for emitting the DRA response was provided prior to conducting this condition. During the forced exposure, the therapist told the target student "if you want to talk to me, you can either touch the card or start talking to me." Then the therapist prompted the target student to touch the card. Contingent on this response the therapist talked to her for 1 to 3 min. If the student did not independently touch the card, manual guidance was provided. This condition served as a control condition for comparison with the TA condition.

Peer attention (PA) condition. Peers were students diagnosed with intellectual disabilities who interacted with the target students on a daily basis, with the exception of peers 2 and 3 for Chelsea. Chelsea's peers attended the same school with Chelsea but did not interact with her on a daily basis. Three peers were trained to deliver attention (orient towards the primary therapist) following a signal from a vibrating pager (Vibrating Wireless Personal Pager by MaxiAids or RemotePager by Safest Monster). Four peers were trained to provide attention (orient towards the primary therapist) following a prompt by the secondary therapist. We trained orienting because it was the most common topography of attention reported in the indirect assessment and was the most commonly observed topography during the descriptive

assessment for all the students that participated in the functional analysis. The primary therapist stood to the side or behind the target student so that, in orienting towards the primary therapist, the peer was also orienting towards the target student, and therefore provided attention to the target student. We designed the delivery of attention in this manner due to concerns that peers whom naturally provided peer attention may not do so with high procedural integrity, this designed allowed for high procedural integrity without teaching the peers to systematically provide attention following problem behavior.

Peers were trained in one of two ways. If the peer could follow instructions to respond to a vibrating pager, she was told to turn around only when the pager vibrated. If the peer could not follow instructions to respond to a vibrating pager, a secondary therapist wore the pager and quietly prompted the peer to look at the primary therapist when paged. In the latter example, if the peer began to orient towards the target student without the prompt, the secondary therapist put her hand up to interrupt the peer from orienting and redirected the peer back to the ongoing activity.

Training sessions were conducted with all peers, in a classroom with no other students present, and were 5 min in duration. All peers were required to complete one five min training session in which the conditional probability of peer attention given problem behavior was 100% and the probability of attention being withheld in the absence of problem behavior was 100% (only providing attention when prompted) prior to participating in functional analysis sessions. During training sessions, the primary therapist stood behind the peer and paged or prompted, depending on the peer, the peer to orient in her direction. The peer was instructed not to turn around if not paged or prompted. In order to give the peer practice withholding attention, during training, the therapist imitated problem behavior (screaming, throwing items, hitting the walls,

etc.) at times and no page was provided. If the peer delivered attention only when prompted, reinforcement was provided. If the peer delivered attention other than when prompted reinforcement was withheld. Training sessions were discontinued if independent responding to the pager was not achieved within the first three sessions. This occurred for the peers that participated in Hank, Donald, Alana, and Bobby's functional analysis, for these peers a secondary therapist was used to prompt the peer to deliver attention during the functional analysis.

Chelsea, Hank, Jackie, Donald, Ginny, Alana, and Bobby were exposed to the PA condition. In the peer attention condition, the target student was seated at a table behind the peer. The peer was either engaging in an independent leisure activity or playing a game with a second therapist. Contingent on problem behavior, the peer was prompted (paged or verbally prompted) to turn around and look at the primary therapist, standing directly behind or next to the target student. This condition served as a test condition to show the effects of contingent peer attention on student problem behavior.

Peer differential reinforcement of an alternative response (PDRA) condition. Hank, Jackie, Donald, Ginny, Alana, and Bobby were exposed to the PDRA condition. In the PDRA condition, the target student was seated at a table behind the peer. The peer was either engaging in an independent leisure activity or playing a game with a secondary therapist. A card was placed on the student's desk. If the target student either touched the card or said the peer's name, the peer was prompted to turn around and look at the primary therapist standing directly behind, or next to, the target student. Forced exposure to the consequence for emitting the DRA was provided for the target student prior to conducting this condition. During the forced exposure, the therapist told the target student "if you touch the card or say your friend's name she is going

to look at you.” Following the instructions, the therapist prompted the student to touch the card. If the student touched the card the peer was prompted to provide attention. If the student did not independently touch the card manual guidance was provided and attention was delivered. This condition also served as a comparison for the PA condition.

Peer ignore (PI) condition. Chelsea was the only student exposed to this condition. The PI condition was used with Chelsea rather than the PDRA because, in a previous assessment, problem behavior continued to be observed in a PDRA condition but was eliminated in a PI condition. During this condition, the target student was seated at a table behind the peer. The peer was either engaging in an independent leisure activity or playing a game with a secondary therapist. The peer was instructed not to turn around at all during the session and the pager was not given to the peer. This condition served as a control condition for assessing the effects of contingent peer attention.

Alone. Hank, Jackie, and Donald were exposed to the alone condition to test for automatic reinforcement, because their behavior persisted across all conditions. In the alone condition, the target student was alone in the room. Prior to the start of the session, the therapist told the student to wait there and that she would return in a few minutes. No consequences were provided for any responses.

Data analysis and reliability. Data were collected on the rate of the same topographies of problem behavior that were measured during the descriptive assessment and on peer orienting. IOA was completed for a mean of 36% (range, 33% to 39%) of sessions across all participants. IOA was calculated in the same manner as in Study 2 for a mean of 95% agreement (range, 91.8% to 98.14%) across all measures for all participants.

Procedural integrity was evaluated by collecting data on the delivery of peer and therapist attention in all sessions. During the PA, PDRA, and PI conditions, peer attention was appropriately delivered (i.e., it was delivered following problem behavior in the PA condition and following appropriate responses in the PDRA condition) in 98.4% (range across sessions, 96% to 100%) of opportunities. This was calculated by dividing the number of instances of problem behavior (PA condition) or appropriate responses (PDRA condition) that were followed by peer attention by the total number of instances of problem behavior (PA condition) or alternative responses (DRA condition). During the PA, PDRA, and PI conditions, peer attention was withheld appropriately (i.e., peer attention was not delivered in the absence of problem behavior in the PA condition, peer attention was not delivered in the absence of an appropriate response or following problem behavior in the PDRA conditions, and PA was not delivered in the ignore condition) in 86% (range across sessions, 75% to 100%) of opportunities. This was calculated by dividing the total number of instances in which peer attention was delivered following problem behavior (PA condition) or an appropriate response (PDRA condition) by the total number of instances of peer attention. During the TA and TDRA conditions, therapist attention was appropriately delivered (i.e., it was delivered following problem behavior in the TA condition and following appropriate responses in the TDRA condition) in 99% (range across sessions, 95% to 100%) of opportunities. This was calculated by dividing the number of instances of problem behavior (TA condition) or alternative responses (TDRA condition) that were followed by therapist attention by the total number of instances of problem behavior (TA condition) or alternative responses (TDRA condition). During the TA condition and TDRA condition, therapist attention was withheld appropriately (i.e., therapist attention was not delivered in the absence of problem behavior in the TA condition and therapist attention was not

delivered in the absence of an appropriate response in the DRA condition) in 99% (range across sessions, 99% to 100%) of opportunities. This was calculated by dividing the total instances of therapist attention being delivered following problem behavior (TA condition) or an appropriate response (TDRA condition) by the total instances in which therapist attention was delivered.

Results and Discussion

Figure 6 depicts the functional analysis results for all participants. The top left panel shows the data for Chelsea. Chelsea engaged in elevated rates of problem behavior during the TA condition (therapist provided attention contingent on problem behavior and withheld attention for any other behavior) compared to the TDRA condition (therapist provided attention for an alternative response and withheld attention for any other behavior) and elevated rates during PA condition with peer 1 (peer provided attention contingent on problem behavior and withheld attention for any other behavior) compared to the PI condition (peer withheld attention for all behavior). The most common topography of problem behavior observed was loud vocals (89%), followed by property destruction (10%), and aggression (<1%). Although aggression and property destruction were observed during the functional analysis, loud vocals were the only topography of problem behavior that persisted in the therapist and peer 1 test conditions. These data indicate that Chelsea's loud vocals were sensitive to attention from the therapist and peer 1 as reinforcement.

The top right panel shows the data for Hank and the second panel shows the data for Jackie and Donald. Hank's rate of problem behavior was initially higher in the PA condition than the PDRA (peer provided attention for an alternative response and withheld attention for any other behavior), however, the level of the data paths converged toward the end of the analysis. Responding was undifferentiated across TA and TDRA conditions. Hank's problem behavior

continued to persist in the series of alone sessions. The most common topography of problem behavior observed during Hank's functional analysis was bolting and flopping (53%), followed by loud vocals (20%), property destruction (14%), and SIB (13%). Bolting, flopping, and loud vocals were observed across all conditions. Property destruction was initially observed only in the PA condition; however, after session 16 there were no further instances observed. SIB was only observed in two sessions of the alone condition. Bolting, flopping, and loud vocals persisted in the alone condition and therefore suggest that these topographies of problem behavior were maintained by automatic reinforcement.

Jackie's problem behavior was initially higher in the PA condition than in the PDRA condition, however, the levels of the data paths converged after the first series. Responding was undifferentiated across TA and TDRA conditions. Jackie's problem behavior continued to persist in the series of alone sessions. The most common topography of problem behavior observed during Jackie's functional analysis was loud vocals (87%), followed by SIB (10%), and bolting or flopping (3%). Loud vocals were observed across all conditions. SIB was observed during two sessions, one PDRA, and one PA condition. Bolting or flopping was observed during 3 sessions; one PDRA, one PA, and one TA condition. These data suggest that Jackie's loud vocals were maintained by automatic reinforcement.

Donald's problem behavior was undifferentiated across the TA, TDRA, PA, and PDRA conditions and continued to persist in the series of alone sessions. The most common topography of problem behavior observed was bolting or flopping (59%), followed by SIB (25%) and loud vocals (16%). All topographies of problem behavior were observed across all conditions, including the alone condition, suggesting that Donald's problem behavior was maintained by automatic reinforcement.

The third panel shows the data for Ginny and Alana. Ginny initially engaged in some problem behavior, however it was on a decreasing trend. There were no further instances of problem behavior observed following session 13. The most common topography of problem behavior observed was loud vocals (58%) followed by bolting or flopping (25%). The maintaining variable for Ginny's problem behavior was not identified in this analysis, however, the data show her problem behavior to be insensitive to contingent peer attention. For Alana, problem behavior was observed in two PRDA sessions, problem behavior was not observed during any test condition. The bottom panel shows the data for Bobby. Bobby did not engage in any problem behavior during any conditions.

Of the seven participants, only Chelsea engaged in problem behavior sensitive to peer attention. This suggests that peer attention is not a common maintaining variable in individuals diagnosed with intellectual disabilities. It is possible that a more salient topography of attention (such as reprimands) would produce different results. However, because the topography of attention was determined based on the most common topography of attention observed during the descriptive assessment, other topographies of attention were not evaluated in this study. In addition, while Chelsea engaged in elevated rates of challenging behavior in the peer attention condition with peer 1, we were unable to replicate this with any additional peers. This suggests that the reinforcing effects of peer attention, when they occur, may be peer specific.

Discussion

This study extended current research on problem behavior maintained by peer attention in individuals with ASD and other intellectual disabilities. This study is the first to investigate the reported prevalence of peer attention as a consequence for problem behavior in individuals with these diagnoses. In addition, it is the first to evaluate the prevalence of peer attention

contingencies and identify common topographies of peer attention using descriptive assessment. Finally, it is the first to evaluate whether contingent peer attention was functionally related to the maintenance of problem behavior in members of this population.

In the indirect assessment, it was relatively common for teachers to report that students received and delivered peer attention following problem behavior. Of the 156 students on which teachers reported, there were 145 for whom at least one person reported that the student received peer attention after engaging in problem behavior and 141 students for whom at least one person reported the student delivered peer attention following problem behavior. In addition, of the 156 students, there were 107 students for whom the majority of teachers reported that the student received peer attention after engaging in problem behavior and 87 students for whom the majority of teachers reported that the student delivered peer attention following problem behavior.

In the descriptive assessment, a positive contingency was observed for 50% of the participants (i.e., the probability of peer attention was elevated following problem behavior for 15 of the 30 participants). A neutral contingency was observed for 23% of participants (i.e., the occurrence of problem behavior was unrelated to the probability of peer attention for 7 of the 30 participants). A negative contingency was observed for 17% of the participants (i.e., the probability of peer attention decreased following problem behavior for 8 of the 30 participants). Across all participants, on average, the probability of peer attention following problem behavior was .33 and the unconditional probability of peer attention was .12 (a positive contingency). These data show that it is relatively common for peer attention to be more likely following problem behavior, like attention generally (McKerchar and Thompson, 2004). Because our participant pool was largely composed of individuals diagnosed with ASD, our findings also

speak to the social environments surrounding children with ASD within special education classrooms. Our results suggest that peer attention being delivered following problem behavior is common in this population and setting. This is an interesting finding because an ASD diagnosis includes an impairment in social interaction (American Psychiatric Association, 2013).

There was only one participant, Chelsea, for whom peer attention was found to be a reinforcer in the functional analysis. However, we were unable to replicate these results with two additional peers. Chelsea's behavior was also sensitive to therapist attention as a reinforcer, therefore, it is unknown if an intervention targeting adult attention but ignoring peer attention would be effective.

A comparison of outcomes across assessment methods is presented in Table 2. As with previous research on adult attention (Thompson & Iwata, 2007), we found peer attention to be a common consequence for problem behavior. Also, as found in other studies with regard to adult attention, our findings show several examples of peer attention failing to function as reinforcement when both indirect assessment and descriptive assessment show it to be prevalent (St. Peter, Vollmer, Bourret, Borrero, Sloman, & Rapp, 2005).

Of the seven comparisons, the results of indirect assessment and descriptive assessment results agreed for six, the indirect assessment results agreed with the functional analysis results for two, and the descriptive assessment results agreed with the functional analysis results for one. There was only one student for whom the results of all three assessments agreed. The one student for whom all assessments agreed was Chelsea whose problem behavior was sensitive to peer attention; however, as mentioned previously, this was only the case with peer 1.

The results of the indirect and descriptive assessments suggest a contingency between problem behavior and peer attention in special education classrooms. However, when the effects

of contingent peer attention were tested during the functional analysis, peer attention was found to be a reinforcer for only one of the seven individuals. This suggests that peer attention may be a relatively uncommon reinforcer in a population of individuals with intellectual disabilities. For Chelsea, both peer (peer 1 only) and adult attention functioned as reinforcers for problem behavior. For all participants, the effects of peer and adult attention were the same. The generality of this finding is unknown, but, for our participants, an adult-attention test condition would have been sufficient to identify whether attention, both peer and adult, functioned as a maintaining variable for problem behavior. Thus, the conditions under which a specific peer-attention test condition are needed are unknown.

A limitation of the descriptive assessment was that, imitative problem behavior could not occur noncontingently. Although most topographies of attention could occur in the absence of problem behavior, imitative problem behavior could occur only if problem behavior occurred. This may artificially inflate the likelihood of observing a positive contingency. To address this concern we recalculated the conditional and unconditional probability for the six students for which imitative problem behavior was observed with the data for imitative problem behavior removed. The interpretation of the data for those students did not change with imitative problem behavior removed from the calculation.

A limitation of the functional analysis was that the topography of attention delivered in the PA condition was orienting. We chose to have peers orient towards the target student because it was the most common topography of attention to be reported in the indirect assessment and was observed during the descriptive assessment for the participants included in the functional analyses. While orienting did not function as a reinforcer for the majority of the

participants, it may be that a different form of attention (such as commenting about the behavior) may have. Future research in this area might test the effects of a more salient form of attention.

A further limitation is that we were unable to evaluate the necessity of accounting for peer attention in devising a treatment for attention maintained problem behavior. For example, if a student was identified for whom both peer and therapist attention were reinforcers, would a treatment that only targets therapist attention be sufficient? If a treatment targeting only therapist attention was effective, there would be no need to determine if peer attention was a reinforcer. However, if problem behavior continued to persist when the therapist no longer provided contingent attention but the peer continued to provide contingent attention it would be essential to identify an effective treatment that could be implemented with that peer. We planned to complete this analysis with Chelsea, however, we were unable to replicate her behavioral sensitivity to contingent peer attention.

In summary, both the indirect and descriptive assessments suggest that attention from peers is a relatively common consequence for problem behavior for individuals diagnosed with intellectual disabilities in special education classrooms. The results of the functional analysis showed that teacher reports and descriptive assessment data were not predictive of functional analysis outcomes with regard to the effects of contingent peer attention on problem behavior. Although peer attention may be a common consequence for problem behavior in individuals diagnosed with intellectual disabilities, and caregivers may accurately note this, our findings do not suggest that peer attention is a relevant maintaining variable for problem behavior.

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Table 1
Target student diagnosis

Diagnosis	Number of target students		
	Indirect assessment	Descriptive assessment	Functional analysis
Autism spectrum disorder	144	28	6
Developmental disorder	3	1	0
Smith-magenis syndrome	1	1	1
Fragile x syndrome	2	0	0
Angelmans syndrome	1	0	0
Bipolar disorder	1	0	0
Congenital encephalopathy	1	0	0
Traumatic brain injury	1	0	0
Childhood disintegrative disorder	1	0	0
unknown	1	0	0
Total	156	30	7

Table 2
Assessment results

	Indirect assessment	Descriptive assessment	Functional analysis
	Majority of staff reported peer attention following <u>problem behavior</u>	Positive <u>contingency</u>	Behavior sensitive to <u>PA as a reinforcer</u>
Chelsea	Yes (90.1%)	Yes (.47)	Yes
Alana	Yes (100%)	Yes (.41)	No
Jackie	Yes (100%)	Yes (.28)	No
Donald	Yes (100%)	Yes (.17)	No
Hank	Yes (73%)	Yes (.13)	No
Bobby	Yes (62.5%)	Yes (.31)	No
Ginny	No (31%)	Yes (.17)	No

Note: A= attention; PB= problem behavior; PA= peer attention. Data in gray shading show agreement between the different assessment methods. Data in the parentheses in the left and middle columns show the percentage of respondents reporting contingent peer attention and the probability of peer attention given problem behavior minus the unconditional probability of peer attention, respectively.

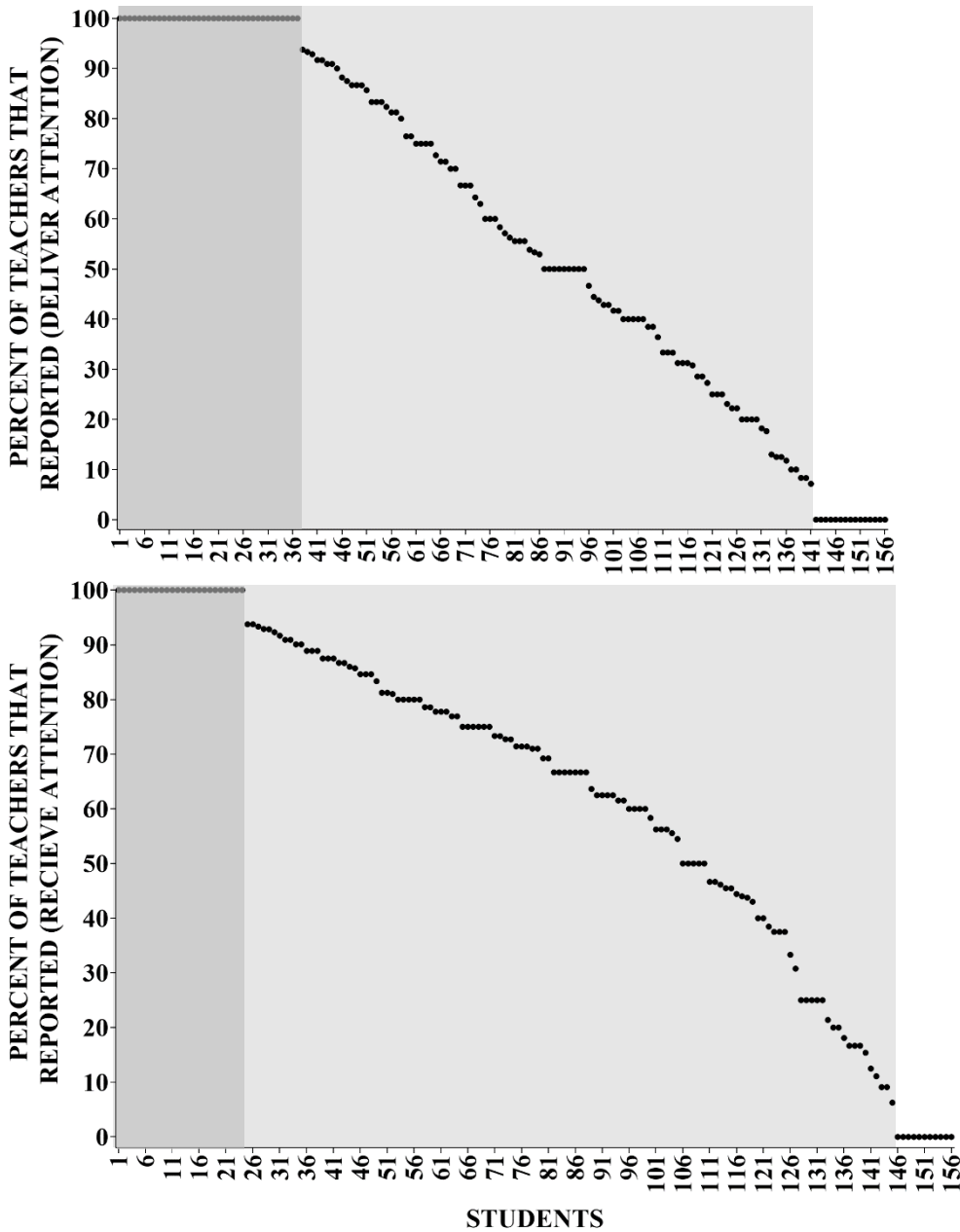


Figure 1. The top graph shows the percentage of teachers that reported that participants delivered attention to their peers when they engaged in problem behavior. The bottom graph shows the percentage of teachers that reported a student received peer attention following problem behavior. The dark shading depicts the students for whom all staff reported that the student delivered or received attention. Any shading depicts the students for whom at least one staff reported that the student delivered or received attention. No shading depicts the students for whom none of the staff reported that the student delivered or received attention. Participant numbers are not the same across the two graphs.

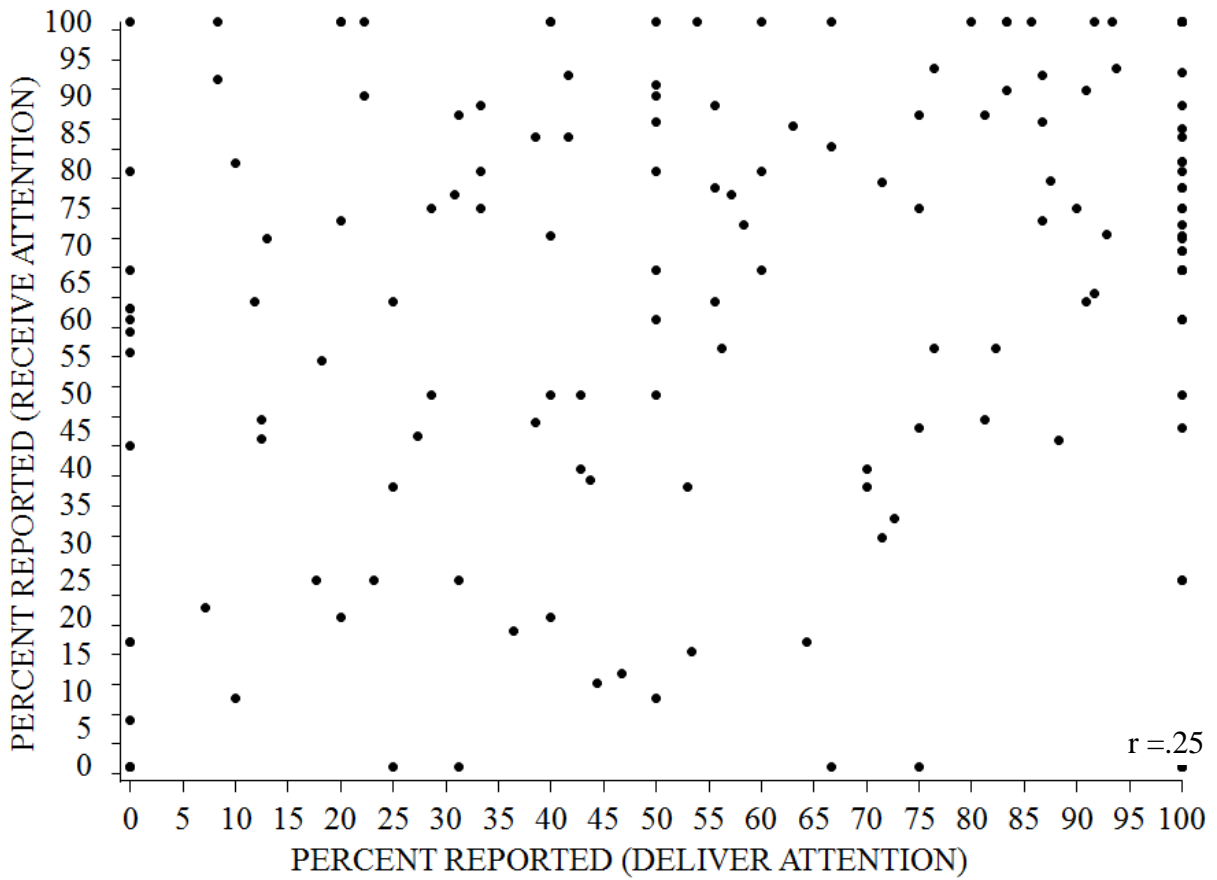


Figure 2. Indirect assessment results. Percentage of caregivers that reported a student received attention across percentage of caregivers that reported a student delivered attention. Each data point represents the data for an individual student.

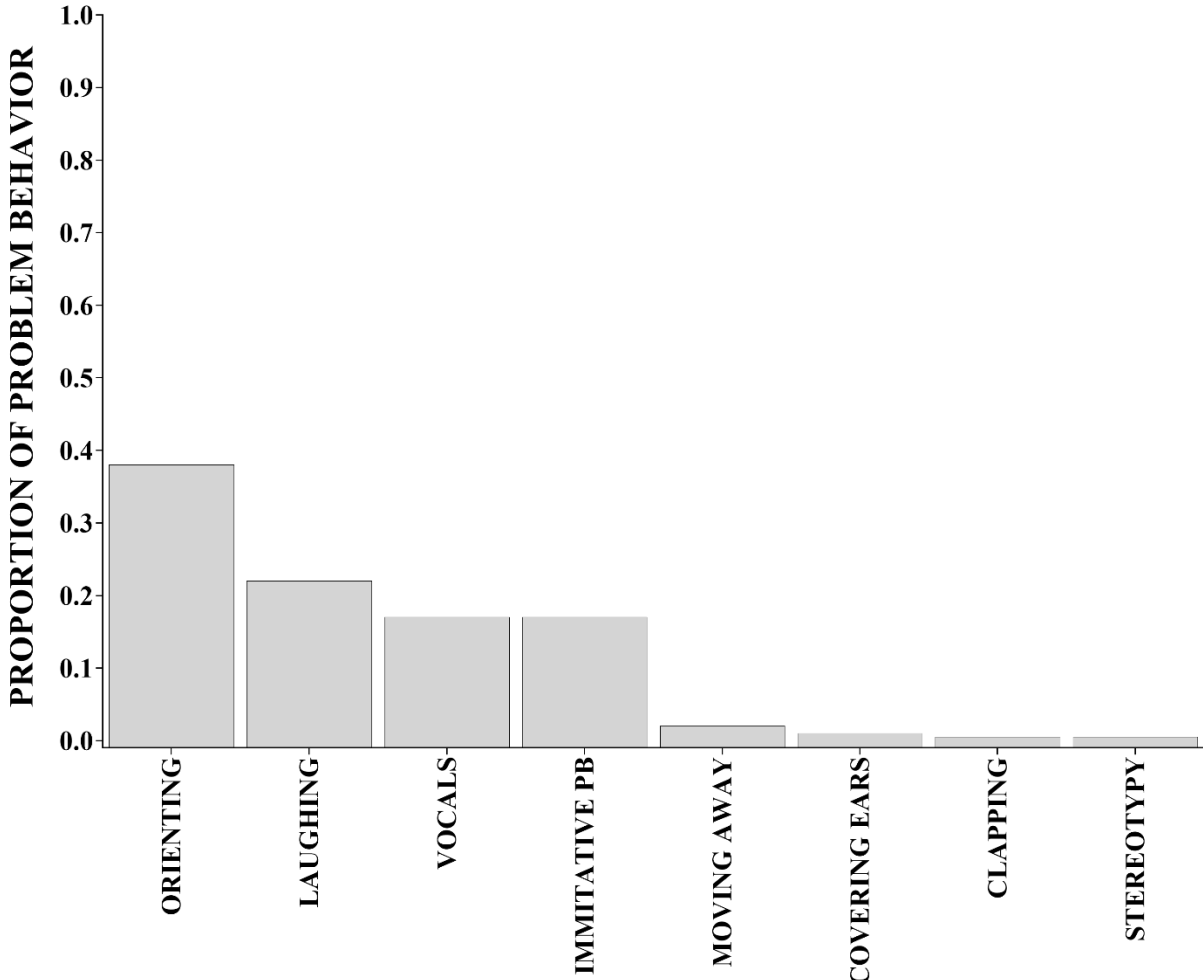


Figure 3. Shows the proportional distribution of individual topographies of peer attention reported in the indirect assessment

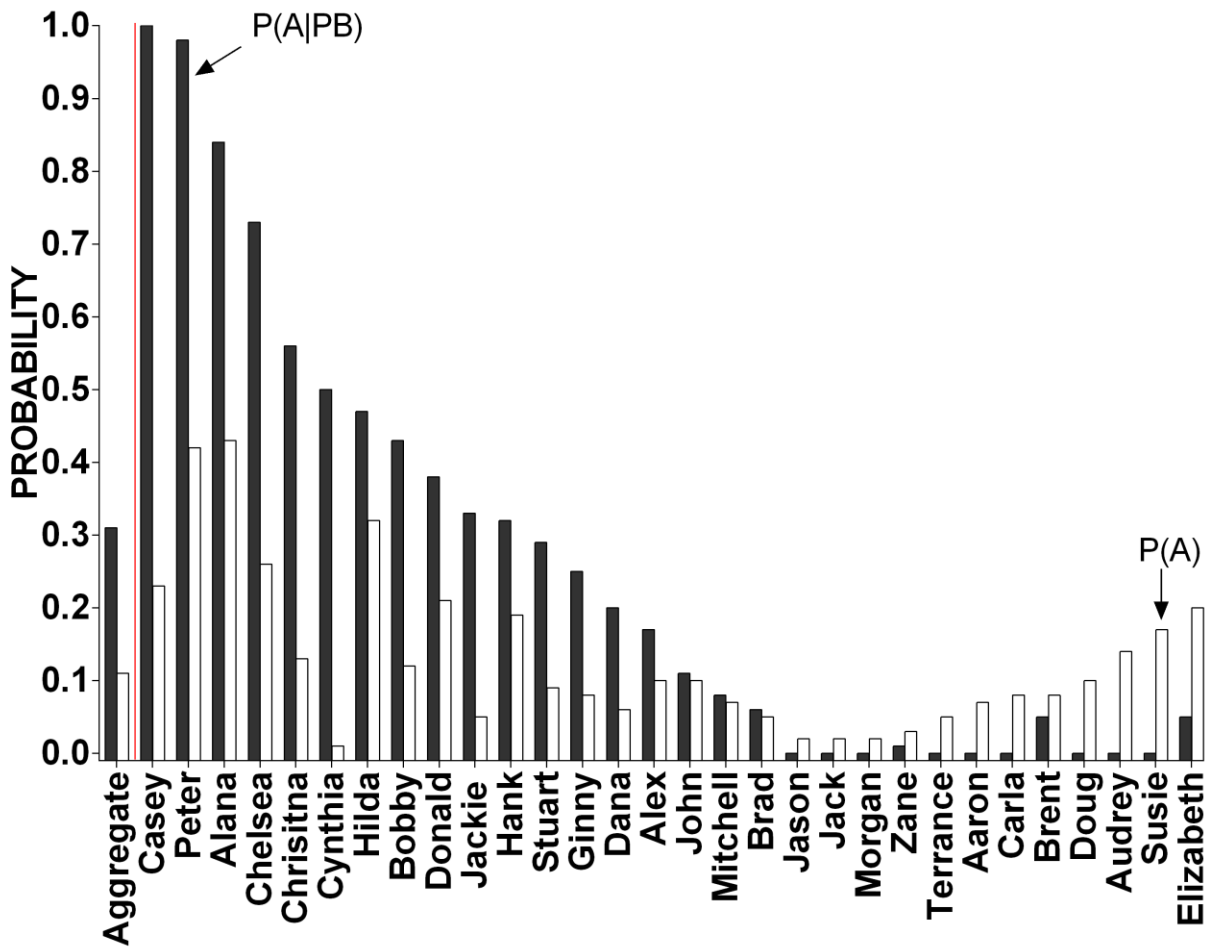


Figure 4. The gray bars show the probability of peer attention given problem behavior. The white bars show the unconditional probability of attention. The left most bars show data aggregated across all participants. The total frequencies of problem behavior in the observations are indicated in the numbers above the bars.

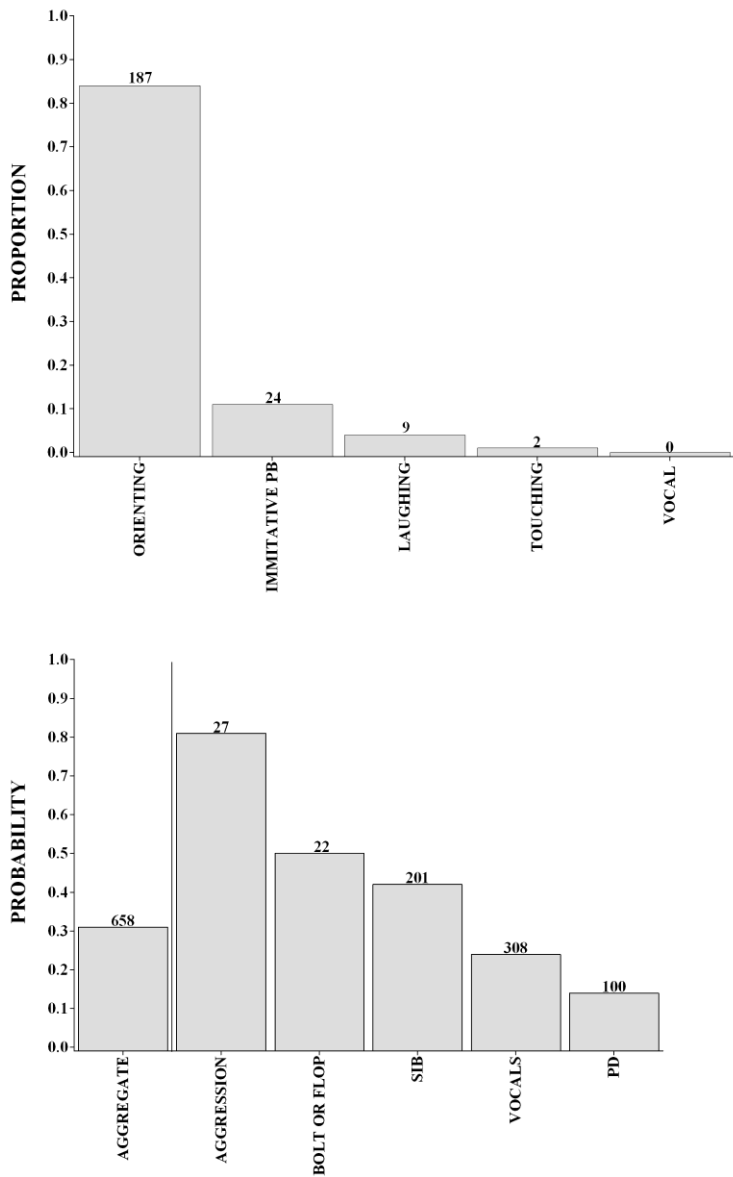


Figure 5. The top panel shows the proportional distribution of individual topographies of peer attention observed during the descriptive assessment. The total frequencies of particular topographies of peer attention are depicted in the numbers above the bars. The bottom graph depicts the probability of attention following different topographies of problem behavior. The total frequencies of particular topographies of problem behavior are depicted in the numbers above the bars. SIB= self- injurious behavior, PD= property destruction.

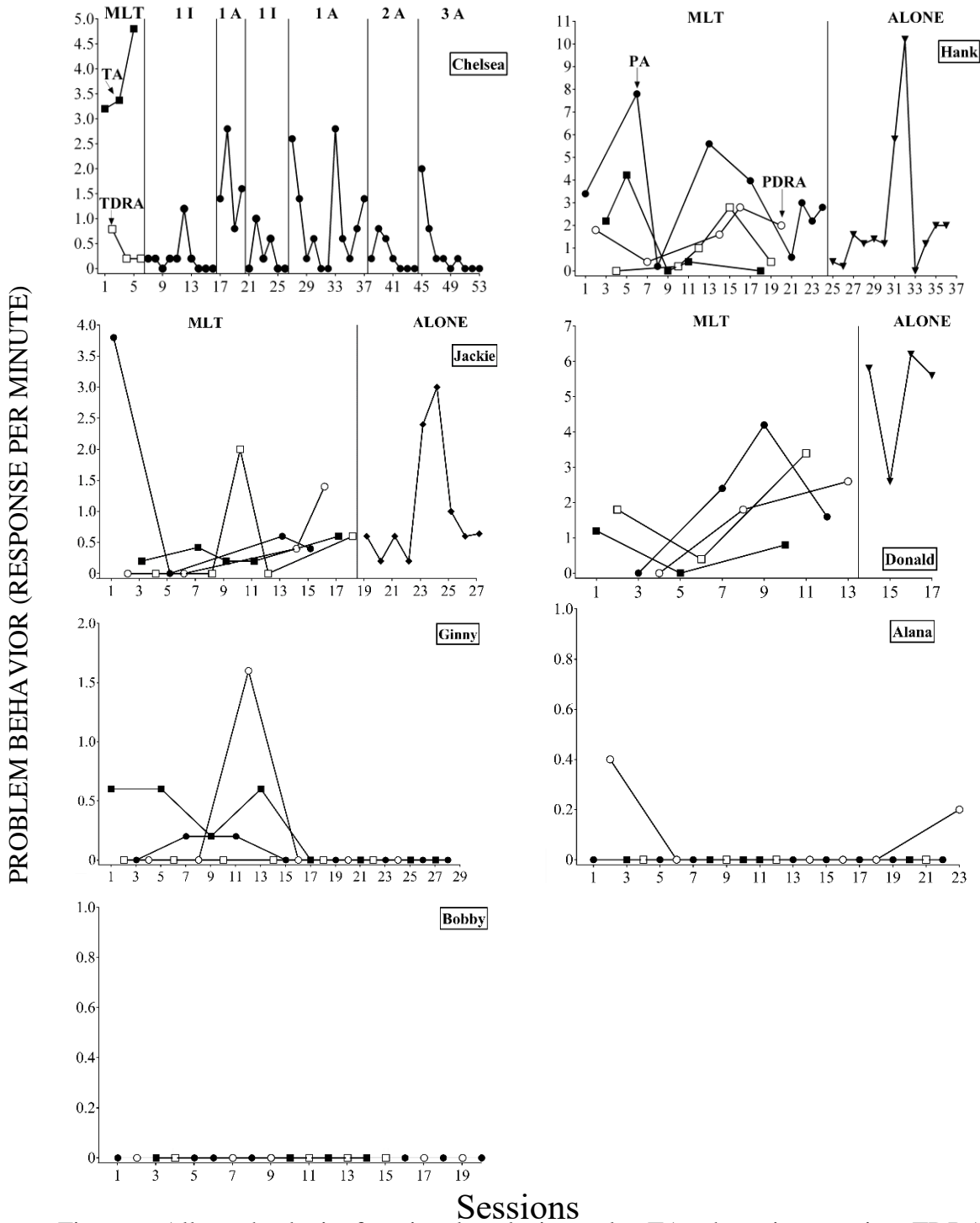


Figure 6. All graphs depict functional analysis results. TA= therapist attention, TDRA= therapist differential reinforcement of an alternative response, A= peer attention, 1= peer 1, 2= peer 2, 3= peer 3, PDRA= peer differential reinforcement of an alternative response, I= peer ignore.