

An Empirical Analysis of the Effects of a Possible Sinus Infection and Weighted Vest on Functional Analysis Outcomes of Self-injury Exhibited By a Child with Autism

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Abstract

Analogue functional analysis methodology was used to assess potential maintaining contingencies of episodic self-injurious behavior (SIB) of a 4-year-old child diagnosed with autism. Analogue conditions were presented within a multielement design when the child did, and did not exhibit signs of a possible sinus infection, and when the participant, did, or did not, wear a weighted vest. Findings revealed higher occurrences of SIB when a sinus infection was considered to be present vs. absent, and the weighted vest did not affect occurrences of SIB during the functional analysis. SIB was considered to be maintained by some form of automatic reinforcement. Implications for enhancing functional analysis methodology by including measures of biological events such as medical illness are discussed.

KEYWORDS: Functional analysis, self-injurious behavior, autism, sinus infection, weighted vests.

Functional analysis methods have been used to identify both social and nonsocial maintaining variables for various behavior disorders. Behaviors maintained by nonsocial variables have been referred to as being automatically reinforced through sensory stimulation or pain attenuation (Vollmer, 1994). Nonsocial maintaining variables have been shown to maintain behaviors such as pica (Piazza, Hanley, & Fisher, 1996), stereotypy (Hanley, Iwata, Thompson, Lindberg, 2000), and eye poking (Kennedy & Souza, 1995; O'Reilly, 1997). Although nonsocial variables may be relevant to several maladaptive behaviors, the direct manipulation of these nonsocial variables responsible for behavior maintenance may be difficult due to the complexities of separating the influence of stimuli from the response (Iwata, Dorsey, Slifer, Bauman, & Richman 1994; Vollmer, 1994). Some behaviors hypothesized to be maintained by automatic reinforcement have been assessed by directly manipulating various idiosyncratic stimuli that could be controlled and ruling out competing hypotheses (Kennedy & Souza, 1995; Piazza et al. 1996).

Carr (1994) suggested extending the utility of functional analysis methodology by investigating the effects of nonsocial variables such as physiological or internal states. He referred to these variables as biological events such as physical illness or drug states. These types of biological events have been considered to act as establishing operations for the occurrence of problem behavior (Hanley, Iwata, & McCord, 2003; Kennedy & Meyer, 1996; Pace & Toyer, 2000). Kennedy and Meyer (1996) recommended expanding experimental analyses to extraexperimental events such as allergy symptoms and sleep deprivation, that occur outside functional analyses in order to obtain a better understanding of their impact on response rates and to conceptualize the effects of these events. Hanley et al. (2003) suggested conducting functional analyses with and without the presence of physiological or internal states such as illness or drugs in order to clarify the impact of these conditions on a specific behavior and to identify a more accurate and effective treatment. Carr (1994) recommended including information obtained from more comprehensive descriptive assessments to individualize functional analyses and enhance relevance of outcomes. The value of using descriptive assessment procedures to enhance functional analysis outcomes has not been clearly described in the literature (Iwata et al., 1994), primarily due to a lack of inclusion of descriptive assessment information in studies reporting on the use of functional analysis procedures (Hanley et al., 2003). The current literature suggests both discrepancies between descriptive assessment and functional analyses and synonymous relations (Carr, 1994; Galiatsatos & Graff, 2003).

O'Reilly (1997) determined that self-injury was associated with a biological event (otitis media) by conducting a functional analysis during periods when otitis media was and was not present. The results indicated that self-injury occurred only when otitis media was present and tentatively concluded that the self-injury served a sensory escape function from ambient noise. This study involved a biological event (otitis media) which could be clearly identified with medical evaluations or laboratory results. In many cases, a diagnosis is not clearly distinguishable due to a number of different reasons such as the unavailability of specific medical screening tests, imprecise laboratory results, rapid cycling of conditions, etc. In the event that a specific diagnosis cannot be determined, conducting a functional analysis while a specific condition is and is not present may not be an option.

Kennedy and Meyer (1996) conducted functional analyses in the presence and in the absence of a biological event (allergy symptoms) and a conditional state (sleep deprivation). The presence of these extraexperimental events was determined by agreements on the occurrence or nonoccurrence of the events by teachers and parents of the children in the study. The results indicated that these extraexperimental events influenced the outcomes of functional analyses. The presence of a possible sinus infection evaluated in the current study relied on a similar method of agreement on the occurrence or nonoccurrence of an illness.

Pace and Toyer (2000) provided an option to conducting a functional analysis in determining the presence of a previously undiagnosed biological event (vitamin deficiency). They used an experimental design to evaluate the effects of a multivitamin on the pica of a 9-year old female diagnosed with severe mental retardation, iron deficiency, and anemia. The BAB design indicated that latency to pica increased during all sessions when the vitamin supplement was being administered. This study did not conduct a functional analysis of the pica behavior but instead manipulated a possible biological event which impacted latency to pica. The current literature examining the influence of physiological variables demonstrates that these variables may serve as establishing operations for severe problematic behaviors and may influence the outcomes of functional analyses.

Research on the use of weighted vests as a treatment for problem behavior reveals few empirical studies. Despite the lack of empirical research on the use of weighted vests, their use appears to be quite prevalent among young children with various disabilities. Olson and Moulton (2004a) surveyed pediatric occupational therapists from different geographic areas of the United States and found that 57% of the 350 respondents reported using weighted vests. Respondents primarily reported using weighted vests with preschool and elementary school age groups to treat symptoms of autism (82%) and Attention Deficit Hyperactivity Disorder (ADHD; 65%). Olson and Moulton (2004b) interviewed 51 pediatric occupational therapists about how weighted vests were used and found that weighted vests were most frequently recommended for treatment of problem behaviors frequently exhibited by children with autistic spectrum disorders (92.2%) and ADHD (76.4%). Their findings also revealed that weighted vests were recommended for the reduction of problem behaviors such as stereotypy (rocking/flapping), hitting, wandering, and tantrums. The weighted vests were also reportedly used to increase behaviors such as attention, eye contact, and staying on task.

Two empirical studies have been conducted on the treatment effects of a weighted vest, but none have focused on severe problem behavior or have incorporated functional analyses of the behaviors. Vandenberg (2001) evaluated the effects of a weighted vest on the on-task behaviors of four children between the ages of five and seven years. The vests were equivalent to approximately 5% of the children body weight. The results revealed an 18 to 25% increase in on-task behavior for all four children while wearing the weighted vests. Using an ABA design, Fertel-Daly, Bedell, and Hinojosa (2001) found a decrease in the number of distractions (off-task behavior) and an increase in the duration of a fine motor task for five preschoolers diagnosed with pervasive developmental disorders while they wore a weighted

vest. Additionally, all but one of the preschoolers demonstrated a decrease in the duration of self-stimulatory behaviors while wearing a weighted vest.

The current study examined the function of episodic self-injurious behavior in a 4-year-old child diagnosed with autism. Functional analysis procedures were conducted in an attempt to identify the function of the self-injury in the presence of possible sinus infection and during periods when a sinus infection was not considered to be present. The analysis also evaluated the effects of a weighted vest on the occurrences of SIB.

Method

Participant and Setting

Gagan was a 4-year-old Asian male who attended a pre-school classroom in a public school building. He was diagnosed with autism and functioned at the profound level of adaptive behavior as measured by the Vineland Adaptive Behavior Scale. Gagan was nonverbal but vocalized using short screams or by humming. His typical daily routine consisted of individualized instructional activities (stacking items, sorting, etc.), group instructional activities (singing songs, counting, etc.), various recreational activities (playground, ball pits, etc.), snacks and lunch. A review of available documentation indicated no significant medical problems other than repeated sinus infections and no complications associated with labor or during pregnancy. A history of maladaptive behaviors included the following: self-injury, spitting, and running away from staff. Previously recommended interventions for self-injury included sensory integration techniques such as swinging, applying pressure, and a weighted vest. The weighted vest manufactured by Velvasoft™ weighed three pounds (approximately 7.5% of Gagan's body weight) and had been recommended by an occupational therapist. In addition, physical blocking or restraint for self-injury had been used periodically. Previous interventions for spitting involved placing a brown paper towel to his lips following an incident of spitting, verbal reprimands, and an occasional requirement to clean the area effected by the spitting. Gagan was referred for assessment and treatment of self-injurious behavior by his teacher who reported a recent increase in self-injurious behavior. The functional analysis took place in the preschool classroom setting while other students were in another part of the room. The classroom furniture was arranged so that Gagan could not easily access or view the other students in the room. A classroom teaching assistant worked quietly with other students throughout all of the functional analysis conditions. Masters-level teachers trained in the application of functional analysis procedures conducted all experimental manipulations.

Dependent Variables, Data Collection, and Reliability

The dependent variables consisted of self-injurious behavior (SIB) and presence of a possible sinus infection throughout the investigation. SIB was defined as hitting head with hand, hitting head against object or person, and/or slapping the backside of hand against object such as floor or table. Data were collected on SIB using a 10 s tape-cued partial interval recording procedure. Inter-observer agreement for the occurrence/nonoccurrence of SIB was calculated based on an overall interval-by-interval comparison of observer recordings. Inter-observer agreement was obtained during 40% of functional analysis conditions and averaged 94% (range: 80% to 100%).

Gagan had a history of sinus infections which were medically diagnosed and correlated with the presence of colored nasal discharge. The presence of a possible sinus infection was determined by observing Gagan prior to conducting experimental analyses for visible signs of colored nasal discharge. A possible sinus infection was considered to be present if Gagan had a visible nasal discharge with a yellowish or greenish color. A possible sinus infection was not considered to be present if Gagan had no visible nasal discharge or had a visible nasal discharge with a clear color. Two experimenters

independently observed Gagan for the presence of a possible sinus infection and independently determined if a possible sinus infection was present. Inter-observer agreement for the presence of a possible sinus infection was evaluated for all sessions and was 100% agreement for all sessions.

Procedures

The functional analysis conditions consisted of procedures similar to those described by Iwata et al. (1994), except for a no interaction condition which resembled an alone condition. The no interaction condition differed from an alone condition due to researchers being present in the room with Gagan but providing no interaction. The presence of researchers during the no interaction condition was comparable to conditions observed in Gagan's classroom, and was necessary due to lack of observation facilities. The attention condition consisted of having a researcher nearby and within eyesight of Gagan but not interacting with Gagan unless he engaged in SIB at which time the researcher delivered a verbal reprimand for approximately 5 s. The demand condition involved the researcher delivering a prompt to work on a task every 30 s using a least to most intrusive prompt hierarchy of verbalization, gesture, or physical assistance, respectively. If Gagan engaged in SIB at any point during the prompting sequence, the demand was terminated until the next scheduled demand delivery. The play condition consisted of having tangible items available throughout the session and a researcher interacting with Gagan at least every 30 s in a non-instructional/non-demanding manner. Each functional analysis condition was conducted once per day. Each condition was 5 minutes in duration and was conducted during periods when a possible sinus infection was considered to be present and during periods when a sinus infection was considered to be absent. Gagan wore his weighted vest during all but 16 functional analysis sessions.

Results

Results obtained in the analysis are shown in Figure 1. During periods when a possible sinus infection was present, Gagan engaged in increased levels of SIB across all conditions. During sessions conducted when illness was considered to be absent, Gagan engaged in low or zero levels of SIB across all conditions. In addition, 8 sessions were conducted when a possible illness was present while Gagan was not wearing a weighted vest. These sessions had similar levels of SIB to sessions conducted when an illness was present and he was wearing a weighted vest. Eight sessions were also conducted with Gagan not wearing a weighted vest during periods when illness was considered to be absent. These sessions appeared similar to other sessions conducted when illness was considered to be absent. Thus, the results suggest that Gagan's SIB reliably occurred at considerably higher levels when signs of illness were present compared to times when there were no signs of illness. The presence and absence of the weighted vest did not affect levels of Gagan's SIB.

See figure 1, next page!

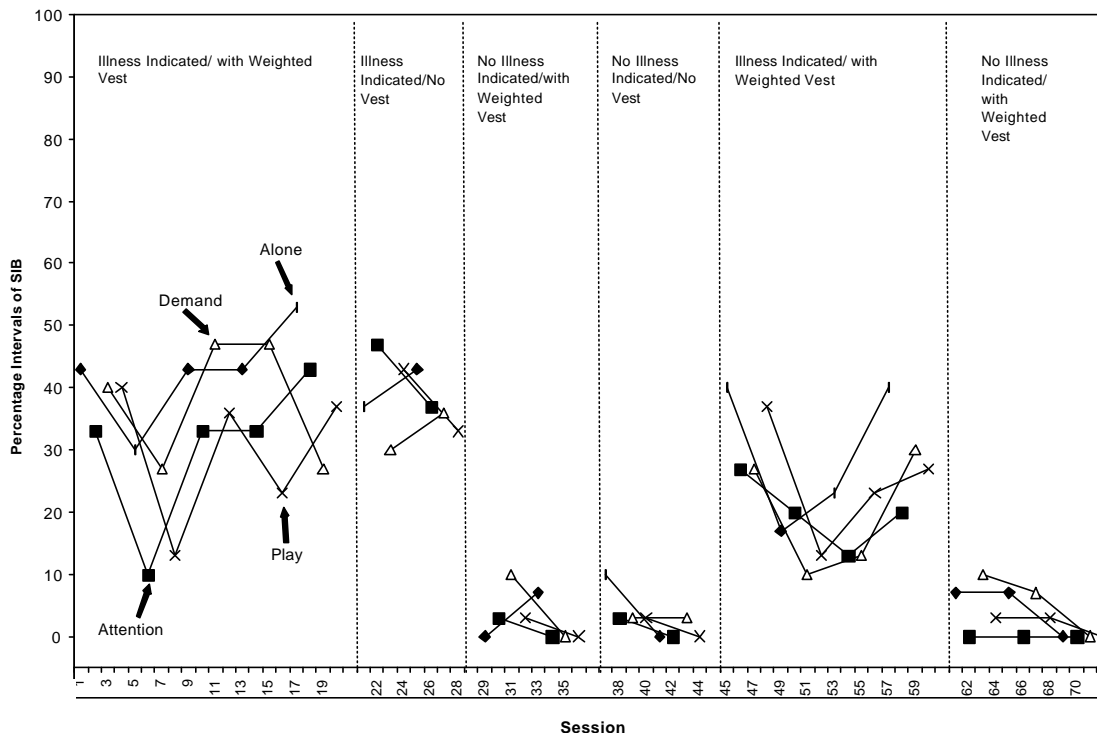


Figure 1. Percent of intervals with SIB.

Discussion

The undifferentiated pattern of responding during the functional analysis combined with persistence of target behaviors during the no interaction condition indicated the SIB was maintained by automatic reinforcement. It was not determined whether the SIB was maintained by automatic negative or automatic positive reinforcement. An overall increase in the level of SIB displayed during sessions when a possible sinus infection was considered to be present provides some potential insight into the specific form of automatic reinforcement maintaining the SIB. An automatic negative reinforcement scenario could be conceptualized as Gagan exhibiting SIB because it may have resulted in a reduction or dispersal of the pain associated with the possible sinus infection. A positive reinforcement scenario could be conceptualized as Gagan exhibiting SIB because it had previously resulted in a pleasurable feeling especially in the presence of a possible sinus infection. In addition, SIB could have served as automatic reinforcement during periods when an illness was considered to be absent due to Gagan experiencing some minor or slight irritations associated with the weather, the temperature, humidity, etc. Based upon anecdotal information from teachers, and low levels of SIB observed during the periods when an illness was considered absent, no specific intervention was recommended other than general preventative strategies for avoiding sinus infections and the importance of treating possible sinus infections at the first indications of such problems.

The lack of a definitive medical diagnosis for the possible sinus infections considered present during the functional analysis is a limitation of this study. The criteria for determining the presence of a possible sinus infection were chosen because the colored nasal discharge had been noted in relation to previous medically diagnosed episodes of sinus infection. It should be noted that due to the lack of a medical diagnosis, a sinus infection may or may not have been present, or the nasal discharge observed

may have been indicative of another illness such as an ear infection. Additional limitations of this study include the lack of treatment data.

The implications of this study include further extending the use of functional analysis procedures to include measures of biological setting events. Kennedy and Meyer (1996) determined that allergy symptoms influenced the outcomes of functional analyses. The current study extended this line of research by evaluating the impact of a possible sinus infection on a young, nonverbal child diagnosed with autism in a classroom situation using teachers as therapists.

Additionally, this study provides a novel contribution to research on assessment of SIB in children with disabilities by evaluating the impact of a sensory integration technique (weighted vest) on the outcomes of a functional analysis for SIB. Considering the popularity of sensory integration techniques for children with autism such as brushing, swinging, and sensory diets; additional research may be warranted on analyzing their impact on functional analysis outcomes and on problematic behaviors. Further empirical evaluation of the effects of sensory integration techniques for treating problem behaviors commonly exhibited by children diagnosed with autism may be pertinent toward determining when and with whom these techniques may be beneficial.

Evaluating the relation between biological events, external environmental events, and behavior in young children through the use of functional analysis methodology may be an area in need of further research. Young children are susceptible to numerous illnesses during their early developmental stages and they may not have developed appropriate behaviors for coping with even minor illnesses. Some of these coping behaviors might include blowing nose, getting additional rest, taking medication, reporting discomfort to caregivers etc. Typically parents may train some appropriate behaviors which result in reinforcement by relieving symptoms of illness. But if these appropriate behaviors are not taught some children may come in contact with ubiquitous reinforcement for inappropriate behaviors which may result in symptom alleviation.

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