



Published in final edited form as:

Am J Intellect Dev Disabil. 2012 May ; 117(3): 225–232. doi:10.1352/1944-7558-117.3.225.

Evidence for Reciprocal Interaction Effects Among Adults with Self-Injury and Their Caregivers

Jason J. Wolff,

University of North Carolina at Chapel Hill, Carolina Institute for Developmental Disabilities, CB #3367, Chapel Hill, NC 27599, USA

Jamie Clary,

J. Iverson Riddle Developmental Center

Vickie N. Harper,

J. Iverson Riddle Developmental Center

James W. Bodfish, and

Carolina Institute for Developmental Disabilities, University of North Carolina at Chapel Hill

Frank J. Symons

University of Minnesota

Abstract

Patterns of caregiver responses to client adaptive behavior were compared between adults with intellectual disabilities with and without self-injurious behavior. Participants with moderate to profound intellectual disability and self-injury ($n = 89$) and age/IQ matched control participants ($n = 20$) were selected from a large sample of adults living in a regional residential center. Approximately 45 minutes of direct observation data were collected for each participant during unstructured leisure time. Data were sequentially analyzed and Yule's Q scores derived and compared among groups. Results indicated that caregivers were more responsive to prosocial initiations and adaptive engagement among individuals with severe self-injurious behavior than to those with mild or no self-injurious behavior and that these responses were more likely to be in the form of a demand.

Keywords

self-injurious behavior (SIB); caregivers; child effects

Caregivers play a critical role in the lives of individuals with intellectual and developmental disabilities (IDD). From specialized service delivery to day-to-day socialization, the nature of the relationship between caregiver and client influences issues ranging from treatment efficacy to general quality of life for both parties (Hile & Walbran, 1991). Researchers have examined challenging behavior in relation to a number of specific caregiver factors, including its emotional effect on caregivers (Jones & Hastings, 2003; Wiegel, Langdon, Collins, & O'Brien, 2006), the role of caregivers in maintaining challenging behavior (Iwata et al., 1994; Oliver, 1995), and the confluence of caregiver attributions and beliefs on subsequent behavior toward persons with challenging behaviors (Bromley & Emerson, 1995; Hastings & Remington, 1994a). Challenging behavior is also known to increase the

likelihood that an individual with IDD will experience abuse at the hands of caregivers (Baker & Allen, 2001; Zirpoli, Snell, & Loyd, 1987). A critical element common to each of these studies is the bidirectional interactions that take place between caregiver and client (Felce & Repp, 1992). Despite this, there remains a very limited understanding of the naturally occurring behavior of direct support staff in relation to their moment-by-moment interactions with individuals with challenging behavior in general and self-injurious behavior (SIB) in particular.

The reciprocal behavior of caregivers who are commonly exposed to SIB depends on numerous factors such as previous training and the topography and severity of the challenging behavior (Hastings, Remington, & Hopper, 1996; Maurice & Trudel, 1982; Saloviita, 2002). Hall and Oliver (1992) found that intense SIB was more likely to be associated with social attention from caregivers than was mild SIB, suggesting that mild SIB may be easier to ignore, with more intense behavior necessitating, or seeming to necessitate, some response from caregivers. Lambrechts, Van Den Noorgate, Eeman, and Maes (2010) examined reactions to challenging behavior among staff persons working with adults with severe/profound IDD living in group homes. Through descriptive and sequential analysis, they found that caregivers frequently responded to aggressive and self-injurious behavior with either verbal or physical attention, with attention in the form of a behavioral directive most likely to follow SIB. Often, the reactive behavior of frontline caregivers inadvertently maintains the continued occurrence of SIB (Oliver, Hall, Hales, & Head, 1996).

In a comprehensive description of the role of mutual reinforcement specific to self-injury, Oliver (1995) points to bidirectional cycles of deprivation and satiation of social attention or escape from demands as key to maintaining SIB. His model of mutual reinforcement suggests that caregiver behavior reinforces the continued occurrence of SIB, a theoretical view well supported by empirical work (Derby et al., 1992; Smith & Iwata, 1997). Sloman and colleagues (2005) likewise proposed that negative reinforcement (e.g., the termination of challenging behavior) may maintain verbal reprimands on the part of caregivers, underscoring the bidirectionality of the interactions involved. Relevant to these interactions is the concept of “child” or “reciprocal effects,” whereby the behavior of the child reciprocally shapes the behavior of the parent (Bell & Harper, 1977). First examined among highly aggressive children and their parents, bidirectional effects within a parent–child dyad are well documented and have expanded beyond the original work by Bell and Harper to a variety of child characteristics that reciprocally influence parenting behavior (O’Connor, 2002; Zirpoli & Bell, 1987). The power of the child to shape the behavior of the adult lies in any compelling behavior the child may perform (Bell, 1979).

Carr, Taylor, and Robinson (1991) extended the concept of child effects specifically to individuals with IDD and disruptive behavior in a school setting, finding similar reciprocal effects on teacher behavior. Their results indicate a decrease both in the quantity and quality of instructional activities presented to aggressors versus nonaggressors. Similarly, McComas, Johnson, and Symons (2004) found that teachers differentially responded to prosocial bids made by children with and without aggressive behavior disorders, with adaptive social initiations made by nonaggressors more likely to elicit a prosocial response. Hastings and Remington (1994b) determined that caregivers initiated fewer social interactions with clients known to engage in challenging behaviors, though others have found caregiver social interactions more common for this group (Emerson, Beasley, Offord, & Mansell, 1992).

Knowing a given individual engages in some form of challenging behavior may be as salient as the behavior itself. This is particularly true of aggression, which has been shown to exert influence on caregiver behavior. We are aware of no comparable research, however, directly

investigating generalized reciprocal interaction effects for SIB. Understanding how self-injury globally impacts caregiver behavior is likely to inform caregiver training and program practices involving people with this serious behavior disorder. The specific purpose of this study was to compare caregiver responses to adaptive behavior, rather than to SIB directly, among individuals with IDD with and without SIB to test whether there are differences in caregiver interaction patterns across groups.

Method

Participants

All participants were recruited from the residential population ($N = 366$) of a regional center for adults with IDD. The SIB group was composed of 89 (61% male) individuals with moderate to profound IDD and SIB. All participants in the SIB group exhibited frequent (at least daily) self-injury of widely varying form. The SIB group was subdivided by severity of SIB as defined by whether the behavior was associated with chronic tissue damage (Self-Injury Trauma [SIT] Scale; Iwata, Pace, Kissel, Nau, & Farber, 1990), resulting in 61 individuals with severe SIB (63% male) and 28 with mild SIB (52% male). The control group consisted of 20 individuals without SIB matched on age and level of IDD (90% male) from the same regional center. Mean age by group was 42.5 (range: 15–60; $SD = 10.7$) for severe SIB, 40.1 (range: 18–59; $SD = 9.6$) for mild SIB, and 44.3 (range: 21–61; $SD = 9.98$) for controls. Though specific IQ scores were not available for participants, the mean classification for each of the three groups was “profound intellectual disability.”

Caregiver participants belonged to a pool of 250 direct care professionals employed by the residential center. All direct support staff were required to possess a high school education (or equivalent) and received regular in-service trainings. The mean age of direct support staff employed by the center was 34 years (range: 18–61), and mean years of service was 6.6 years (Deacon, Mack, & Stroup, 2004). The precise number of staff persons observed was not accounted for. However, direct support staff persons varied randomly across observations and participants.

Data Collection

Approximately 45 minutes (three 15-minute sessions) of direct observation data were collected for each participant. Three separate observations were made to capture each client’s “average” behavior with respect to environmental events. Direct observation took place during unstructured leisure time consistent with each individual’s Individual Habilitation Plan. These periods maximized opportunities for naturalistic contact among residents, caregivers, and their environment outside of programmed activities. Observational data were collected using hand-held iPAQ Pocket PC devices with Observer 5.0 Mobile software and were analyzed using the Observer (REF) and MOOSES (Tapp, Wehby, & Ellis, 1995) observational software packages. Summary (frequency, duration) and sequential analyses (sequential dependencies) were performed to test differences between caregiver interaction patterns with individuals with and without SIB. Interobserver agreement was calculated for 28% of sessions and was 93% for frequency codes and 85% for duration codes.

Specific codes used for this study pertained to social interactions between residents and caregivers. For residents, two behavioral measures were considered: *adaptive engagement*, defined as contact with an object/activity in the manner it was intended, and *social bid*, defined as unprompted physical, verbal, or gestural communication directed toward caregivers or peers. To account for a variety of potential caregiver verbal behavior, two gross categories of social response were used. Caregiver behavior was coded as *demand*,

defined as a command, reprimand, or verbal directive to perform or stop a task/activity, or *attention*, a default code for any neutral or positive non-demand response, such as a question (e.g., “Are you finished?”), comment/statement (e.g., “Here you go.”), or greeting (e.g., “Hi Adam!”).

Analyses

MOOSES computes sequential dependencies between identified antecedent and target events by (a) counting the number of occurrences of a code (the *target* event) within an event (e.g., next event) lag from another designated code or combined codes (the *given* or antecedent event), (b) computing the probability that given an occurrence of the antecedent event the target event follows it, and (c) calculating whether this probability significantly differs from what would be expected by chance. Because use of transitional probabilities to index the strength of sequential association between given and target events include chance occurrences of the sequence, they are influenced by the base rates (simple probabilities) of the given and target events that tend to vary across individuals. Yule’s Q provides an index of sequential association that corrects for the simple probabilities of the antecedent and target behaviors and permits comparisons across individuals (Bakeman & Gottman, 1997; Yoder & Feurer, 2000). Subsequent sequential analyses of interest for this study were those concerning caregiver responses to adaptive engagements on the part of the clients. Specific relationships included caregiver attention of any kind given adaptive engagement, caregiver demand given adaptive engagement, caregiver attention of any kind given a client prosocial bid, and caregiver demand given a client prosocial bid. Demographic characteristics were tested for potential group differences using nonparametric Kruskal-Wallis analysis of variance (age, race) or Fisher’s exact test (gender). A multivariate general linear model (GLM) was used to compare Yule’s Q coefficient means for SIB groups for each of four behavioral dyads of interest. For significant omnibus results, Bonferroni corrected tests were used for post-hoc pairwise comparisons among SIB groups. All statistical analyses were performed using SPSS 18.

Results

Summary-Level Comparisons

There were no significant differences among groups in age [$H(2) = 1.8, p = .41$], ethnicity [$H(2) = 4.4, p = .11$], or IDD category [$H(2) = .18, p = .91$]. Groups differed significantly by gender ratio ($p < .001$, Fisher’s exact test), and this factor was included as both a main effect and interaction term in subsequent sequential level analyses. There were no significant differences among groups in duration of adaptive behavior, $F(2, 106) = .48, p = .62$, or frequency of social bids toward caregivers, $F(2, 106) = 1.9, p = .14$. Caregiver behavior toward groups did not differ for either frequency of caregiver attention, $F(2, 106) = .7, p = .49$, or frequency of demands made toward clients, $F(2, 106) = 1, p = .36$. For the severe and mild SIB groups, there were no differences in the frequency [$t(87) = .23, p = .82$] or duration [$t(87) = .27, p = .79$] of SIB.

Sequential-Level Comparisons

For SIB groups (control, mild, and severe), mean Yule’s Q scores were calculated for two general caregiver attention dyads (attention given adaptive engagement; attention given client social bid) and two caregiver demand dyads (demand given adaptive engagement; demand given client social bid). Means with 95% confidence intervals for each caregiver–client dyad among SIB groups are presented in Figure 1. For each of the four sequential relationships of interest, Yule’s Q scores ranged from 1 (a given client behavior was always followed by a given caregiver response) to -1 (a given client behavior was never followed by a given caregiver response). Differences in group means for behavioral dyads among SIB

groups (control, mild, and severe) were assessed by Type III sum-of-squares multivariate GLM. Because the proportion of males to females differed significantly between groups, this factor was added to the model as a main effect and SIB Group \times Gender as an interaction term. These results are presented in Table 1.

Because aggression is known to influence interactions between caregivers and those in their care, we conducted a partial test of whether aggressive behavior differed among SIB and control groups. Although direct observational data were not collected on aggression, the Behavior Problem Inventory (BPI; Rojahn, Matson, Lott, Esbensen, & Smalls, 2001) Aggression scale data were available for 65% of controls, 79% of those with mild SIB and 68% of those with severe SIB. There were no significant differences in aggression scale ratings among groups, $F(2, 73) = .29, p = .75$.

Discussion

How caregivers interact with individuals with IDD and SIB independent of SIB occurrence itself is not well understood. Theoretical models (Oliver, 1995) and empirical evidence (Hastings & Remington, 1994b; Lambrechts et al., 2010) are clear on the powerful role that social interaction or the lack thereof has on the maintenance of SIB. Knowing whether and how social interaction occurs outside of direct responses to SIB may be of particular importance to efforts to disrupt response–reinforcer relationships by changing the value attention and other forms of interaction in relation to SIB and adaptive behavior. In this study, we found preliminary evidence that SIB severity may influence the way in which caregivers interact with individuals with IDD and SIB around instances of adaptive behavior and that these patterns are unrelated to the gender of the individual. Two main conclusions may be drawn from these findings.

First, our findings suggest that caregiver interactions with individuals with mild SIB are comparable to interaction patterns seen among individuals with no SIB. This sets apart severe SIB from mild in its effect on reciprocal social interaction independent of the actual occurrence of SIB. This is a key point. The sequential analyses were between caregiver behavior and the adaptive engagement of individuals with and without SIB and between individuals with severe and mild forms of SIB. We were not comparing caregiver interaction patterns contingent on the occurrence of SIB itself. The observed differences in caregiver patterns of interaction between individuals with severe and mild SIB may be directly related to differential patterns of direct response to SIB described elsewhere, where severity is an important factor in determining social response to the behavior (Hall & Oliver, 1992). In our initial analyses, considering SIB as a general category without considering the possibility of relatively discrete subgroups would wash out differential patterns of interaction. Practically, individuals with minor and infrequent leg slapping versus individuals who frequently head bang on hard surfaces are likely to have a very different effect on caregiver perceptions and behavior.

Second, it is notable that caregivers were more likely to give attention in the form of demands to those with severe SIB following either adaptive engagement or prosocially initiated contact, as this is contrary to what would be expected based on the reciprocal effects aggression literature. We had implicitly hypothesized that caregivers would be less likely to place demands on individuals with SIB to avoid eliciting the behavior. Although admittedly speculative, our preliminary findings may be accounted for by differences in caregiver attributions between SIB and aggression. Research concerning attributions of caregivers toward individuals with IDD suggests that SIB may be considered qualitatively different from aggressive behavior by caregivers, though this result is not consistent across studies (Noone, Jones, & Hastings, 2006; Stanley & Staden, 2000). Lambrechts and

colleagues (2009) found similarities in caregiver reactions to aggression and SIB, but they did identify one key difference: caregivers were more likely to give a verbal demand following SIB than following other maladaptive behaviors. This increased likelihood for a demand was observed in the current study as well, though here increased demands were recorded in response to adaptive engagement and prosocial bids during times when no SIB was occurring.

Anecdotal caregiver reports indicated that higher levels of demands for those with SIB may be the result of caregivers capitalizing on periods of contentment or accepting affect in order to complete programming requirements. Given this explanation, we might assume that caregivers place demands on those with SIB during times when compliance is most likely in anticipation of SIB, precluding task demands later (Oliver, 1995). In a traditional child effects model, child aggressive or disruptive behavior is maintained through escape from a parent demand or access to some item or activity, whereas parent behavior is maintained by the prevention or termination of undesirable child behavior (Bell, 1979; Emery, Binkoff, Houts, & Carr, 1983). This model of bidirectional behavioral maintenance may not fully apply to self-injury. Unlike aggression, which is likely to directly punish and suppress demand behavior on the part of the caregiver, SIB is by definition self-directed. As a result, caregivers may not internalize SIB incidents to which they are exposed (Jones & Hastings, 2003; Snow, Langdon, & Reynolds, 2007). In other words, the occurrence of SIB may lack the punishing qualities of aggression and other out-wardly directed disruptive behavior. The effect of self-injury on day-to-day interaction patterns described here is consistent with previous surveys of caregiver beliefs regarding challenging behavior (e.g., aggression vs. self-injury; Jahoda & Wanless, 2005; Lowe & Felce, 1995; Noone et al., 2006).

The present results are also in line with the models of SIB maintenance proposed by Oliver (1995). In those models, inadvertent caregiver behavior during periods of no-SIB elicit the behavior later on. Applied to the context of the current data, caregivers differentially placed demands on those with SIB during periods of adaptive engagement, increasing the reinforcing effects of escape motivated SIB and differentially punishing prosocial behavior. The maladaptive behavior of those with SIB, then, is in part a product of the social behavior of their caregivers (Bell & Harper, 1977). In terms of reciprocal effects, caregivers may be attuned to certain salient behavioral signals that control their own behavior (e.g., the presence or absence of SIB), differentially responding based largely on overt characteristics across social situations (Bell, 1979). Interactions with those lacking challenging behaviors may be based on a broad array of signals, whereas interactions with those with severe challenging behavior may be based on a single trait. Caregivers may use periods of no-SIB to elicit desirable behavior, a response pattern governed largely by previous failures because of the presence of SIB (Zirpoli & Bell, 1987).

A number of limitations are relevant to the present study. The direction of cause and effect among relational dyads remains undetermined by the present data. As is true of the child effects literature, it is difficult to assign causality because of cycling patterns of mutual behavioral maintenance (O'Connor, 2002; Sloman et al., 2005). The present study did not fully account for caregiver characteristics, and it is likely that their background and experience influenced patterns of client interactions (Hastings, Remington, & Hopper, 1995; Oliver, Hall, Hales, & Head, 1996). Future naturalistic examinations of reciprocal interactions might control for or specify caregiver attributes and test interaction effects as they relate to these factors. We likewise were unable to fully account for how many caregivers were observed and for how long. Although caregivers varied randomly across observed sessions and participants, it is possible that this uncontrolled factor influenced our results. The SIB group in our sample was subdivided by severity based on whether the behavior had been associated with tissue damage. Although it seems a logical subgrouping

variable, there are other dimensions that may be just as relevant (location, topography, function, etc.) and should be included in future research. Finally, our results may be best generalized to residential centers for persons with IDD. Although the present findings are certainly suggestive, further research is necessary to determine how they generalize to other settings (e.g., small group homes) and populations (e.g., children).

Despite these limitations, the present study was a novel initial test of caregiver–client interactions independent of the occurrence of SIB. By extending child-effects theory, we found that severe SIB was associated with differential patterns of caregiver interaction, suggesting that reciprocal interaction effects are at work. It would seem that additional research is warranted to further clarify the nature of caregiver perceptions/attributions and interactions among individuals with IDD and SIB. Although reciprocal interaction effects are known to influence the fidelity and success of treatment, it is uncommon for providers to consider these system variables in treatment development and implementation (Emery et al., 1983). Though bidirectional functional analysis may be prohibited by cost, it remains important for providers to consider the potential influence of reciprocal effects on service delivery (Sloman et al., 2005). Caregiver social responding to individuals with SIB and independent of the occurrence of SIB is important not only to the quality of day-to-day social interactions, but also for the maintenance or reduction of future problem behavior.

References

- Bakeman, R.; Gottman, JM. *Observing interaction: An introduction to sequential analysis*. Cambridge University Press; Cambridge, England: 1997.
- Baker P, Allen D. Physical abuse and physical interventions in learning disabilities: An element of risk? *Journal of Adult Protection*. 2001; 3:25–31.
- Bell, RQ.; Harper, LV. *Child effects on adults*. Lawrence Erlbaum; Hillsdale, NJ: 1977.
- Bromley J, Emerson E. Beliefs and emotional reactions of care staff working with people with challenging behavior. *Journal of Intellectual Disability Research*. 1995; 39:341–352. [PubMed: 7579992]
- Carr EG, Taylor JC, Robinson S. The effects of severe behavior problems in children on the teaching behavior of adults. *Journal of Applied Behavior Analysis*. 1991; 24:523–535. [PubMed: 1752841]
- Deacon, JR.; Mack, D.; Stroup, S. Skills and characteristics deemed important for the appropriate performance of daily direct support duties. Paper presented at the 50th Anniversary Conference of the Southeastern Region of the American Association on Mental Retardation; Choctaw, Mississippi. 2004.
- Derby KM, Wacker DP, Sasso G, Steege M, Northup J, Cigrand K, Asmus J. Brief functional assessment techniques to evaluate aberrant behavior in an outpatient setting: A summary of 79 cases. *Journal of Applied Behavior Analysis*. 1992; 25:713–721. [PubMed: 1429322]
- Emerson E, Beasley F, Offord G, Mansell J. An evaluation of hospital-based specialized housing for people with seriously challenging behaviors. *Journal of Intellectual Disability Research*. 1992; 36:291–307. [PubMed: 1525438]
- Emery RE, Binkoff JA, Houts AC, Carr EG. Children as independent variables: Some clinical implications of child effects. *Behavior Therapy*. 1983; 14:398–412.
- Felce D, Repp A. The behavioral and social ecology of community houses. *Research in Developmental Disabilities*. 1992; 13:27–42. [PubMed: 1585020]
- Hall S, Oliver C. Differential-effects of severe self-injurious behavior on the behavior of others. *Behavioural Psychotherapy*. 1992; 20:355–365.
- Hastings RP, Remington B. Rules of engagement: Toward an analysis of staff responses to challenging behavior. *Research in Developmental Disabilities*. 1994a; 15:279–298. [PubMed: 7972967]
- Hastings RP, Remington B. Staff behaviour and its implications for people with learning disabilities and challenging behaviors. *British Journal of Clinical Psychology*. 1994b; 33:423–438. [PubMed: 7874036]

- Hastings RP, Remington B, Hopper GM. Experienced and inexperienced health care workers' beliefs about challenging behaviours. *Journal of Intellectual Disability Research*. 1995; 39:474–483. [PubMed: 8746734]
- Hile M, Walbran B. Observing staff-resident interactions: what staff do, what residents receive. *Mental Retardation*. 1991; 29:35–41. [PubMed: 2017049]
- Iwata BA, Pace GM, Dorsey MF, Zarcone JR, Vollmer TR, Smith RG, Willis KD. The functions of self-injurious behavior: An experimental-epidemiological analysis. *Journal of Applied Behavior Analysis*. 1994; 27:215–240. [PubMed: 8063623]
- Jahoda A, Wanless K. Knowing you: The interpersonal perceptions of staff towards aggressive individuals with mild to moderate intellectual disabilities in situations of conflict. *Journal of Intellectual Disability Research*. 2005; 49:544–551. [PubMed: 15966962]
- Jones C, Hastings RP. Staff reactions to self-injurious behaviours in learning disability services: Attributions, emotional responses and helping. *British Journal of Clinical Psychology*. 2003; 42:189–203. [PubMed: 12828807]
- Lambrechts G, Van Den Noorgate W, Eeman L, Maes B. Staff reactions to challenging behavior: An observation study. *Research in Developmental Disabilities*. 2010; 31:525–535. [PubMed: 20036104]
- Lowe K, Felce D. How do careers assess the severity of challenging behavior? A total population study. *Journal of Intellectual Disability Research*. 1995; 39:117–127. [PubMed: 7787381]
- Maurice, P.; Trudel, G. Self-injurious behavior: Prevalence and relationships to environmental events. In: Hollis, JH.; Meyers, CE., editors. *Life threatening behavior: Analysis and intervention*. Monographs of the American Association on Mental Deficiency. American Association on Mental Deficiency; Washington, DC: 1982.
- McComas JJ, Johnson LA, Symons FJ. Teacher and peer-responsivity to prosocial behavior of high aggressors in pre-school. *Educational Psychology*. 2004; 25:223–231.
- Noone SJ, Jones RSP, Hastings RP. Care staff attributions about challenging behaviors in adults with intellectual disabilities. *Research in Developmental Disabilities*. 2006; 27:109–120. [PubMed: 15994057]
- O'Connor TG. Annotation: The 'effects' of parenting reconsidered: findings, challenges, and applications. *Journal of Child Psychology and Psychiatry*. 2002; 43:555–572. [PubMed: 12120853]
- Oliver C. Annotation: Self-injurious behaviour in children with learning disabilities: Recent advances in assessment and intervention. *Journal of Child Psychology and Psychiatry*. 1995; 30:909–927. [PubMed: 7593402]
- Oliver C, Hall S, Hales J, Head D. Self-injurious behavior and people with intellectual disabilities: Assessing the behavioural knowledge and causal explanations of care staff. *Journal of Applied Research in Intellectual Disabilities*. 1996; 9:229–239.
- Rojahn J, Matson JL, Lott D, Esbensen A, Smalls Y. The Behavior Problems Inventory: An instrument for the assessment of self-injury, stereotyped behavior, and aggression/destruction in individuals with developmental disabilities. *Journal of Autism and Developmental Disorders*. 2001; 31:577–588. [PubMed: 11814269]
- Saloviita T. Challenging behavior and staff responses to it, in residential environments for people with intellectual disability in Finland. *Journal of Intellectual and Developmental Disability*. 2002; 27:21–30.
- Sloman KN, Vollmer TR, Cotnoir NM, Borrero CS, Borrero JC, Samaha AL, St. Peter CC. Descriptive analyses of caregiver reprimands. *Journal of Applied Behavior Analysis*. 2005; 38:373–383. [PubMed: 16270846]
- Smith RG, Iwata BA. Antecedent influences on behavior disorders. *Journal of Applied Behavior Analysis*. 1997; 30:343–375. [PubMed: 9210312]
- Snow E, Langdon PE, Reynolds S. Care staff attributions towards self-injurious behavior exhibited by adults with intellectual disabilities. *Journal of Intellectual Disabilities*. 2007; 11:47–63. [PubMed: 17287229]
- Stanley B, Staden PJ. Carers' attributions for challenging behaviour. *British Journal of Clinical Psychology*. 2000; 39:157–168. [PubMed: 10895359]

- Tapp J, Wehby JH, Ellis N. A multiple observation system for experimental studies: MOOSSES. *Behavior Research Method, Instruments, and Computers*. 1995; 27:25–31.
- Weigel L, Langdon PE, Collins S, O'Brien Y. Challenging behavior and learning disabilities: The relationship between expressed emotion and staff attributions. *British Journal of Clinical Psychology*. 2006; 45:205–216. [PubMed: 16719979]
- Yoder, PJ.; Feurer, ID. Quantifying the magnitude of sequential association between events or behaviors. In: Thompson, T.; Felce, D.; Symons, FJ., editors. *Behavioral observation: Technology and applications in developmental disabilities*. Paul H. Brookes; Baltimore, MD: 2000. p. 335-348.
- Zirpoli TJ, Bell RQ. Unresponsiveness in children with severe disabilities: Potential effects on parent-child interactions. *International Journal of Disability, Development, and Education*. 1987; 34:31–40.
- Zirpoli TJ, Snell ME, Loyd BH. Characteristics of persons with mental retardation who have been abused by caregivers. *Journal of Special Education*. 1987; 21:31–41.

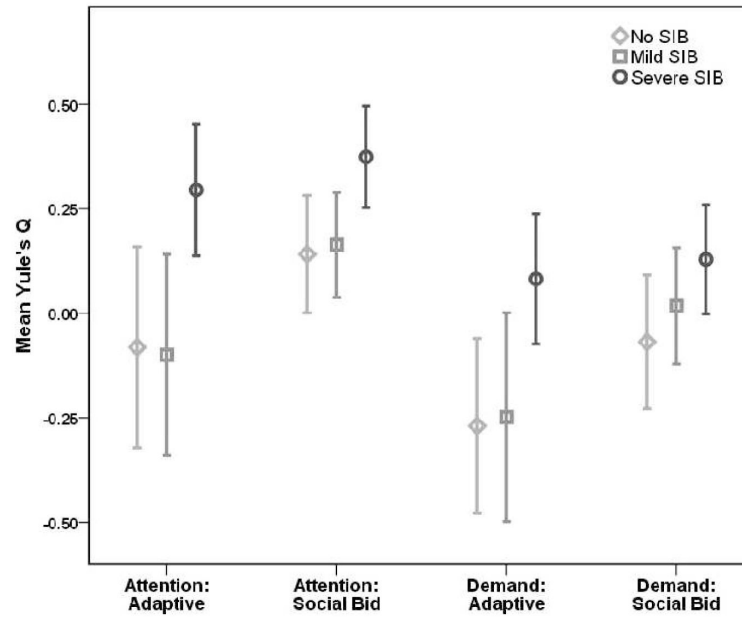


Figure 1. Mean Yule's Q with 95% confidence intervals for each sequential interaction of interest for 3 groups (no self-injurious behavior [SIB] control, mild SIB, and severe SIB). X-axis terms denote caregiver behavior given client behavior (caregiver–client).

Table 1

Multivariate General Linear Model Results for Effect of Group Status (Control, Mild SIB, and Severe SIB) and Sex on Yule's Q Scores for Social Dyads

Variable	<i>df</i> ¹⁰³	<i>F</i>	<i>p</i>	η_p^2
Attention: Adaptive				
Group	2	4.57 ^a	.013	.081
Gender	1	.037	.847	0
Group × Gender	2	.063	.939	0
Attention: Social Bid				
Group	2	4.04	.020	.057
Gender	1	0.31	.576	.003
Group × Gender	2	0.64	.530	.012
Demand: Adaptive				
Group	2	3.47 ^a	.035	.063
Gender	1	0.05	.820	0
Group × Gender	2	1.13	.326	.022
Demand: Social Bid				
Group	2	1.11	.335	.021
Gender	1	0.19	.666	.002
Group × Gender	2	0.05	.949	.001

Note. Variables represent caregiver behavior given client behavior (caregiver–client).

^aSignificant Bonferroni adjusted pairwise comparison, severe self-injurious behavior (SIB) > mild SIB.