Intellectual and Developmental Disabilities

Social Positioning to Increase Communication of Adults with Extensive Support Needs
--Manuscript Draft--

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Manuscript Region of Origin:	UNITED STATES

Abstract:	Social positioning involves positioning individuals with extensive support needs (ESN) in proximity to and facing a communication partner, with access to a speech-generating device (SGD). We used a multiple probe design to evaluate if social positioning would increase the symbolic and nonsymbolic communication of 10 adults with severe and multiple disabilities and complex communication needs when they were out of their wheelchairs. Dependent variables included: SGD activations, eye gaze, vocalizations, and reaching. Visual analysis of the results indicated a functional relation between the introduction of social positioning and increased eye gaze and SGD activations of participants while maintenance data were variable. Implications for service providers and future research directions are discussed.

Abstract

Social positioning involves positioning individuals with extensive support needs in proximity to and facing a communication partner, with access to a speech-generating device (SGD). We used a multiple probe design to evaluate if social positioning would increase the symbolic and nonsymbolic communication of 10 adults with extensive support needs (ESN) when they were out of their wheelchairs. Dependent variables included: SGD activations, eye gaze, vocalizations, and reaching. Visual analysis of the results indicated a functional relation between the introduction of social positioning and increased eye gaze and SGD activations of participants while maintenance data were variable. Implications for service providers and future research directions are discussed.

Keywords: social positioning, speech-generating devices, extensive support needs, complex communication needs

Social Positioning to Increase Communication of Adults with Extensive Support Needs

Individuals communicate for a variety of reasons – to make choices and show preferences; exchange information; express feelings, thoughts, and ideas; impact their environments; socialize with others; and many other reasons. All individuals have the right to communicate, given that social communication is an important aspect of life that leads to emotional fulfillment and meaningful relationships (Brady et al., 2016). In the United States, it is estimated that four million individuals do not use natural speech to communicate (Feeney, 2015). Among this group, individuals with extensive support needs (ESN) require assistance across several life domains, including having complex communication needs (Beukelman & Mirenda, 2013). Many individuals with ESN have a significant intellectual disability that impacts their learning, socialization, and communication. Oftentimes, they also encounter physical challenges ranging from positioning or transporting their own bodies to performing basic tasks such as eating, bathing, and dressing. As a result, individuals with ESN receive a range of integrated supports and services to enhance their daily participation and quality of life. For example, they commonly use speech-generating devices (SGDs) to increase their communication potential and adapted equipment (e.g., wheelchairs for mobility, standers to assist in standing, and wedges to lay down on an incline) to enhance their positions and mobility (Turnbull et al., 2013).

Existing intervention studies on increasing social communication for individuals with ESN have primarily focused on interactions of school-age children (e.g., Carter et al., 2010) or interactions between individuals with ESN with their support personnel (e.g., van der Meer et al., 2017). Carter and colleagues (2010) reviewed 85 intervention studies and identified 20 practices, ranging from student-, partner-, and context-based supports, used to promote peer interactions of students with intellectual disabilities and/or autism in school settings. More recently, van der

Meer et al. (2017) examined 22 studies that trained direct support personnel to deliver

interventions to promote communication of adults with intellectual disability. In over half the

reviewed studies ($n = 12$), staff learned to deliver specific intervention strategies (e.g., providing

choices or teaching signs), while the remaining studies ($n = 10$) focused on overall

communication goals (e.g., creating opportunities). Among the 19 studies that reported

communication outcomes of adults with disabilities, 10 studies resulted in either mixed (both

positive and negative outcomes were present; $n = 6$) or negative (no improvement; $n = 4$)

communication outcomes for adults with disabilities.

Overall, this body of literature has provided practitioners with guidelines on how to

promote interactions between individuals with ESN and their communication partners without

disabilities (e.g., peers or staff). However, very little intervention research has explored

increasing social communication with partners with disabilities (Carter et al., 2010; Nijs & Maes,

2014). In Carter et al.'s review, the majority of the peer interaction intervention studies (80%)

only measured interactions between school-aged students with autism and/or intellectual

disability and their peers without disabilities. Only 10 out of 85 studies evaluated interaction

outcomes involving peers with and without disabilities. In an attempt to better define social peer

interactions of individuals with profound intellectual and multiple disabilities, Nijs and Maes

(2014) reviewed eight descriptive studies published from 1991 to 2011. Three studies reported

observations on interactions between children and their peers with profound intellectual and

multiple disabilities. Only one study examined social interactions among three adults with

profound intellectual and multiple disabilities. The authors concluded that encouraging

socialization among individuals with ESN is important for creating relationships between these

individuals in order for them to be able to share their commonalities instead of only socializing with individuals who lack a common point of view.

There is very limited intervention research on promoting interactions between individuals with ESN and their peers with ESN. These interactions could foster the inclusion of others with similar experiences and abilities instead of only interacting with peers who are typically developing and caregivers and teachers without disabilities. Bonnike and colleagues (2018) coined the term *social positioning* (p. 153) to demonstrate the effect that positioning participants with ESN in proximity to (no more than 1 m apart) and facing each other with access to an SGD would have on the social interactions. Proximity is an important consideration for this population as oftentimes visual and hearing impairments can be a barrier to communication as well as upper extremity range of motion. Eye gaze, vocalization, and reaching were dependent variables as the use of SGDs were part of the intervention package. The authors concluded that all three participants demonstrated increased communication when social positioning was used in the withdrawal design study. Some of the study limitations included small sample size with school-aged students, no SGDs offered in baseline, and a brief maintenance phase.

It is evident that additional intervention research on increasing communication between individuals with ESN is needed to expand the research base. One of the intervention strategies to consider is environmental arrangement. Environmental arrangement involves staging an area with the intent to foster social communication or to elicit particular behavior responses (Arthur et al., 1999). A range of approaches have been discussed or used to arrange environments for children with ESN, such as creating a social language rich environment, ensuring access to SGDs, pairing appropriate communication partners, increasing proximity to peers, and making sure adults who were facilitating interactions did not become a physical communication barrier

to peers (Arthur et al., 1999; Chung & Carter, 2013; McEwen & Karlan, 1989; McEwen & Lloyd, 1990).

For example, McEwen and Karlan (1989) investigated the impacts of positioning on switch activation of children with ESN. The authors found that when two participants were positioned in an adapted chair, stander, or prone on a wedge, they increased their abilities to activate a switch, compared to when they were in a sidelying position (lying on their side on a wedge). Additionally, Hostyn and Maes (2009) reviewed 15 articles on the interactions between individuals with ESN including both children and adult participants. The authors noted that the body position of these individuals and the availability of SGDs were two factors that positively influenced communication.

Furthermore, proximity to an SGD as well as peers (less than 1 m away) in addition to variables such as paraprofessional and peer training were related to increased interactions according to Chung and Carter (2013) in their study of two students with an intellectual disability. Likewise, Chung and colleagues (2012) found that 58% of peer interactions took place when students with disabilities were in proximity to peers without disabilities, and 43% of social interactions happened when they had access to their SGDs. These studies suggest that both proximity to peers and SGDs are important in order for social interactions to occur for individuals with disabilities. The compilation of these studies informed the current study because they supported the ideas for social positioning including proximity, face-to-face positions, the use of adaptive equipment, and SGD location as possible means to increase socialization.

The goal of this study was to investigate the impact of social positioning alone and social positioning with participant training on the communication between adults with ESN. The specific research questions included: (a) Will social positioning increase the nonsymbolic (eye

gaze, vocalization, and reaching) and symbolic (SGD activations) communication of adults with

ESN? (b) Will social positioning with participant training further increase the nonsymbolic and

symbolic communication? (c) Will the level of participants' symbolic and nonsymbolic

communication maintain following the intervention? and (d) Will staff perceptions change

between pre- and post-intervention surveys?

Method

Participants

Adults with ESN

Following IRB approval, we recruited potential participants from a convenience sample

of 107 adults with ESN who attended a developmental training center. Criteria for participation

included: (a) had at least a 90% attendance rate for the past 6 months, (b) 18 years of age or

older, (c) had a diagnosis of severe or profound intellectual disability as determined by IQ score

of 40 or below on previous tests administered within the last five years, (d) used a wheelchair for

mobility, (e) had limited or no functional speech but able to vocalize as a way to initiate or

respond to communication, (f) had a history of SGD use (demonstrated operational competence)

according to the last 3 years of annual speech-pathology reports, and (g) had demonstrated each

of the dependent variables (eye gaze, vocalization, and reaching) in 75% of trials when screened

by the speech-language pathologist to show consistency. Exclusion criteria included: (a) had

medical precautions regarding upper extremity movement, SGD use, or time out of their

wheelchairs; (b) had blindness or deafness as a diagnosis; or (c) did not demonstrate all of the

dependent variables during screening. As a result, 10 adults with ESN ranging in age between 26

and 56 participated in the study, resulting in six dyads (with two additional adults with ESN

participating as communication partners though data were not reported due to the lack of

consent). See Table 1 for participant characteristics and SGD.

Staff participants

We gave 20 staff members at the developmental training center the option to participate in the study and all accepted. Seventeen staff members were female and three were male, while all were over the age of 20 and with experience ranging less than one year to over 10 years. In addition, one was Asian American, seven were Hispanic, and 12 were European American. They were all certified nursing assistants, except one who was a developmental instructor. During the study, each staff participant worked only with one participant with ESN at a time.

Setting and Materials

This study took place at a vocational-focused developmental training center with seven classrooms for adults with ESN in a suburban, Midwestern city. Daily program schedules included time for activities of daily living (grooming, toileting, eating), speech, recreational, music, occupational, aquatic, and physical therapies, community visits, and repositioning out-of-wheelchairs for relaxation and pressure relief. The study took place in the corresponding classrooms of the participants.

Each participant had their own appropriate positioning equipment and SGD (see Table 1). The first author measured the distance between dyad members' heads with a tape measure to ensure that the adults were no more than 1 m apart during the social positioning condition. She also used six digital cameras for video recording purposes. Video cameras were located near the dyad to record the participants' communication. She watched the videos in Windows Media Player[TM].

Research Design

We used a multiple probe design (Leford & Gast, 2018) across dyads to examine the effects of social positioning on symbolic and nonsymbolic communication. We randomly

divided participants into two groups of three dyads in order to establish functional relations with the staggered introduction of social positioning and potential for multiple demonstrations of effect. The first author chose dyads based on individuals in the same classroom and staff input regarding individuals who might enjoy socializing with one another based on nonverbal communication during previous class activities. The order of conditions included: baseline, social positioning, social positioning with participant training, and maintenance. Dyads moved from baseline to social positioning in a staggered fashion after the baseline data points were stable or decelerating and the prior tier's social positioning data showed a change in level for SGD activation. Dyads moved from social positioning alone to social positioning with participant training after at least five data points and when SGD activations plateaued or decelerated to determine if training would increase the presentation of any or all of the dependent variables. At least five data points and stable or accelerating SGD activation data were required to move from social positioning with participant training to maintenance.

Data Collection

The dependent variables in this study included nonsymbolic communication (eye gaze, vocalization, and reaching) and symbolic communication (intentional and unintentional SGD activations). We chose these variables based on the works of other authors who identified these means of communication in this population (adults with ESN; Beck et al., 2009; Brady et al., 2012). We recorded eye gaze when the participant looked in the direction of their partner's face. We defined vocalization as any noise from the participant's mouth when they looked at their partner or seemed to be in response to an interaction with their partner. We recorded reaching when a participant extended their upper extremity in the direction of their partner. Anytime the SGD spoke a message after being pressed or activated by a switch, we recorded SGD activation.

The first author viewed each video recorded session and used an event recording system to tally instances of eye gaze, vocalization, reaching, and SGD activation for 20 min during each condition. At the beginning of each session, she recorded contextual information (e.g., activity, personnel present, distance between dyad partners, the SGD, and its message).

Procedures

Screening

As a licensed speech-language pathologist, the first author screened each participant to determine if they could demonstrate the dependent variables of eye gaze, vocalization, and reaching and to determine which SGD was the most effective for the participant to activate. The selected SGD was a familiar device to the participant and accessible to the participant in every session throughout the study. In addition, a licensed physical therapist or physical therapist assistant and first author worked together to screen the participants for the most effective out-of-wheelchair position that promoted all of the dependent variables for each participant (e.g., lying on his or her side on a wedge, prone over a wedge). This was important because some positions are more appropriate for encouraging the activation of an SGD or demonstrating any of the other dependent variables (McEwen & Lloyd, 1990).

Baseline

The first author collected baseline data on how often each participant demonstrated the dependent variables when positioned out of their wheelchair during the first 20 min of the participant's repositioning time following usual out-of-chair procedures at least five times or until data were stable or decelerating. Staff positioned participants in or on positioning equipment, such as wedges, mats, standers, gait trainers, Theragym® Bouncing Chairs^{2TM}, and bean-bags in approved and comfortable positions placed around the classroom, near their partner

(between 1 and 2 m apart but not always facing each other), and with access to an SGD. The first

author introduced partners to each other by saying and pointing to their partner. She further

oriented each participant to their SGD by showing the SGD to the participant and activating it

one time as a model. The SGDs had the same messages programmed throughout the study (e.g.,

Hi. Let's chat! / Hey! Look at me. / How's it going?).

Social Positioning

Prior to the beginning of the social positioning condition, the first author delivered staff

training to promote an understanding of social positioning to staff members. The training

consisted of scripted instructions read to staff members and a visual demonstration of positioning

and SGD use. We operationally defined social positioning as positioning a participant out of

their wheelchair facing their dyad partner, no more than 1 m apart, and with SGD access which

was similar to Bonnike et al. (2018). Participants were positioned by staff members with

assistance from the first author during this condition. The first author collected data in the same

manner as in baseline for 20 min. The criterion to move to the next condition was the completion

of at least five sessions and SGD activation plateauing or decelerating.

Social Positioning with Participant Training

Participant training was added to social positioning to determine if communication could

be further enhanced. During this condition, participants were positioned as they were in the

previous condition with the same orientation to their SGD and partner. Then the first author read

a brief and simple script to the dyad participants describing how to communicate when they are

near each other and gave examples with models (reaching for one another, looking at each other,

vocalizing to each other, and activating SGDs). She then provided a brief modified Aided

Language Stimulation lesson where she activated each SGD to show how to use them. She cued

each participant to practice reaching, eye gaze, vocalization, and SGD activation and assisted

with additional practice as needed prior to the start of the 20 min session. The training period

lasted no more than 5 min for each participant. The criterion to move into the maintenance

condition was at least five sessions and stable or accelerating with a positive trend SGD

activation data.

After a few sessions in this condition and as the trend increased, the first author added

intermittent verbal praise and feedback regarding specific behaviors in which the participants

were engaging for the remainder of the study in an attempt to increase the dependent variables

further. She added this intervention modification to further increase the number of dependent

variables elicited and to emphasize intentionality. This was a reinforcement method similar to

that used by Chung and Carter (2013) to accentuate the production of dependent variables (e.g., *I

like how you pushed your SGD and then looked at X. He knows you're speaking to him now*).

Maintenance

Following the social positioning with training condition, the first author collected data

during maintenance sessions every other week until the end of the study. She conducted these

sessions in the same way as the social positioning with training sessions. Some participants had

fewer maintenance sessions due to time constraints in the implementation of the study.

Social Validity

The first author collected social validity data from participating staff members at the

beginning and conclusion of the study. The purpose of the survey was to assess the study's goals,

procedures, and outcomes and to determine if staff members' perceptions changed following the

study. Following baseline and maintenance conditions, staff members completed a survey with

10 demographic questions, 2 open-ended questions, and 22 Likert-type scale questions to share their perceptions of social positioning, SGDs, and working with individuals with ESN.

Data Analysis

We used visual analysis to analyze the data, which is the recommended data analysis approach in single case research (Ledford & Gast, 2018). We conducted visual analyses of the level, trend, variability of the data between and within conditions, immediacy of effect, and the percentage of nonoverlapping data (PND). Due to time constraints, the trend had to be stable or decelerating or at least five data points had to be collected in order to move to the next condition.

Inter-Observer Reliability

The first author operationally defined each dependent variable for a second observer and provided training on how to tally presentations of those variables when watching practice videos. The second observer independently collected inter-observer agreement (IOA) data on each dependent variable by viewing a random selection of 20% of the videos in each condition. If IOA fell below 80%, the first author retrained the observer to ensure consistent data collection with clear dependent variable definitions. The first author calculated the mean IOA by dividing the number of total agreements from all conditions by the number of total agreements plus total disagreements from all conditions and multiplying by 100. IOA was 100% for all participants in all conditions due to the accuracy in watching videos.

Procedural Reliability

The same trained observer collected procedural reliability data on 20% of the sessions in each condition. She independently viewed a random selection of video recordings of the room to show the positioning and orientation of the participants and their SGDs and ensuring that the procedures for each condition were followed using a procedural checklist (e.g., facing partner, 1

m apart, SGD access). The first author calculated mean procedural reliability by dividing the

number of observed researcher behaviors by the number of opportunities to emit the behavior

and multiplying by 100. Mean procedural reliability was 99% for baseline, 100% for social

positioning, 100% for social positioning with participant training, and 100% for maintenance.

Staff Orientation Fidelity

The first author trained staff by following a checklist of instructions and activities. She

self-recorded the completeness of the delivery of her training. The same secondary rater viewed

a random selection of 20% of the videos for consistency in training using the checklist which

resulted in 100% fidelity.

Results

Based on visual analysis of the data, there was a functional relation between social

positioning and increased eye gaze and SGD activations of participants with ESN (see Figures 1

and 2). Each dyad provided a demonstration of effect for these two dependent variables when

analyzing the change in level, trend, and PND. Although the dependent variables continued to be

demonstrated during social positioning with training, no functional relation was noted with the

introduction of training. All but one participant (i.e., Hannah) increased one or more dependent

variables following the addition of the intermittent verbal praise and feedback. Maintenance data

for social positioning with training were variable.

Calvin and Betty

Vocalizations and reaching were at or near zero for all sessions for Calvin; however, eye

gaze had a change in level and 100% PND and SGD activations had a positive change in level

and trend with 90% PND for between baseline and social positioning. Data maintained at these

levels with little change for the remaining conditions. In Betty's social positioning condition, her

eye gaze data increased in level with 80% PND and her SGD activation showed a positive level

change though data were variable data and PND was 0%. Vocalization and reaching remained

near zero. Betty's data during social positioning with training remained similar to the data during

the social positioning condition. SGD activations showed an abrupt and therapeutic change in

level following the session with intermittent praise and feedback. Betty's data remained

consistent in the maintenance condition.

Calvin and Betty as a dyad showed similar trends for the dependent variables. They

demonstrated level and trend changes at similar times indicating that communication was taking

place. In addition, at times when Calvin was activating an SGD more often, Betty's eye gaze

increased and vice versa which could indicate that they were giving attention to the more

expressive communicator on those days.

Faith

At session 4, Faith required a new, non-participant partner due to her previous partner

changing classrooms. She was told this and encouraged to choose a new partner which she did

by driving her power wheelchair up to a classmate, pointing at her, smiling, and vocalizing. In

the social positioning condition, Faith's data greatly increased in level for SGD activation (100%

PND) and eye gaze (80% PND), while vocalization showed a slight level change (60% PND)

and reaching remained low throughout the condition. During social positioning with training, her

data remained similar to the previous condition even with praise and feedback on the dependent

variables. In the maintenance condition, all of her data levels maintained. She was observed

taking conversational turns during intervention with her partner.

Irene and Hannah

Once Irene entered the social positioning condition, she had an abrupt improvement in level for eye gaze and SGD activations (100% PND for both), but low stable data for vocalization and no change in reaching. Results were similar during the social positioning with training condition and decreased during maintenance. For Hannah, eye gaze increased in level with 100% PND and SGD activations increased with variable data and 60% PND during social positioning. Vocalizations were not demonstrated during this condition while reaching decelerated. In an attempt to increase the frequency of the dependent variables, training was implemented with intermittent verbal praise and feedback. However, no reaching or vocalizations were observed and eye gaze and SGD use decreased. The one maintenance session for Hannah that showed minimal SGD use and all other behaviors deteriorated. Hannah had increased seizure activity around the time of the study (particularly once intervention began) that was abnormal for her and may have caused her variable data.

Similar to Calvin and Betty, Irene and Hannah's data followed similar trends despite differences in magnitude during intervention. Similarities may have been greater had it not been for the seizure activity Hannah experienced during intervention.

John and Kevin

John had an abrupt change in level for eye gaze (17% PND due to outlier in session 1) and SGD activations (100% PND) with the introduction of social positioning. Reaching was never elicited. Eye gaze and vocalization remained relatively stable during training and consistent with the prior condition. An increase in level was noted following praise and feedback for SGD activation. John had an abrupt change in level in a therapeutic direction for SGD activation and eye gaze in the first maintenance session, but then these behaviors began to

deteriorate for the remainder of the study. Vocalization remained at zero during maintenance and reaching was never demonstrated.

In Kevin's social positioning condition, eye gaze and SGD activation followed an overall variable, therapeutic trend with 100% and 33% PND respectively. The onset of the training condition showed level changes for eye gaze and vocalization and a negative change in level for SGD activation. Reaching was never observed. All dependent variables (except reaching) were inconsistent throughout the remainder of the condition and concluded with contratherapeutic data trends even during maintenance.

Together, John and Kevin's data followed relatively similar data paths. When a high magnitude change in SGD activation occurred for John, Kevin's SGD activations decreased and vice versa. Individually, Kevin communicated with eye gaze and vocalizations, but John did not demonstrate these behaviors regularly.

Elise and Dulcie

For Elise, the first session showed higher levels of eye gaze and SGD activation than the remainder of baseline data because Elise and her partner were coincidentally positioned next to each other on day one of the study. In the social positioning condition, Elise had an abrupt change in level and trend for eye gaze (100% PND) and SGD activation (80% PND). Vocalizing and reaching were stable at zero during all conditions. In social positioning with training, data levels were slightly lower than the previous condition for eye gaze and SGD. In the maintenance condition, eye gaze started at the same level as the previous condition before deteriorating during the final maintenance session. SGD activation decreased in level initially, but increased back to a higher level before the study ended.

During the social positioning condition for Dulcie, there was an abrupt and immediate

change in level for eye gaze (80% PND), vocalization (0% PND), and SGD activation (100%

PND). Vocalization and reaching were somewhat variable and overall low for the entirety of the

condition. During social positioning with training, data levels remained the same for all of the

dependent variables. In the maintenance condition, an initial change in level contra-

therapeutically was noted for SGD activation but not eye gaze. In the second maintenance

session, eye gaze decelerated and SGD activation accelerated.

Like the other dyads, Elise and Dulcie demonstrated similar patterns of target behavior

trends particularly for SGD activations during all conditions. Both participants had a large

magnitude level change after the introduction of intermittent verbal praise and feedback as well.

Adah

During social positioning, Adah demonstrated an abrupt change in level for eye gaze and

SGD activations that continued into a stable and therapeutic trend with 100% PND for each.

PND for vocalization was 60% with a small magnitude of effect and no reaching was elicited.

During social positioning with training, eye gaze data continued from the previous level and then

accelerated until the final session decreased. SGD activations decelerated from the previous

levels. In maintenance, there was very little deterioration in level of eye gaze and the level of

SGD activation showed substantial improvement. Vocalization increased slightly, but reaching

did not occur during maintenance. Adah was observed frequently taking conversational turns

during intervention with her partner.

Social Validity

Of the 24 surveys completed after baseline, 20 (83%) were returned. Due to staffing

changes by the end of the study, only 17 (71%) of the initial staff members completed the study

and social validity survey after maintenance. During the pre-intervention survey, staff members had positive attitudes toward the participants. Staff members strongly believed that the participants and all clients in the developmental training program should be able to communicate with whomever they wanted. Prior to the intervention, 75% of staff members indicated there were regular peer interaction opportunities for the participants. When asked about social positioning and its purpose, one staff stated "I think it is a good idea and can benefit them in many ways." Another said "I think that the clients have as much of a right to communicate/socialize with anyone they want at any time as anyone else. I would be happy to position clients so they can socialize with each other." During pre-intervention survey, the respondents also shared that they did not need further training on SGDs nor did the participants need further training. More than half noted that they generally ask *yes* and *no* questions when communicating with participants, and reported that the participants had more interaction with staff, not with their peers.

Following the intervention, 81% of the staff members noted that there were opportunities for peer interaction. All of the respondents indicated they were more confident in positioning participants for socialization when they had out-of-wheelchair time. Respondents supported the practice of social positioning. Many stated that they were willing to positioning their clients for socialization in the future. Some staff members also provided suggestions for future social positioning opportunities, including ensuring access to more SGDs, identifying a designated helper to facilitate communication, organizing social positioning groups, and using social positioning during aquatic therapy.

Discussion

Key Findings Related to Participants

The results of this study enhance the literature on social interactions of individuals with ESN. In particular, it extends the knowledge on how these individuals communicate with peers with disabilities through social positioning. This study offered options other than resting and repositioning for pressure relief during out-of-wheelchair time. Our findings indicated that these individuals communicated more often when positioned at no more than 1 m apart, facing each other, and provided with a SGD. When training was added to social positioning, there was little difference in communication outcomes, but individuals continued to communicate through maintenance sessions.

This research strengthens the evidence of social interaction interventions that involved the use of body position, increased SGD access, and proximity to peers (Bonnike et al., 2018; Chung & Carter, 2013; Hostyn & Maes, 2009). All of the participants made gains in eye gaze and SGD activation during social positioning, even though some gains were minimal with variable data. One explanation is that, because of these individuals' extensive support needs, there are various factors impacting their daily lives and communication. For example, Calvin often communicated when he had certain needs (e.g., being physically uncomfortable). On a regular day, Calvin often had to rely on a staff to determine and address the source of issues (e.g., discomfort). When his basic needs were not met, he focused more on his physical comfort than the need to socialize. Thus the amount of his social interactions along with his desire and energy varied daily, which can result in variable data.

In some cases, the gains in dependent variables were minimal or nonexistent. For example, reaching only occurred for some participants. It is possible that reaching was more personal than eye gaze, vocalization, or SGD activation and did not occur as often due to participant familiarity or comfort. Although all participants could reach their SGD, the upper

extremity range of motion decreased when they reached for a peer. Thus, some participants may

not want to use that specific physical approach. Also, the participant training showed little effect

for these individuals. Possible explanations include not enough practice time, limited receptive

language given the verbalize instructions, or too many skills trained at one time.

Key Findings Related to Staff Participants

Findings from the staff surveys revealed that they obtained better understanding of the

participants, their communication, and social positioning by the end of intervention. Throughout

the study, staff members strongly believed that the participants should communicate with

whomever they wanted, but also indicated that participants had more opportunities to

communicate with peers after social positioning. Some staff members may believe that being in

the same room or sitting next to a peer was enough of an opportunity to communicate. In

addition, over half of staff members felt that they primarily communicated with the participants

by asking yes/no questions. This result was similar to some of the communication partner

barriers reported in the previous research, including not allowing response time (Weiner, 2005),

dominating conversations (Clarke & Wilkinson, 2007), and not providing consistent access to

needed communication devices (Chung et al., 2012).

Limitations

There were several limitations that warrant considerations. First, this study was

researcher-led and would have been stronger if it had been led by trained staff members who

worked with the participants daily using a train-the-trainer model. Unfortunately, the staffing

shortage caused a much greater than usual variety of staff to be regularly involved with each

participant. Second, to decrease novelty and increase participants' familiarity, SGDs messages

and partners remained the same throughout the study. However, some participants could have

benefited from working with different partners or having different message options. Third, more

participant training and feedback delivered during the social positioning with training condition

could have been more systematic. This could have further increased the participants'

communicative competence and potentially their demonstration of the dependent variables.

Fourth, we recorded SGD activations for both intentional and unintentional communication,

resulting in over 80 activations during a 20 min period for everyone except Betty, Irene, Kevin,

and Adah. For adults with ESN with idiosyncratic communication profiles, their intentionality is

highly individualized and can be difficult to capture (Iacono et al., 1998). Also, while we

operationally defined the dependent variables and had high reliability with 100% IOA, errors

may have occurred in recording eye gaze and vocalizations as the true intention of the participant

could not be determined. Fifth, we only collected social validity data from the staff and not the

participants. Future studies should obtain social validity data from the participants to illustrate

their like or dislike and comfort with social positioning.

Future Directions

Further research on positioning for social interaction for adults with ESN is needed to

replicate the findings of this study and extend its external validity. Future researchers could

continue to evaluate the impacts of social positioning on communication of adults with ESN and

incorporate more staff involvement and participant training. Other research directions include

social positioning in out-of-wheelchair groups and using different SGD messages, partners, and

settings or activities. To increase self-determination and independence of adults with ESN,

participants should have the opportunities to choose their own communication partners. In

addition, staff training needs to be an essential part of social positioning. We valued staff

orientation training in this study not only for the implementation purpose, but for helping the

caregivers recognize the importance of strength-based thinking when providing holistic services across activities and settings. Future researchers should also explore the most effective means and dosages to teach communication. Perhaps more training with aided language stimulation and more exposure to different communication modes would have improved participant performance during social positioning with training and maintenance. Another idea is to use video models during training sessions given the large literature base supporting the efficacy of video-based interventions for learners with ESN (e.g., Banda et al., 2010; Mason et al., 2016). The effectiveness of social positioning strategies may be enhanced when combined with video-based interventions.

Implications for Practice

The promising findings of the study show that communication between adults with ESN can increase, following simple changes in positioning, without any systematic teaching or direct communication training. These positioning changes required minimal staff training and do not divert time and personnel resources away from other adults with ESN and instructional activities. We hope this finding will encourage adult agencies to invest more on personnel in-service training and increase staff accountability in creating communication opportunities. Based on the social validity data, staff found the purpose of the study and training to be beneficial. The culture at service provider agencies and schools along with the individual beliefs of staff members and educators must change to support the socialization needs of individuals with ESN during repositioning time. When an environment is optimal for communication, the repositioning time can be purposeful and interactive.

Conclusion

The right to communicate is the right of every human being. We hope this study will increase the awareness of the communication potential of individuals with ESN as peer partners. Families, support personnel, and educators need to provide purposeful interaction opportunities for people with ESN to develop and maintain friendships and social interactions. Our findings indicated social positioning can increase the symbolic and nonsymbolic communication between adults with ESN. In addition, proximity to peers, comfortable prone or sidelying positions, and access to SGDs are key considerations in promoting social interactions. With appropriate training and support, staff, educators, and family members can implement social positioning to further enhance the communication skills and quality of life for individuals with ESN.

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Figure 1

Participant Data for Calvin, Betty, Faith, Irene, and Hannah

Figure 2

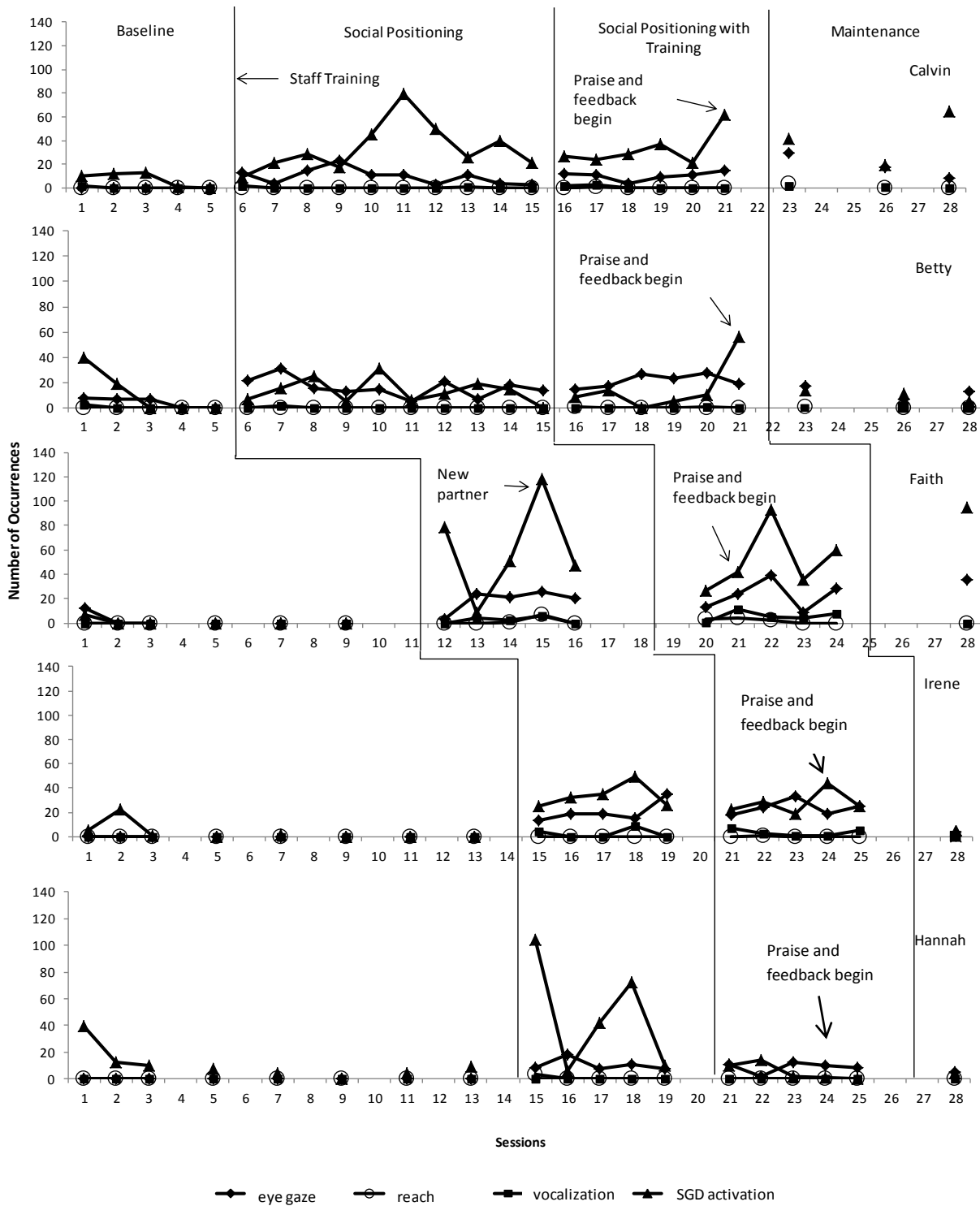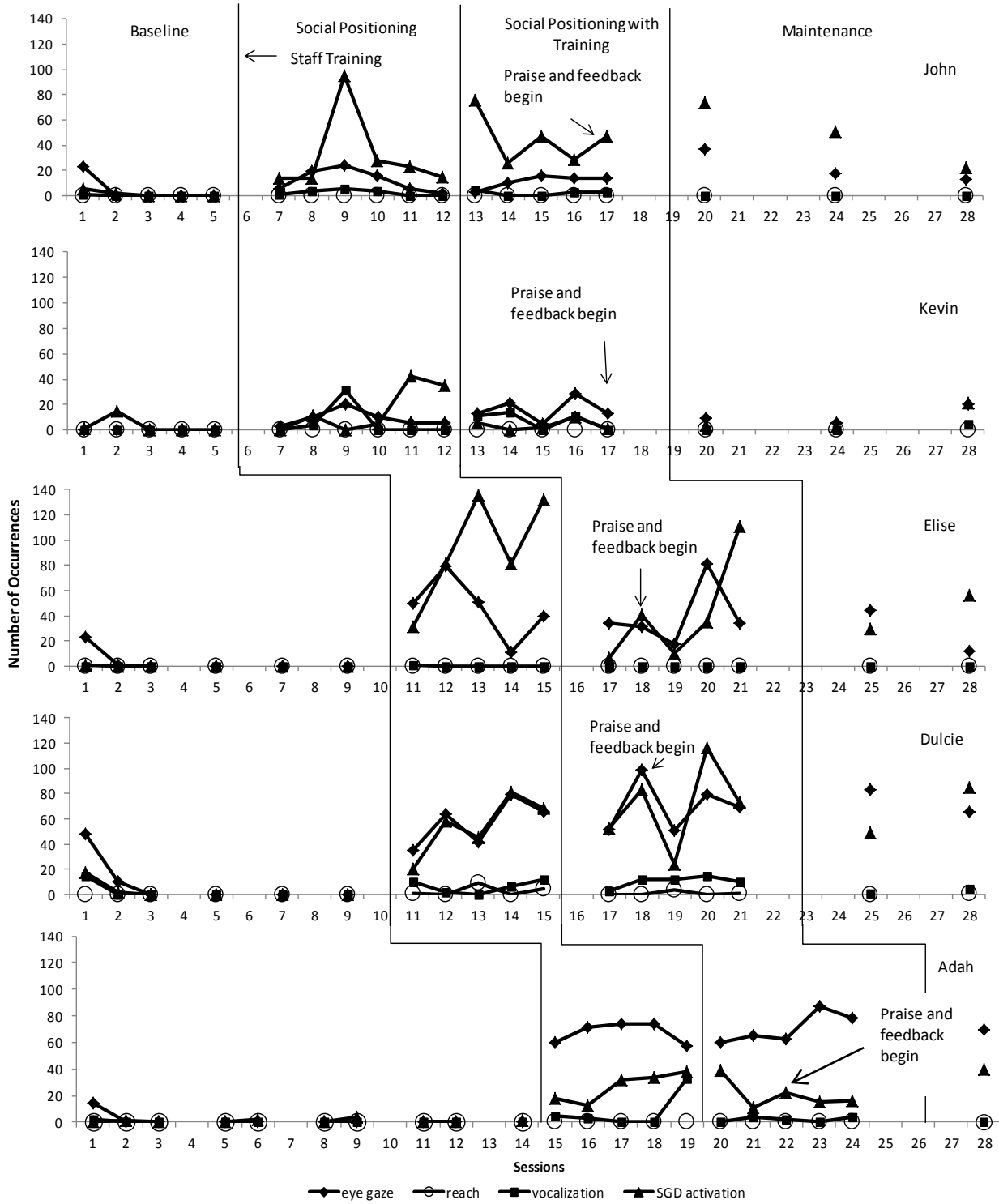*Participant Data for John, Kevin, Elise, Dulcie, and Adah*

SOCIAL POSITIONING   1

Table 1

Participant Characteristics

Name	Age, Gender, Ethnicity	Diagnoses	Test scores	SGD, Positioning Equipment	SGD-Related Goals
Calvin	35, M, European American	CP, SQ, severe ID, dysphagia with gastrostomy	IQ = 24 (Slosson Intelligence test)	Cheap Talk 8^{TM}, stander	Maintain a conversation with a staff member or a peer using a SGD after set-up and instructions with supervision; Activate SGD when ready to take medicine
Betty	56, F, African American	Profound ID, CP, congenital encephalopathy, microcephaly, SQ, dysphagia, visual impairment	IQ = 24 (Slosson Intelligence Test)	LITTLE Step-by-step^{TM}, stander	Activate a button as requested on SGD to communicate given minimal cueing; Make choices, requests, and answer yes/no questions on SGD given minimal cueing
John	37, M, European American	Profound ID, seizure disorder, CP	IQ = 13 (Slosson Intelligence Test)	LITTLE Step-by-step^{TM}, wedge	State the day of the week following orientation to the day using SGD given no more than one cue; Greet others using SGD
Kevin	26, M, European American	Profound ID, seizure disorder, dysphagia with gastrostomy, CP with SQ, congenital hydrocephalus	IQ = 5 (Slosson Intelligence Test)	LITTLEmack^{TM}, wedge	Activate SGD to make a request given moderate cueing
Dulcie	44, F, European American	Profound ID, encephalopathy secondary to meningitis, SQ, dysphagia, multiple contractures	IQ = 2 (Slosson Intelligence Test)	LITTLEmack^{TM} with button switch, wedge	Follow commands to activate SGD to make a request given minimal cueing

Elise	28, F, African American	Profound ID, CP, acquired encephalopathy, SQ, microcephaly, seizure disorder, multiple contractures, dysphagia with gastrostomy, visual impairment, GERD	IQ = 2 (Slosson Intelligence Test)	LITTLEmack[TM] with credit card switch, wedge	Activate SGD to greet others on command with moderate cues
Faith	52, F, European American	Profound ID, CP, dysphagia with gastrostomy, GERD	IQ = 18 (Slosson Intelligence Test); Peabody Picture Vocabulary Test[9TM] age equivalent 2:2	LITTLE Step-by-step[TM], bean bag chair	Initiate communication with a staff member using SGD
Adah	38, F, European American	Severe ID, CP, SQ, dysphagia with gastrostomy, seizure disorder	IQ = 2 (Slosson Intelligence Test)	LITTLEmack[TM], wedge	Activate SGD to greet others on command given minimal cues
Irene	44, F, European American	Profound ID, microcephaly, congenital encephalopathy, hypotonic athetoid quadriparesis, visual impairment, dysphagia with gastrostomy, GERD	IQ = 2 (Slosson Intelligence Test)	LITTLEmack[TM], wedge	Activate SGD to communicate with a peer with minimal cueing
Hannah	45, F, African American	Profound ID, acquired encephalopathy, multiple contractures, seizure disorder, spastic triplegia, dysphagia	IQ = 7 (Slosson Intelligence Test)	LITTLE Step-by-step[TM], wedge	Activate SGD to greet others on command given no more than one verbal cue

Note. All ages are in years. CP = cerebral palsy; SQ = spastic quadriplegia; ID = intellectual disability; GERD = gastroesophageal reflux disease