Digital Platforms and Supervisory Feedback to Graduate Student Clinicians

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Abstract

Portable electronic devices are becoming more prevalent in the field of speech-language pathology, from assessment and intervention to supervision. This study examined the use of various forms of supervisory feedback provided through digital platforms on a detailed fidelity checklist to five first-year graduate student clinicians participating in a community-based practicum. Three feedback conditions were compared: (a) e-mails sent after intervention sessions, (b) text messaging during intervention sessions, and (c) no e-mails or text messaging feedback. All forms of feedback were supplemented by an e-mail graph depicting progress on the fidelity checklist. Graduate student clinicians found all forms of digital feedback to be beneficial, with specific, immediate feedback being preferred. The fidelity checklist supported the graduate student clinicians' implementation of intervention techniques as well as the supervisors' ability to provide detailed feedback. Implications for future research and suggestions for supervision of graduate student clinicians are discussed.

Supervision in Community-Based Settings

Community-based clinical practicums expose graduate student clinicians to diverse work settings and opportunities to provide services that promote generalized use of communication skills and inclusion in natural environments (McGinley & Robke, 2011; Watermeyer & Barratt, 2013). However, community-based settings that promote participation in everyday activities, by their nature, occur in environments that are not easily controlled by the clinician, and tend to be less predictable. Traditional clinical practicum experiences for speech-language pathology graduate students in clinics and schools may be more controlled, allowing supervisors to provide consistent input and feedback related to specified outcomes and intervention strategies. In a less controlled community setting, such as a public library or summer camp, supervisors may find themselves providing feedback across multiple spaces, activities (e.g., outdoor play, small group computer lab, and snacks), and intervention targets. Furthermore, these settings may include interactions with

partners who have differing communication skills and varying levels of motivation to participate. Supervisors may also need to provide feedback related to techniques for collaborating with other professionals in the community-based setting as well as for the clients served. Providing feedback in a dynamic environment can increase the likelihood of inconsistent or inadequate feedback being provided (Cascia, 2013).

Importance of Feedback in the Supervisory Process

Effective supervisory feedback in a variety of practicum experiences is essential for building student clinician competency. Clinical supervisors must be comfortable providing feedback in a consistent, constructive manner and have knowledge of feedback strategies that can be used across various clinical settings. The use of treatment fidelity measures can be a tool to increase systematic intervention implementation in community settings. Incorporating technology into the supervisory process may be a second tool to increase the immediacy and lasting impact of the feedback.

Fidelity of Implementation. Fidelity measures, also called measures of treatment fidelity or procedural integrity, are designed to help graduate student clinicians implement each step of an intervention as intended, and may also assist clinical supervisors in collecting objective and reliable data during live observations. Fidelity measures may include a checklist or protocol, a treatment manual, or a list of methodological strategies designed to enhance treatment fidelity, and they are used in a variety of allied health disciplines (Borelli, et al., 2005; Marturana, Friedman, Brown, & Woods, 2011; Woods, Coston, Lawrence, & Richmond, 2005). Fidelity data can be used to develop a visual graph to supplement written feedback and display progress across various intervention areas (Reinke, Lewis-Palmer, & Merrell, 2008; Sanetti, Luiselli, & Handler, 2007). Studies have shown that it is important for a supervisor and student clinician to have a firm understanding of the expectations for the practicum experience; this awareness increases the student clinician's ability to accomplish client outcomes, meet their practicum goals, and also improves the supervisor's ability to provide constructive feedback (Kilminster, Cottrell, Grant, & Jolly, 2007; Shapiro & Anderson, 1989). By utilizing a fidelity checklist, both the supervisor and student clinician have clearly delineated procedures, individualized targets for the client, and predefined goals, allowing them to monitor progress across several therapy sessions (Stormont & Reinke, 2013).

Fidelity checklists and visual displays of progress have been found to improve clinicians' intervention skills (McCollum, Hemmeter, & Hsieh, 2011; Seal & Hilton, 2007), potentially decreasing the need for continuous, detailed feedback. Written feedback can supplement the results of the fidelity checklist (Cascia, 2013), focusing on areas that need the most improvement and providing relevant examples of intervention techniques that can be used in the future. The specificity of the written feedback can also be decreased once the student clinician becomes more experienced with the intervention procedures, allowing the fidelity checklist results to be used as a self-reflection tool, encouraging clinicians to independently identify where they need to make changes.

Technology. As tablets and other portable electronic devices become prevalent in schools and practices, speech-language pathologists are increasingly using digital applications for assessment, service delivery, and data collection. Additionally, the use of technology to aid in the supervision of clinical fellows and graduate student clinicians is becoming more prevalent in the field of speech-language pathology (e.g., Brown, Heggs, & Millican, 2013; Herd, Epperly, & Cox, 2011; Smith & Hardy, 2014). Researchers in counseling, social work, and nursing have also begun to investigate student perceptions of technology-supported supervision (Coker & Schooley, 2009; Gilbert & Maxwell, 2011; Mettiäinen, 2015). Mettiäinen (2015), for example, recently conducted an investigation of clinical nursing students' attitudes toward a web-based tool that prompted them with daily assessment questions to gauge their learning during an on-the-job training experience, and students, overall, responded positively to the tool. Supervising teachers used the results to help determine which students needed to be supervised more

closely. Internet-based supervision is becoming even more common in allied health professions, such as physical and occupational therapy, as telehealth and telemedicine expand (American Occupational Therapy Association, 2013; Houston, Fleming, Brown, Weinberg, & Nafe, 2014). With the advancements in technology and the increasing number of graduate student clinicians being supervised at one time, clinical supervisors need to identify ways in which supervisory feedback can be provided quickly through technological formats while improving graduate student clinicians' intervention fidelity (Gibson & Musti-Rao, 2015). To increase the immediacy of feedback, fidelity checklists can be completed on an iPad or other electronic device, allowing the supervisor to immediately send the checklist results to the graduate student clinicians after their therapy sessions (Cascia, 2013).

Immediate Feedback. Graduate student clinicians in speech-language pathology consistently report a preference for immediate and specific supervisory feedback (Gurley, 2000; White, 2008). To address this finding, studies have examined "bug-in-the-ear" feedback, which allows clinicians to make rapid adjustments while in a therapy session (Gallant, Thyer, & Bailey, 1991; Goodman, Brady, Duffy, Scott, & Pollard, 2008; Ottley & Hanline, 2014). This method of feedback requires the student clinician to wear an audio transmitting device in the ear, which is linked to a microphone used by the supervisor. However, "bug-in-the-ear" feedback can be less effective in community-based practicum settings because the audio transmitting devices may be difficult to hear in settings with extraneous noise or can be a distraction in settings including various professionals collaborating to meet the needs of the client. Furthermore, graduate student clinicians may not be able to discretely respond to their supervisors' feedback for clarification or explanation. Reflection upon the "bug-in-the-ear" feedback is also limited because once the feedback has been provided, it is gone. There is no written documentation of the feedback received.

Written Feedback. Conventional one-on-one, face-to-face supervisory models continue to dominate speech-language pathology graduate programs, although supervision in groups or from a distance also occurs (Sheepway, Lincoln, & Togher, 2011). E-mailed supervisory feedback, in particular, has emerged as a common feedback option. Graduate student clinicians enjoy the immediacy of e-mailed feedback compared to handwritten feedback, which typically requires the supervisor to make photocopies of written feedback before delivering it to the student clinician's mailbox (Herd et al., 2011). E-mailed feedback decreases the amount of time supervisors need to meet with graduate student clinicians face-to-face, allowing them to supervise more students at a time (White, 2008). E-mailed supervisory feedback has also been found to be effective at improving intervention skills (e.g., Hemmeter, Snyder, Kinder, & Artman, 2011). Barton, Fuller, and Schnitz (2015) found that feedback delivered through e-mail was effective at increasing student use of intervention techniques.

Barton et al. (2015) also suggested examining the effects of text messaging feedback, which is immediate and more accessible for graduate student clinicians, considering advancements in technology use. Text messaging feedback can be provided during therapy sessions, allowing clinicians to discretely respond to their supervisors. The ability to immediately respond to supervisory feedback may be important for developing clinical competency. Kaufman, Codding, Markus, Tryon, and Kyse (2013) found that new teachers made more progress when they were provided with supervisory feedback that allowed reciprocal discussions, including the ability to ask and answer questions with their supervisors. In addition, graduate student clinicians can reread their text messages from supervisors and reflect upon feedback received, in contrast to "bug-in-the-ear" feedback as previously mentioned. Text messaging feedback is a written form of supervisory feedback that has the potential to be immediate, discrete, and reciprocal.

Purpose of the Study

The purpose of this pilot study was to examine the efficiency and acceptability of two features of clinical supervision, a fidelity checklist and three digital forms of supervisory feedback, adapted to a community-based clinical practicum. A detailed intervention fidelity checklist was

used to guide the graduate student clinicians' use of positive behavioral interventions and supports (PBIS) and social communication strategies for children and teenagers with autism spectrum disorder (ASD) and/or challenging behaviors. The fidelity checklist also provided the content and organization of feedback by the supervisors. Prior to the practicum experience, graduate student clinicians completed a seminar on the use of PBIS and strategies to embed social communication intervention into technology-based activities for individuals with ASD. Positive behavioral interventions and supports (PBIS) is regularly utilized to engineer the environment in order to reduce the potential for challenging behavior and emotional dysregulation in individuals with ASD (Dunlap et al., 2010; Neitzel, 2010).

To gather information on the utility and feasibility of different types of digital supervisory feedback provided during and immediately following therapy sessions, the supervisors designed a systematic approach to feedback that was sensitive to the graduate student clinicians' learning needs and the privacy required in a community setting. Feedback methods included e-mails, text messaging, and electronic graphs. It was hypothesized that graduate student clinicians would be most comfortable with e-mailed feedback as it was the most familiar form of digital feedback received in previous practicums. Text messaging during intervention sessions was expected to be non-preferred, because it was unfamiliar and could be distracting. However, it was assumed that graduate student clinicians would respond more favorably to text messaging feedback as their familiarity increased. The researchers also hypothesized that the intensity of digital feedback could be decreased toward the end of the practicum experience, and chose to end the study with a feedback phase that included only an e-mailed visual graph of fidelity checklist progress.

The following research questions determined the methodology of this study:

1. Does the use of a fidelity checklist improve graduate student clinicians' ability to implement individualized PBIS and embed social communication supports for children and teenagers with ASD and/or challenging behaviors?
2. Do different types of digital supervisory feedback impact graduate student clinicians' scores relate to fidelity of implementation?
3. What are graduate student clinicians' perceptions of immediate and delayed digital supervisory feedback including visual displays of progress related to a fidelity checklist measure?

Method

Participants and Settings

Five first-year graduate student clinicians participated in the pilot study. Each held a bachelor's degree in Communication Science and Disorders, had completed two semesters of clinical practicum in a university clinical setting, accumulated at least 90 supervised clock hours, and were participants of Project ASSET (Autism Spectrum Specialized Education and Training), a federally funded personnel preparation grant that focused on students with ASD. None of the graduate student clinicians had previous experience with PBIS or fidelity checklists to support intervention implementation prior to their seminar course and the community-based practicum at a summer camp.

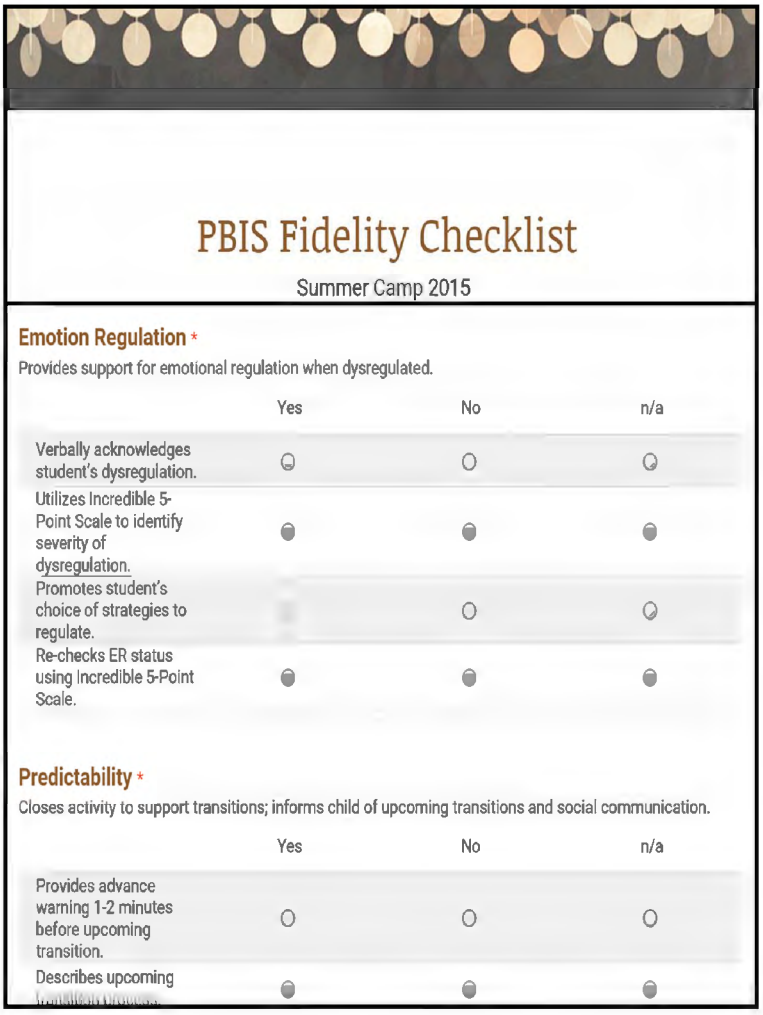
Two first-year doctoral students and a professor served as clinical supervisors and co-investigators for this study. All supervisors held Certificates of Clinical Competence in Speech-Language Pathology (CCC-SLP), had prior experience conducting evaluations and interventions for individuals with ASD, were knowledgeable regarding application of PBIS, and had experience supervising clinical practicum in community settings.

The intervention was conducted at a 10-day community-based summer camp in northern Florida. The camp was held at a private school that offered multiple camp experiences each summer and welcomed students with diverse learning needs. The summer camp included a total of 35 camp attendees with and without disabilities between the ages of 5–14 years. Two camp developers and at least three volunteers were available to the camp attendees at all times during the camp days. The graduate student clinicians supported a total of eight camp attendees with a parent-reported diagnosis of ASD and/or challenging behaviors. Their support allowed more attendees with disabilities to enroll and participate fully in the camp than was possible in the past. The camp attendees with ASD and/or challenging behaviors were between the ages of 6–13 years. The graduate student clinicians' primary goal was to support attendees throughout the day to facilitate full inclusion in the camp. The graduate student clinicians also collaborated with the camp developers and volunteers to organize camp activities, develop materials, and prepare lesson plans for use during the practicum. The graduate student clinicians participated in all camp activities throughout the six-hour day.

Materials

Electronic Devices. The clinical supervisors and graduate student clinicians used iPads throughout the intervention portion of the study. Google Drive™ was downloaded onto the clinical supervisors' iPads to allow access to Google Forms™ used for data collection (Figure 1). The clinical supervisors collected data using a fidelity checklist, importing responses via the Google Form, allowing for quick, personalized data collection on graduate student clinicians' use of PBIS strategies and social communication supports. Data collected through Google Forms™ were automatically transferred to Google Sheets™ for data analysis and the development of graphs displaying daily progress. During the immediate feedback phase of the study, personal smartphones were used to send immediate feedback via text messaging to the graduate student clinicians during their intervention sessions. The graduate student clinicians focused their intervention sessions around various iPad apps (Farinas et al., 2015). Apps used during the structured intervention sessions were chosen based on their connection to the Common Core State Standards and included a literacy-based component.

Figure 1. PBIS Fidelity Checklist.



PBIS Fidelity Checklist

Summer Camp 2015

Emotion Regulation *

Provides support for emotional regulation when dysregulated.

	Yes	No	n/a
Verbally acknowledges student's dysregulation.			
Utilizes Incredible 5-Point Scale to identify severity of dysregulation.			
Promotes student's choice of strategies to regulate.			
Re-checks ER status using Incredible 5-Point Scale.			

Predictability *

Closes activity to support transitions; informs child of upcoming transitions and social communication.

	Yes	No	n/a
Provides advance warning 1-2 minutes before upcoming transition.			
Describes upcoming			

Fidelity Checklist. A fidelity checklist was developed to include targeted PBIS techniques and social communication supports. The graduate student clinicians used the checklist to structure their intervention sessions and encourage self-evaluation during the practicum experience. The clinical supervisors used the online, Google Forms™ version of the checklist for data collection. The clinical supervisor checklist included 23 items across six categories, and each item was rated as either "Yes", "No", or "n/a" (Figure 1). If the student clinician completed a particular item on the checklist during her therapy session, that item was scored "Yes." If the clinician had the opportunity to complete that item, but did not, the item was scored with a "No." If the clinician did not have the opportunity to complete an item on the checklist (e.g., the child did not exhibit challenging behaviors), the item was scored as "n/a." Table 1 displays the technique categories included on the checklist as well as specific examples of each.

Table 1. Fidelity Checklist Technique Categories.

Intervention Area	Definition	Example
Organization	Organizes environment and provides structure at beginning of session	Directs child's attention to personalized visual schedule
Visual Support	Uses personalized visual supports to enhance understanding of directions and language used during activity	Redirects child to personalized visual support as needed (e.g., visual support symbolizing turn-taking with peer)
Emotion Regulation	Monitors and provides support for emotion regulation when dysregulated (e.g., agitated, frustrated, or "checked out")	Utilizes Incredible Five-Point Scale (Buron & Curtis, 2003) to identify severity of dysregulation
Predictability	Closes activity to support transitions and informs child of upcoming transitions and/or social communication roles	Describes upcoming transition process and asks for confirmation of child understanding
Challenging Behavior	Acknowledges challenging behavior and redirects child when necessary	Reminds child of current role in the activity and redirects to activity using a prompting hierarchy
Social Communication	Embeds social communication goals into iPad activity with peer	Supports initiations between peers by using comments and a prompting hierarchy

Questionnaire and Focus Group Script. A short questionnaire was designed to gauge graduate student clinicians' attitudes toward the use of supervisory feedback presented via digital applications (Wood, Miller, & Hargrove, 2005). The questionnaire included ten open-ended questions and was administered at the end of the clinical practicum. A focus group session was also conducted after the clinician practicum, and the focus group leader was provided with a script including seven base questions developed to elicit graduate student clinicians' opinions regarding supervisory feedback, especially the feedback received during the practicum experience. See Table 2 for examples of questions included on the questionnaire and during the focus group.

Table 2. Questionnaire and Focus Group Questions.

Format	Examples
Questionnaire	As a graduate student clinician, what kinds of supervisory feedback have you preferred in the past? What kinds of supervisory feedback went well during this study? If you could have more of any type of feedback, what would it look like? What types of feedback are not helpful?
Focus Group	What went well with supervision during the camp experience, and what would you change? If you were a clinical supervisor, what kinds of feedback would you most likely give to your graduate students?

Procedures

The camp schedule incorporated three iPad activities each day, which included Minecraft®/™, Make Beliefs Comix®, Toontastic®, and the "App of the Day". The "App of the Day" included a rotation of literacy-based apps such as Scribblenauts Remix, Hangman, and

Bluster. Minecraft was available during the morning half of the camp schedule. Camp attendees engaged with Minecraft using their personal or camp iPad or computer, sat anywhere they chose, and participated with others or individually as desired. Make Beliefs Comix, Toontastic, and "App of the Day" activities were conducted during the afternoon portion of the camp schedule, organized to include peers sharing an iPad, and were located in a quieter area of the camp. The afternoon iPad activities provided more opportunities to work on social communication goals in addition to the literacy goals embedded in the "App of the Day".

Using the PBIS and social communication supports fidelity checklist as a guide, the graduate student clinicians provided direct intervention for at least ten minutes during three iPad activities: Minecraft, Make Beliefs or Toontastic, and "App of the Day". This resulted in at least 30 minutes of direct intervention per day for camp attendees with ASD and/or challenging behaviors. Inter-rater reliability measures were completed on 17% of the camp intervention sessions. The first and second investigators completed the fidelity checklist on the same student clinician three times each day with different clinicians being scored each day. Overall, inter-rater measures revealed 76% reliability with a range of 40–100% reliability across graduate student clinicians and intervention activities.

Supervisory Feedback. Daily feedback to graduate student clinicians incorporated research-based tools, including formative assessment and self-reflection (Pasupathy & Bogschutz, 2013). All feedback was based on implementation of techniques listed in the fidelity checklist. Three types of digital feedback were compared during the 10-day camp experience: delayed written feedback, immediate written feedback, and no written feedback (Table 3). Delayed feedback was provided 2–4 hours after the camp day whereas immediate feedback was provided during graduate student clinicians' therapy sessions.

Table 3. Supervisor Feedback Schedule.

	Phase 1: Days 1-4	Phase 2: Days 5-7	Phase 3: Days 8-10
Feedback Type	Delayed Written	Immediate Written	No Written
Feedback Components	E-mail and graph at end of day	Text messages during session and graph e-mailed at end of day	Graph e-mailed at end of day

The delayed e-mail feedback phase occurred during the first four days of the camp. Delayed feedback e-mails were supplemented by a graphical display of the graduate student clinician's use of intervention techniques on the fidelity checklist. Individualized delayed feedback was e-mailed to each clinician at the end of the camp day.

The immediate feedback phase occurred during the fifth, sixth, and seventh days of camp, and incorporated text messages during intervention sessions. Clinical supervisors sent short text messages related to the techniques listed on the fidelity checklists via personal smartphones. In addition to receiving text messages during sessions, graphical displays of progress related to the fidelity checklist were e-mailed to the graduate student clinicians at the end of each day.

The final phase, no e-mailed narrative or text message feedback, was provided during the last three days of the camp. Clinical supervisors sent only graphical displays via e-mail at the end of the day. The graphs maintained the same format as the graphs sent during the delayed and immediate feedback phases. After the first week and again at the end of the second week, a progress monitoring graph was sent to show total progress made across each week. The two progress monitoring graphs were not supplemented with written feedback.

Questionnaire and Focus Group. One week after the summer camp practicum experience, the graduate student clinicians independently completed a written questionnaire and then participated in a focus group session that included all five graduate student clinicians participating in the study. The focus group was facilitated by a doctoral student not involved in any aspect of

the study prior to the focus group session. During the focus group, the facilitator followed a script and was encouraged to ask additional questions as needed to gain as much information possible related to the graduate student clinicians' thoughts, opinions, and perceptions of digital supervisory feedback and the overall camp experience. The focus group discussion was audio recorded, transcribed, and analyzed with Dedoose® Version 4.5 using a grounded theory approach (Dedoose, 2013). The first two authors completed transcription and analysis procedures. All procedures followed were approved by, and in accordance with the ethical standards of the Florida State University Human Subjects Committee.

Results

Fidelity Checklist

All graduate student clinicians showed increased fidelity of PBIS and social communication strategy use during intervention sessions (Table 4). As a group, the clinicians increased their implementation of the fidelity checklist measures by an average of 61 percentage points between the first and final days of camp with a range of 2% to 89%.

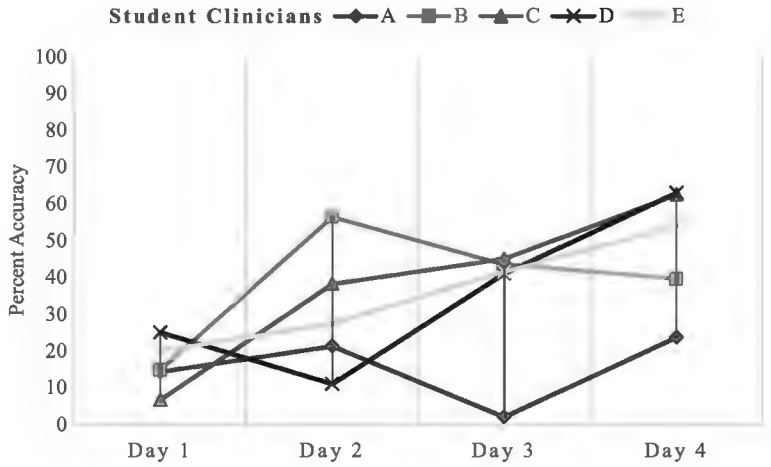
Table 4. Student Clinician Intervention Fidelity Across the 10-day Intensive Practicum Experience.

Student Clinician	Percent Accuracy on Fidelity Checklist		
	Day 1	Day 10	Pre/Post Change
A	14	82	68
B	15	89	74
C	7	68	61
D	25	67	42
E	20	81	61

Digital Supervisory Feedback

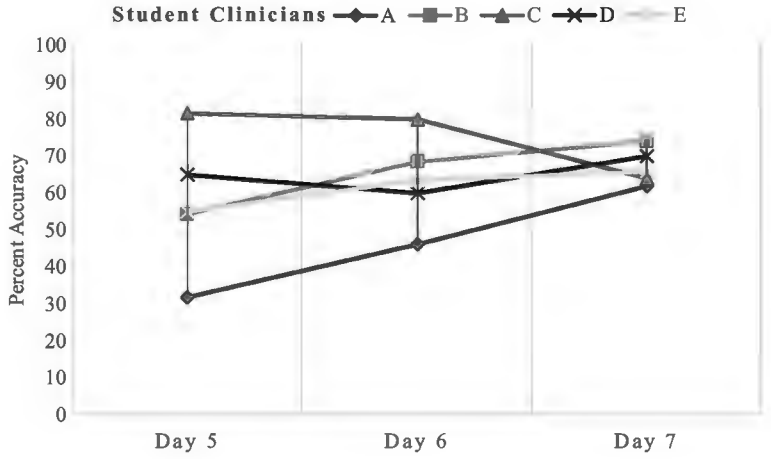
Delayed Written Feedback and Graphs. Delayed feedback included written e-mails and visual graphs that were provided within 2–4 hours after each camp day during the first four days of the camp. Based on visual inspection of the intervention fidelity graphs, all graduate student clinicians increased their intervention fidelity during this feedback phase (Figure 2).

Figure 2. Phase 1- Graduate Student Clinician Progress Following Delayed Written Feedback.



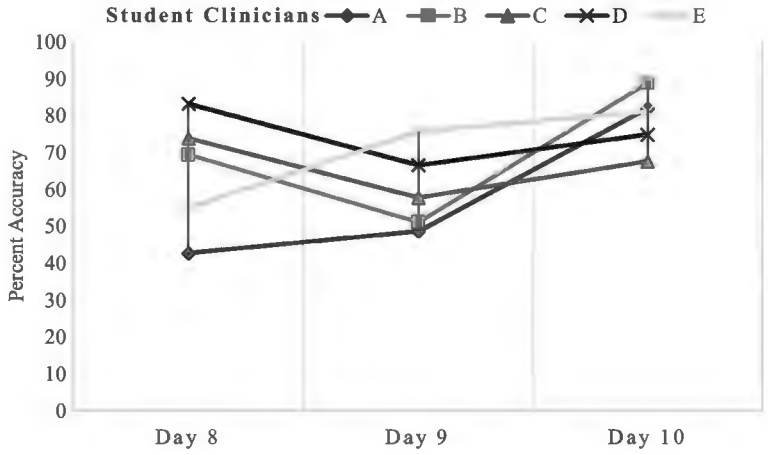
Immediate Written Feedback and Graphs. Immediate feedback was provided via text messaging with personal smartphones. This form of feedback elicited varying levels of improvement across the graduate student clinicians. Three graduate student clinicians improved their intervention fidelity while one decreased and one remained stable (Figure 3).

Figure 3. Phase 2- Graduate Student Clinician Progress Following Immediate Written Feedback.



Graphs Only. The final feedback phase encompassed only visual feedback, the same e-mailed daily graphs that were used across the two previous forms of feedback. The supervisors did not send any written feedback to support the graphs during this phase. Two graduate student clinicians were noted to show overall decreases in fidelity checklist accuracy, with two clinicians showing increases in levels of fidelity (Figure 4).

Figure 4. Phase 3- Graduate Student Clinician Progress Following No Written Feedback.



Perceptions of Graduate Student Clinicians

From the final questionnaire and focus group discussion, five recurring, major codes (with twelve sub-codes) emerged through the use of an iterative, grounded theory approach that began with open coding and proceeded to team-based, focused coding. Inter-rater reliability tests, during which the first and second investigators applied codes independently, resulted in a pooled Kappa of 0.81, suggesting a high level of agreement. Agreement rose to 100% after discussion with consensus coding. Two themes from the focus groups were chosen for further exploration:

1. Supervisory Feedback Experience
2. Suggestions for Refinement

Supervisory Feedback Experience. In general, the graduate student clinicians preferred feedback that was presented immediately after their therapy sessions. They were not partial to verbal over written feedback, or face-to-face versus e-mail. They were familiar with both feedback styles from previous clinical practicum experiences. The graduate student clinicians' overarching preference was for constructive feedback that would provide them with detailed information about positive aspects of their performance, and suggestions for specific changes to implement.

E-mails. One of the criticisms the graduate student clinicians identified was that they were unable to read e-mails immediately after their individual sessions. In this study, written feedback was e-mailed 2–4 hours after the end of the camp day. One student clinician noted, "I didn't like waiting all day to hear how I did during the session."

Text Messaging. None of the graduate student clinicians had experienced text messaging feedback prior to the study. Evaluation of texting feedback varied among the group. Four of the graduate student clinicians felt it was helpful, with one clinician finding it to be the best form of feedback used during the study. This clinician especially appreciated being able to discreetly ask her supervisor questions during the session without the camp attendees or anyone else overhearing. Another clinician mentioned that text messages might be most beneficial during longer intervention sessions (e.g., 30–60 minutes); she felt the text messages were overwhelming during a short 10–15-minute session. Two graduate student clinicians reported reviewing and reflecting upon the text messages they received once the day was over and they were at home. They mentioned that reviewing the text messages helped them identify skills they should focus on the following day. One clinician found her experiences with text messaging feedback to be negative. This clinician felt the texting made it "hard to shift attention, read, process, and implement" the intervention techniques during the session, and she felt text messaging during therapy might lead a client to become "offended, like, you're looking at your phone…means that

I am not important." This graduate student clinician shared that she preferred to put her phone away before therapy sessions and "be present." She stated it may be related to her experience with her two teenagers at home "with the [phones] always in their faces."

Graphs. The graduate student clinicians appreciated seeing the graphs at the end of each day, but they felt the graphs were most helpful when supplemented with specific, written feedback. When the written feedback was provided with the graphs, the graduate student clinicians were able to see the areas that needed the most work (e.g., supporting emotion regulation), and could also read specific examples of techniques provided by the supervisors, which could be used in future sessions to build upon that skill (e.g., referring to Incredible Five Point Scale, offering a break, etc.).

Although one graduate student clinician perceived the graphs to be "scary," they all concurred that seeing progress on their individual graphs was reinforcing. One graduate student clinician remarked that accompanying graphs might be helpful in interpreting their midterm and semester grades. As one student clinician pointed out, graphs may be most helpful after a certain period of time (e.g., 1 month) to show growth or lack of growth across specific therapeutic areas.

Suggestions for Refinement. During the focus group, the graduate student clinicians expressed a preference for training on the planned supervisory feedback methods, such as more information about how to read the graphs and knowing what types of feedback they could expect on which days. While the graduate student clinicians were open to all types of digital supervisory feedback, they agreed that they preferred a "five-minute debriefing" with "specific and immediate" feedback following their session, whether it be via e-mail, text messaging, or face-to-face. The opportunity to debrief face-to-face with a supervisor after a session was ideal, according to the focus group participants. Finally, each graduate student clinician valued thoughtful, constructive, kind, and honest feedback.

Discussion

The purpose of this study was to examine the impact of three forms of supervisory feedback provided through digital platforms on graduate student clinician performance, satisfaction, and adaptability to a community-based practicum setting. The researchers investigated graduate student clinicians' performance when using a fidelity checklist to implement PBIS techniques and social communication strategies during digital game and literacy activities at a summer camp for attendees with and without ASD and/or challenging behaviors. By the end of the 10-day practicum experience, all graduate student clinicians increased the amount of targeted PBIS and social communication strategies used during intervention sessions. Changes in implementation were noted based on the different phases of supervisory feedback provided during the clinical practicum: delayed written (e-mail and graph), immediate written (text messaging and graph), and no written feedback (graph only). Visual displays of progress (e.g., graphs) were provided to graduate student clinicians daily across all three feedback phases. The graduate student clinicians provided valuable information regarding their perceptions of digital supervisory feedback.

Supervisory Feedback

While most graduate student clinicians valued all three forms of digital feedback, a short, face-to-face debriefing with the supervisor after an intervention session was also identified as important. They further stated they preferred e-mailed feedback to be delivered immediately after an intervention session rather than at the end of the day. These results may reflect the graduate student clinicians' level of experience overall and especially within a community-based practicum setting; a more experienced graduate student clinician may not feel as though immediate or daily feedback is essential, and a weekly e-mail may suffice (Cassidy, 2013; Gordon-Pershey & Walden, 2013).

While these graduate student clinicians appeared to make the most progress during the immediate feedback phase (e-mail), it is important to note that this phase was conducted during

the first four days of the camp, so it may be that the graduate student clinicians made more progress due to their limited experiences with PBIS, social communication strategies, and/or use of fidelity checklists. In other words, the graduate student clinicians had the most room to grow in this phase. By the time they reached the last two feedback phases, they were refining their intervention skills, likely resulting in smaller levels of improvement.

Text Messages. It was surprising to find that four of the five of the graduate student clinicians liked the text messaging feedback and would like to receive this type of feedback from supervisors in the future. The summer camp was designed with a technology theme. Graduate student clinicians used their smartphones as timers during turn-taking activities with electronics. In these ways, having a smartphone at the graduate student clinician's side was not as unusual as it might have been in a traditional therapy setting. The preference for text messaging feedback could be different in a more traditional setting where using smartphones may be viewed as rude or inappropriate for the context.

Despite their approval of text messaging, the graduate student clinicians made less progress during this feedback phase. This could be attributed to several factors. One factor could be the text messaging was a distraction during intervention sessions limiting their ability to successfully implement the techniques on the checklist. The text messages could have distracted both the graduate student clinician and the camp attendees resulting in missed opportunities. Another reason may be that the upward trend for all five graduate student clinicians during the first phase (e-mails) was not sustainable. There simply may not have been as much room to improve during the immediate feedback phase (text messaging).

Graphs. It is important to note that visual graphs were found to be meaningful to the graduate student clinicians, but they were more meaningful when supplemented with written feedback. Clinical supervisors should be sure graduate student clinicians understand the format of graphs and describe the requirements to meet specific benchmarks, allowing the graphs to be more easily read. Graphs may be more helpful after extended periods of time (e.g., 1 month) to show visible progress and consistent areas of weakness. A graph could serve as a helpful visual aid during semester reviews when clinical grades are dispersed.

Fidelity Checklist. The fidelity checklist was found to be a valuable intervention tool for both graduate student clinicians and clinical supervisors. A fidelity checklist can help a clinician to reliably embed target skills into the therapy sessions. This same checklist can be used by supervisors to guide performance feedback to graduate student clinicians, serving as an objective measure of progress across multiple intervention areas. This checklist can later be used to assist the supervisor in assigning a data-driven grade at the end of the practicum. The fidelity checklist may be even more advantageous in a community-based setting, which can be less structured or predictable than a clinical setting. Graduate student clinicians were observed to refer to the checklist often during therapy sessions, and the feedback related to the checklist helped them identify areas they needed to work on in upcoming intervention sessions. The clinical supervisors in this study found the fidelity checklist to be especially helpful when providing detailed, objective feedback during live observations of multiple student clinicians at the same time, and for tracking progress across multiple therapy sessions.

Implications for Clinical Supervisors

With the increase in society's technology use, digital forms of supervisory feedback in clinical practicum settings are expected by graduate student clinicians. Many clinical supervisors find themselves supporting several clinicians at one time, and digital feedback can limit the time spent providing feedback face-to-face. E-mails, text messages, and graphs can be used in conjunction with face-to-face feedback and each should be used based on the supervisor's and graduate student clinician's preferences and clinical experience level. Newer graduate student clinicians may require more intensive feedback that the supervisor finds is better provided face-to-face, whereas more advanced graduate student clinicians may find that less intensive feedback is appropriate. Ultimately, graduate student clinicians value immediate, specific, and

constructive feedback as well as positive rapport with their supervisors, which is a finding from our study that concurs with previous research (Gurley, 2000; Ottley & Hanline, 2014). By developing positive rapport with graduate student clinicians, supervisors can identify the best forms of feedback that work for their specific clinicians, and the clinicians can feel comfortable asking for forms of feedback that meet their needs.

Limitations

This pilot study included ten data collection points on five graduate student clinician participants, therefore the data presented should be viewed as preliminary. Due to the short duration of the camp, only three of our graduate student clinicians exceeded 80% accuracy on the fidelity checklist. Because of the setting, we were unable to collect maintenance data for the graduate student clinicians.

The graduate student clinicians increased their fidelity checklist scores by an average of 61%. However, one would assume fidelity checklist scores are cumulative and graduate student clinicians would improve their fidelity regardless of feedback style due to increased familiarity with the checklist. With this in mind, the graduate student clinicians' progress cannot be entirely attributed to supervisory feedback. Other factors including improvement in the camp attendee's response to intervention, familiarity of the setting and routines, and increased knowledge of the peers participating with the camp attendees with ASD and/or challenging behaviors likely contributed to the graduate student clinician's fidelity of intervention. The severity of the camp attendee's challenging behaviors is also a factor that could have limited the graduate student clinician's fidelity of implementation. Three of the camp attendees had more challenging behaviors recorded on a daily basis as compared to the other five. Graduate student clinicians assigned to these camp attendees had more variability in their fidelity checklist scores from session one to ten, which could be related to the need to apply specific PBIS strategies to support the camp attendee.

A final limitation of this study is that data was not collected to confirm if graduate student clinicians' use of PBIS and social communication strategies generalized to additional settings beyond camp. One goal of clinical practicum experiences is to teach graduate student clinicians new intervention skills, and then prepare them to transfer those skills to other settings. It cannot be ascertained if the PBIS and social communication strategies generalized to other settings, such as home-based settings or schools.

Recommendations for Future Research

To our knowledge, this study is the first to examine the effects of text messaging supervisory feedback for speech-language pathology graduate student clinicians. This study includes several limitations due to the small sample size and the nature of the therapy experience; however, our results are supported by social validity measures confirming that most graduate student clinicians appreciated all forms of digital feedback and improved their fidelity of intervention implementation.

Future studies should continue to examine the effects of various forms of digital feedback during clinical practicum experiences, possibly within a study that incorporates longer digital feedback phases. The feedback phases could also alternate across graduate student clinicians experience levels to determine if one form of feedback is more appropriate for clinicians based on their levels of clinical knowledge or experience. In addition, data should be collected to explore the generalization and maintenance of knowledge and skills once the digital and/or face-to-face supervisory feedback is eliminated. Future studies may also examine a supervisory experience that begins with live coaching via text messaging or face-to-face, and slowly reduces coaching as the graduate student clinician gains more confidence in his/her skills. Coaching often involves a learner implementing a targeted skill while being observed and supported by an experienced teacher, or coach. Observations are conducted live, in-person (e.g., Fox, Hemmeter, Snyder, Binder, & Clarke, 2011), or via telecommunication platforms (e.g., Ruble, McGrew, Toland, Dalrymple, &

Jung, 2013). Observations are followed with performance feedback, opportunities for learner reflection, and identification of future goals. A systematic coaching component was outside the scope of this study as the primary research focus was digital forms of supervisory feedback and a fidelity checklist; however, a coaching component comes recommended within the professional development literature (Dunst, 2015). In future studies on this topic, a systematic coaching component may support the use of an intervention fidelity checklist and help clinical supervisors identify when to provide less support to more advanced graduate student clinicians.

Overall, this study took a preliminary look at digital forms of supervisory feedback using fidelity of implementation as the primary measure. The findings support ASHA's emphasis on mentorship, a functional working relationship, and meaningful, personalized feedback. Timeliness of supervisory feedback was important to the participants in this study. Continued research in this area is necessary to determine the true effects of digital feedback on graduate student clinicians' competence and confidence across clinical practicum settings. Future research should also examine the feasibility and acceptability of digital feedback of the supervisors using it within various community settings.

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