Teaching and Learning in Communication Sciences & Disorders

Volume 8 | Issue 3 Article 5

2024

Reimagining Clinical Education Practices for Autism through the Multi-client Multilevel Mentorship Model

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DOI: 10.61403/2689-6443.1320

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Abstract

Speech-language pathology students require comprehensive graduate education to address the needs of their future autistic clients. Despite this need, survey research suggests that students receive limited didactic and clinical graduate training that sufficiently prepares them to work with autistic clients. Contemporary research into clinical education for autism includes several features, such as more support and group-based services, that do not align with traditional clinical education in the field (Anderson, 1988; Dudding et al., 2017). The purpose of this study is to describe feasibility (by acceptability and implementation) of a new clinical education protocol, the Multi-client Multilevel Mentorship (M^3) model. The M^3 model is a collaborative clinical education model that emphasizes in-the-room clinical supervision of group-based service delivery for a team of students. Two cohorts of student clinicians (N = 9) participated in two ten-week rotations where they provided (a) and a literacy intervention (b) an intervention targeting executive function for two groups of clients with mixed diagnoses including autism spectrum disorder. Two clinical educators supervised the sessions with additional support by peer mentors. Survey feedback from participants showed that they rated the clinical education experience highly, suggesting adequate acceptability of the M^3 model. Participants demonstrated strong fidelity to one protocol and fair fidelity to the other, which was a positive indicator of implementation. Overall, student participants appear to benefit from the M^3 model during an adapted group intervention protocol designed for autistic clients. Further testing of the M^3 model's effectiveness is warranted given the positive feasibility indicators.

Keywords

Autism, Clinical Education, Collaborative Clinical Education Models

Cover Page Footnote

Acknowledgements: The authors are grateful to the student participants, client participants, and families of clients who supported this project. This project received no internal or external grant funding though the project was supported by Midwestern University.

Introduction

Although autism was once considered a specialized practice area, most speech-language pathologists (SLPs) now commonly work with autistic[1] individuals during their career (American Speech-Language-Hearing Association [ASHA], n.d.-a; ASHA, 2022). For example, the 2022 American Speech-Language-Hearing Association (ASHA) Schools Survey indicated that autism spectrum disorder (ASD) was the most commonly reported "area of intervention", more common than even speech sound disorders or language disorders (ASHA, 2022, p. 5). Yet practicing SLPs consistently report limited graduate training experiences with autism alongside low confidence and competence serving autistic children (McClain et al., 2020; Plumb & Plexico, 2013; Schwartz & Drager, 2008). These findings highlight the growing need for innovative graduate training programs that better prepare future SLPs to work with autistic children (ASHA Ad Hoc Committee, 2020, 2023; Williams, 2021). The purpose of this feasibility study is to describe graduate student learning outcomes from a multi-client, multi-level clinical education model that addresses the confidence and competence needs of graduate students who will increasingly work with autistic children throughout their future careers.

Contemporary Challenges in Graduate Clinical Education

Graduate speech-language pathology programs must prepare students for entry level supervised practice. Since the early days of the field, these preparation requirements have been gradually increasing due to the expanding breadth of the scope of practice in speech language pathology. For example, to apply for the certificate of clinical competence (CCC) in 1965, ASHA required applicants to obtain a master's degree with 275 clinical clock hours in five practice areas (i.e., (a) hearing, (b) articulation, (c) voice, (d) fluency, and (e) language; ASHA, n.d.-b; Bernthal, 2007). As of 2024, CCC applicants must complete 400 clinical clock hours in nine practice areas, which add (f) social aspects of communication, (g) augmentative and alternative communication (AAC) modalities, (h) swallowing/feeding, and (i) cognitive aspects of communication (ASHA n.d.-c). Yet, the length of a typical graduate program has remained at about 2-years since the 1960s (ASHA Ad Hoc Committee, 2020; Williams, 2021).

The increasing breadth of graduate training requirements, without extended program length, have adversely impacted the frequency and depth of clinical learning experiences across the scope of practice (ASHA Ad Hoc Committee, 2023; Donaldson, 2015; Marvin et al., 2003; Mason et al., 2020; Plumb & Plexico, 2013; Schwartz & Drager, 2008; Seal & Hilton, 2007; Yaruss et al., 2017). Specific to autism, many graduate programs offer limited clinical experiences working with an autistic client for each graduate student (Plumb & Plexico, 2013; Schwartz & Drager, 2008). For instance, Plumb and Plexico (2013) found that many graduate SLP students reported they did not complete a university clinic rotation with autistic clients, and most students did not receive any off-campus experiences working with autistic clients. Of the few students who were assigned an on-site rotation with autism, this experience was typically limited to a single experience working with just one autistic client.

[1] Given the discussions of terminology (Keating et al., 2022), we use the identity-first term "autistic" and the term "autism" for children who present with the autistic neurotype. This term is especially appropriate when discussing intervention as many individuals may not have a formal diagnosis yet still present with support needs that an SLP can address. We will use the term "autism spectrum disorder" to denote the formal medical diagnosis.

In addition to limited availability of clinical assignments, contemporary evidence-based interventions for autism are both more complex and more dynamic than traditional interventions from the 1960s. For instance, some traditional articulation interventions require that a clinician prepare a set of words and work through a preset hierarchy that uses operant conditioning for verbal responses (Hodson & Schudder, 1990; Van Riper, 1939). Selection of targets and then implementation of these preset steps facilitate the client's progress towards their therapy goals. Alternatively, contemporary autism interventions emphasize contingent responding to an autistic child's actions; these therapeutic responses are often varied multimodal teaching opportunities that shift based on the child's focus of attention (e.g., Schreibman et al., 2015; Sandbank et al., 2020; Verschuuer et al., 2020). The contingent responses to the child's actions facilitate the client's progress towards their therapy goals. Therefore, these contemporary interventions for autism require more dynamic responding from the therapist, which is more challenging for students to acquire than static steps (Moses & Shapiro, 1996; Wolford et al., 2024b).

In addition to learning challenging dynamic interventions, graduate students have unique challenges when working with autistic individuals. Autistic children have differences in behavioral self-regulation and communication when compared to nonautistic children (American Psychiatric Association [APA], 2013). These differences cause people to frequently misattribute what an autistic individual intends to communicate, especially if those people are not autistic themselves (Brewer et al., 2016; Casartelli et al., 2020; Crompton et al., 2020a). Therefore, students will need instruction to learn to interpret an autistic child's intent to deliver contingent responses quickly and efficiently in therapy. Relatedly, students must understand how co-occurring needs of autistic children that are outside SLP's scope of practice (e.g., sensory differences, epilepsy, sleep disorders) might interact with the child's actions or intervention methods in sessions (Ausderau et al., 2014; Mannion et al., 2013). Without this understanding on a continuous moment-by-moment basis in a session, students face compounding challenges to appropriately respond in a fast and therapeutic way that promotes both a client's communication needs and *self-agency*.

Contemporary Educational Protocols for Clinical Education about Autism

To address the needs of current graduate students, contemporary educational protocols have been developed that provide both explicit instructions outside of the sessions as well as frequent modeling of appropriate responses within the session (Benigno, 2019; Brown et al., 2018; Donaldson 2015; Weiss, et al., 2020; Wilson, 2017). Although these models span across different disciplines and foci, they share at least one of these common features: (a) in-the-room teaching, (b) an explicit initial training and ongoing pre-post session feedback, (c) group intervention components with multiple clients, and (d) collaborative clinical education. Some of these common features differ from the traditional university clinical education setup in the United States, which includes one clinical educator (CE) supervising one student's individual therapy sessions using Anderson's continuum model (Anderson, 1988; Sheepway et al., 2011; Dudding et al., 2017). These features, including points of divergence from the traditional model, are discussed next.

In-the-Room Teaching. In the traditional model, there is limited in-the-room teaching. The cardinal goals of the continuum model are to promote student independence and problem-solving skills (Anderson, 1988; McCrea & Brasseur, 2020). To accomplish these goals, the continuum

model recommends using shared planning, discussion, and data analysis that occur *outside* of the therapy session during a supervisory conference between the CE and student. Supervising in-the-room (termed "live supervision") is described as a threat to the supervisory relationship and therefore to students' learning (McCrea & Brasseur, 2020, pp. 236-7). The student is responsible for translating these strategies into within-session clinical behaviors. To test the continuum model, Gilliam et al. (1990) used a multiple baseline single subject research design to demonstrate learning for students who were working with clients with speech sound disorders. In the baseline phase, there were no supervisory conferences; in the intervention phase, they began to introduce supervisory conferences. The research team found that after a single supervisory conference, students often improved their targeted behaviors by 50-60% (Gilliam et al., 1990).

Given the inherent difficulty in the delivery of contemporary therapy, however, similar gains are unlikely to be realized, and clients deserve quality intervention from the start. To address these concerns, Donaldson (2015) described the benefit of explicitly setting the expectation that the supervisor would be in the room in early sessions, functioning as a real-time support system rather than a correctional response. Setting this expectation cognitively prepares students for live teaching within the session and offers wider space to learn in real time (Back et al., 2010; Donaldson et al., 2015; McCrea & Brasseur, 2020). Students learn from the CE modeling expert clinical behaviors through a process called *implicit learning* without even realizing how much information they are taking in. Implicit learning allows people to extract common elements from complex systems through observation, which has roots in social learning theory and statistical learning theory (Bandura, 1977; Saffran et al., 1996; Smalle et al., 2022). In this context, implicit learning would allow students to pick out the key elements of complex clinical behaviors without being directly instructed if they observed expert models in-the-room.

Emerging evidence in the field for this in-the-room approach in two contemporary studies with autistic clients report significant changes to students' intervention fidelity and confidence in response to in-the-room teaching (Donaldson, 2015; Wilson et al., 2017). Donaldson (2015) showed that students improved their implementation fidelity from approximately 30% to 60-70% in just 5 weeks. Wilson and colleagues (2017) found that all students made significant gains in their clinical knowledge of autism, and 71% of students reported increased confidence for serving autistic individuals. Although in-the-room teaching is time-intensive, the addition of expected implicit learning opportunities within sessions may more quickly benefit student learning and mastery implementing the intervention. However, the supervisory relationship has not been directly measured within these contemporary protocols, which means that the theoretical threats to the supervisory relationship are unclear using these protocols (Donaldson, 2015; McCrea & Brasseur, 2020; Wilson et al., 2017).

Explicit Initial Training and Ongoing Feedback. An initial intensive training period is a key component to prepare students for their future clinical experiences with autistic children (Donaldson 2015; Weiss, et al., 2020). Although an initial training is similar to the traditional methods, which stress orientation to the supervisory process, the contemporary aims are to use the orientation as a chance to prime students for learning rather than thoroughly prepare them (Anderson, 1988; Donaldson, 2015). The goals of such training are to establish supervision expectations, describe the principles of the intervention, and prime students to begin clinical learning. While the contents of these pre-clinical training periods vary in the literature, they

typically consist of asynchronous work, such as assigned readings, assessment of pre-clinical intervention knowledge, as well as participating in group supervisory meetings (Donaldson, 2015; Weiss et al., 2020). For example, Donaldson (2015) reported a pre-clinical training phase that included a 3-hour in person training, two independent study modules, and a test of knowledge of the intervention package. After students begin implementing the intervention, traditional methods of outside of the session feedback through written and verbal modalities benefit students' ability to connect the theory and intervention methods to client actions in intervention.

Group Intervention Components. Group intervention is mutually beneficial for the intervention needs of autistic clients and the educational needs of graduate students. Since autistic clients have diverse profiles of strengths, needs, and behaviors, students benefit from working with many different clients to understand the active ingredients of the interventions within a holistic clinical experience (Benigno, 2019; Brown et al., 2018; Donaldson, 2015; Turkstra et al, 2016; Wilson, 2017). One study reported that delivering the intervention to a group of autistic children increased student understanding of the differences between individual autistic clients (Wilson et al., 2017). In contrast, the traditional model typically delivers services in one-to-one contexts (Sheepway et al., 2011; Anderson, 1988), which may limit a student's understanding of autism to one autistic client.

Group intervention is commonly used to meet the clinical needs of autistic children, particularly if those interventions are conducted in inclusive environments through partnership with multiple professionals (Brown et al., 2018; Weiss et al., 2020). Developing group interventions may further benefit autistic children's connections to other autistic children from an early age. These connections may be particularly important for positive identity formation in which autistic peer connections can foster a sense of belonging to the autistic community, which is associated with higher psychological wellbeing in adulthood (Crompton et al., 2020b; Cooper et al., 2023).

Collaborative Clinical Education. Although the traditional clinical education model has one CE – student dyad (Anderson, 1988), professional practice patterns with autistic individuals inherently involve more than one discipline. Various forms of collaborative care have been shown to benefit autistic children including: interprofessional education (Price et al., 2023), the collaboration between professionals (Brown et al., 2018), or the transdisciplinary nature of autism intervention (Weiss et al., 2020). Research also often includes community building such as with families (Benigno et al., 2019; Lanter et al., 2011), non-autistic peers (Lanter et al., 2011), and siblings (Donaldson, 2015). Several studies designed approaches in which students worked with other students to provide services (Brown et al., 2018; Wilson et al., 2017), called a collaborative model of clinical education (Sheepway et al., 2011; Markowski et al., 2021; Wolford et al., 2024a). Students benefit from this model through (a) distributing and sharing responsibilities, (b) additional implicit learning opportunities to observe peer models, and (c) offering access to multiple sources of mentorship and support beyond the single supervisor.

Purpose

Emerging clinical education research in autism demonstrates that in addition to traditional clinical education methods, students who are learning to deliver contemporary interventions for autistic clients benefit from expanded support. The purpose of this paper is to describe the feasibility of a

multi-client, multilevel mentorship (M^3) model of clinical education that includes the components found to benefit students learning to work with autistic children: (a) in-the-room teaching, (b) an explicit initial and ongoing training, (c) group intervention with multiple autistic clients, and (d) collaborative clinical education. The focus of this model is to provide enhanced support and varied models to activate both the implicit learning pathways while continuing to teach concepts explicitly.

In this study, we used a feasibility design to determine the implementation and acceptability of the M^3 model in a real-world clinical education setting (Bowen et al., 2009). Feasibility testing represents a preliminary assessment in a real-world context to determine a need for further evaluation under more rigorous experimental control. As such, early-stage feasibility studies assess if a defined practice-driven or theoretical approach, *can work in the real-world*. If these studies show strong ecological validity, further research focuses on controlled evaluations of intervention efficacy and effectiveness. Researchers select indices of feasibility for measurement based on the goals of the intervention (Bowen et al., 2009). We measured acceptability and implementation as indices of feasibility. Acceptability represents how-well students receive and respond to the clinical education model. Implementation describes how and how well students delivered the intervention while receiving the M^3 model of clinical education. Acceptability was measured by student report to survey instruments. Implementation was measured directly by measuring intervention fidelity and student report of learning. The specific research questions were:

1. Research Question 1 (Acceptability): How do students rate the acceptability of the M^3 model?
   - *Hypothesis 1*: Following participation in the M^3 model, students will report positive supervisory relationships and rate their clinical education highly.
2. Research Question 2 (Implementation): Do students implement an intervention with fidelity while participating in the M^3 model?
   - *Hypothesis 2*: While participating in the M^3 model, students will demonstrate a high degree of fidelity to the intervention from the start.
   - *Hypothesis 3*: Students will report that they learned intervention skills using the M^3 model.

Methods

Participants. This study was approved by the Midwestern University Institutional Review Board. Following approval, nine speech-language pathology graduate students (henceforth referred to as "students") provided informed consent to participate as part of a larger study exploring literacy, executive function, and social communication development in children ages 3-7 (henceforth referred to as "clients"). Students had a mean age of 24.67 years (SD = 2.6), mean undergraduate GPA of 3.37 (SD = .22), a mean GRE-Verbal of 147.11 (SD = 4.45), and a GRE-Quantitative of 148 (SD = 4.82). All but one student identified their ethnicity as "white," and all were female. The first cohort of students (N = 4) joined in the initial academic quarter (Q1). During the second quarter (Q2), the Q1 students rotated to a different clinical placement, and a second cohort of students (N = 5) joined the research program. All students were trained to deliver the intervention protocol and implemented the program with the same groups of clients. Q1 and Q2 students were in their second and third clinical placements, respectively, and had earned between approximately

15-60 clinical hours. All students had successfully completed at least one child language development course prior to study onset.

Clinical Intervention Protocol. Clients were enrolled in a broader study that used a translational adapted group (TAG) intervention design to target early literacy skills through shared reading (TAG-SR; see Fissel, 2018 for a description of the TAG-SR intervention) and behavioral self-regulation through motor synchrony games (TAG-MSG). The TAG-SR and TAG-MSG were each implemented once weekly per group for approximately 10 weeks in a quarter. Therefore, students implemented TAG-SR twice, once to each of the two groups of clients, and students implemented TAG-MSG twice per week, once to each of the two groups of clients. The TAG-SR addressed decoding and language comprehension through group shared reading using adapted books that contained repetitive verses. The TAG-MSG addressed behavioral self-regulation through synchronized group movement games such as freeze dance or stop and go (similar to the *Red Light, Purple Light* intervention; McClelland et al., 2019; Tominey & McClelland, 2011). Although individual client learning targets differed, the active ingredients of both protocols were matched to the strengths and needs of autistic children, and involved the use of visual symbols, individualized prompting hierarchies, and elements of shared control (Schreibman et al., 2015). Both interventions addressed joint engagement in addition to targeted skills by modeling synchronous group movements in concert with rhythmic, musical repetitive phrases/directions (Behrends et al., 2012).

Intervention Sessions and Student-Client Assignments. Both groups of clients included children ages 3-6 who were enrolled in the TAG intervention for at least two quarters. Both groups had approximately 5 clients who presented with either autism or developmental language disorder (DLD). Because the group consisted of children with mixed diagnoses, students learned to work with a diverse group of clients who had overlapping intervention targets. When there were more students than clients (e.g., due to absences), two students were assigned as a pair to work with one client such that students had the full experience each week. In general, students were assigned one client in both cohorts and were responsible for delivering a short (~20 min) 1:1 intervention session to that client immediately prior to participating the group sessions. The 1:1 intervention was an intentional component of the M^3 program, which was designed to prime each client for the skills needed to participate in group sessions and to give the students practice with 1:1 intervention. Since each student was assigned two clients (one per group), we ensured that at least one of the clients was autistic.

When delivering the group TAG interventions, one student was assigned to the role of group leader and was responsible for engaging the clients. The group leader was instructed to deliver the majority of the teaching opportunities. The other students were instructed to facilitate the intervention as needed, using nonverbal prompts, so that clients' attention remained focused on the group and group leader. The group leader rotated each session, and all students were assigned as the group leader for each client cohort at least three times in a quarter. Students were also instructed to support the needs of *any child* in the group session rather support only the client seen in individual sessions.

Multi-level Mentorship: Clinical Educators (CEs) and Peer Mentors. The first and second authors served as the CEs for this placement. The first author had approximately two years of

clinical education experience and six years of experience supporting autistic individuals. The second author had approximately 6 years of clinical education experience and 10 years of experience supporting autistic individuals. Both authors had taken continuing education courses, which informed the theoretical aspects of this model. The second author trained the first author in the TAG-SR intervention by reading the TAG-SR intervention protocol, observing a past TAG-SR intervention training video, and observing the second author run one TAG-SR intervention live. Both authors worked with all students to implement the intervention and jointly supervised the sessions.

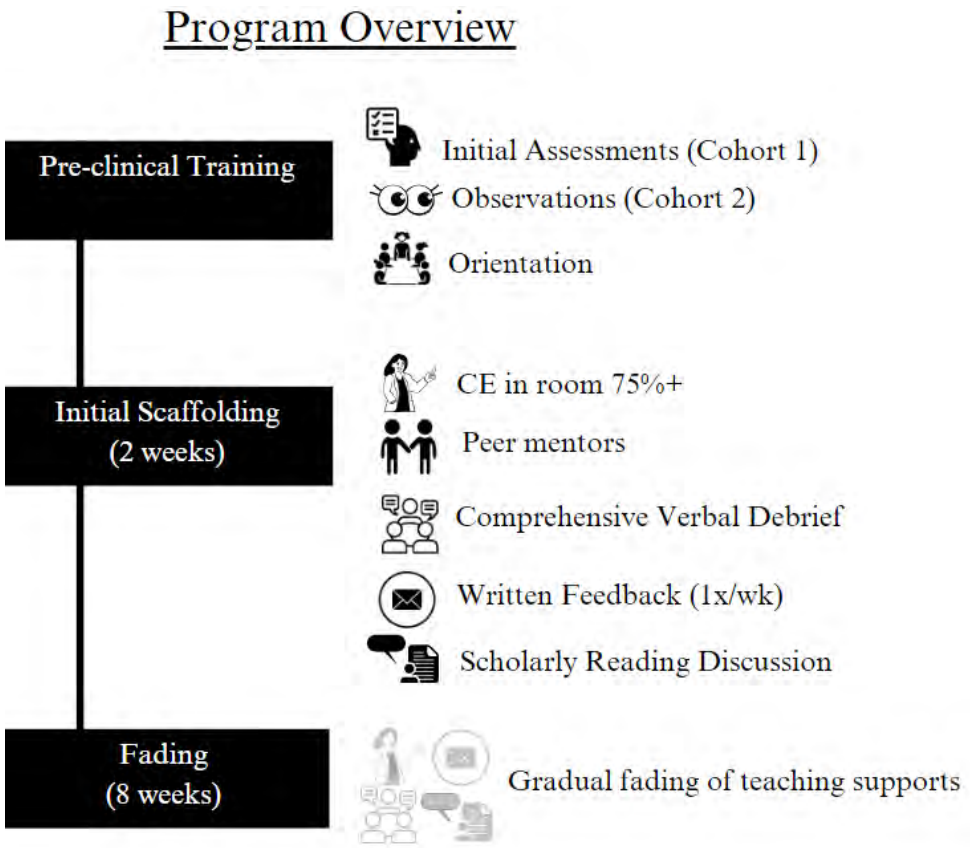
In addition to the two CEs, graduate students with prior experience implementing the TAG intervention, served as peer mentors to new students in the first two weeks of sessions. The exact activities of the peer mentors were not tracked throughout the study. They were trained briefly to: (a) be an informal source of support for the current cohort of students, (b) answer simple questions for the current cohort including anything the current cohort would hesitate to ask the CEs, and (c) provide guidance on therapy techniques or materials. Additionally, peer mentors assisted in the room during sessions and attended group session debriefs during the scaffolding phase. For the second cohort of students, peer mentors led the first group intervention session, detailed below. After the scaffolding phase, peer mentors faded out entirely.

Student Training Phases. Student training was divided into three phases: pre-clinical training during orientation, initial scaffolding, and gradual fading of teaching supports (See Figure 1 below). During the Q1 pre-clinical training, students were instructed on administration of the assessment battery and then conducted the intake assessments. For the second cohort of students, they were instructed to observe two to four hours of intervention before the subsequent quarter. Each group participated in an approximately 2-hr pre-clinical training session where the CEs described the intervention protocol, demonstrated the adapted book reading, and modeled concrete introductory strategies to use in early sessions. These strategies included modeling, prompting, and using synchronous rhythm and motor techniques to promote engagement and child skill acquisition. The training also provided a brief overview of methods to support behavioral self-regulation (e.g., redirection, synchronous actions, not to interrupt stimming, delivering teaching opportunities to the group rather than an individual). Finally, the initial training covered basic clinic procedures (e.g., key locations, procedures), and established an expectation that the CEs would be present and provide supportive in-the-room teaching from the start.

During the initial scaffolding, the CEs were supervising in-the-room over 75% of the time in both the group and individual components. They would rotate between rooms as needed to supervise students' 1:1 treatment. Peer mentors were also assigned to be in the room for 1:1 sessions during the initial scaffolding phase. During the group therapy session, one CE took data on student performance and notes on the session from outside the room. The other CE was in-the-room modeling therapy actions, prompting the students verbally or non-verbally, providing in-the-moment feedback, and helping to organize the physical environment as needed. Infrequently, both CEs were in-the-room. During the first week of Q1, the CEs were designated as the group leader; during the first week of Q2, the peer mentors were designated as the group leader. Peer mentors participated the second week as group members but no longer fulfilled the "lead" role. In this way, student participants received peer mentorship from different clinicians who recently completed the program; allowing them to observe multiple ways of implementing the intervention.

Figure 1

Student Training Phases During a Quarter Using the M[3]



After each session, students and CEs met together to debrief. The CEs used this format to ensure all students understood the multiple different ways that all clients responded to the intervention. Group debriefs were also used to establish rapport among student participants and peer mentors and facilitate group cohesion. The peer mentors joined the debrief when they participated and helped to describe their observations and rationale behind their therapy decisions. The debriefs were longer initially (over an hour) but lasted between 30-45 min in subsequent weeks. Individual feedback was provided to each student in writing or verbally during weekly student meetings. Also, during the first five weeks of intervention, students were assigned weekly readings that informed the theoretical foundation for the intervention. All students and CEs met as a group once a week to discuss these readings and connect theory to the active ingredients of the TAG interventions and profiles of autistic learning. Readings informed the rationale for individualized adaptations, prompting, modeling, use of explicit and embedded instruction, use of imitation and gesture, social focus on rhythm and motor synchrony, methods to promote peer interactions, as well as shared interactive book reading methods (e.g., Barton et al., 2011; Fissel, 2018; Justice & Kaderavek, 2002; Kaderavek & Justice, 2010; Kasari et al., 2012; Morrison et al., 2010; Schreibman et al., 2015; Timler et al., 2005). The CEs made explicit the expectation that students would learn to implement the intervention before thoroughly understanding why they were using

the intervention methods. A benefit of this implicit to explicit teaching sequence is that students could ground the theoretical teachings and readings in their concrete clinical experiences.

After the initial two weeks, the third phase began. The third phase was marked by continued student support that was faded throughout the remainder of the program. In-the-room supervision of the 1:1 sessions and group sessions continued but was gradually decreased over time. More active in-the-room supervision was faded from, for instance, frequent modeling to in-the-room non-verbal cueing. The CEs were increasingly more comfortable with fading out of the room for progressively longer periods of time towards the end of the intervention. Debriefs continued after each session and decreased in time and later in frequency (e.g., after week 5, students were given the option of reducing the number of debriefs from twice to once a week). Complete independence was never set as an expectation though in-the-room supervision decreased to approximately 20% of the time in the group by the end of the quarter.

Outcomes. Acceptability was measured by student report of their experience using post-experience survey measures. The self-report outcome measures evaluated the students' perceptions of the quality of their supervisory experiences and included two validated scales and one researcher developed feedback form. Implementation was measured by both fidelity to intervention and by student reported learning.

Student Report Measures. The two validated student report scales were the Maastricht Clinical Teaching Questionnaire (MCTQ; Stalmeijer et al., 2010), and the Short Supervisory Relationship Question (S-SRQ; Cliffe et al., 2016). The MCTQ is a criterion referenced assessment that uses a 1 to 5-point scale to provide indicators of supervisory behaviors along five dimensions: modeling, coaching, articulation, exploration, and safe learning environment. There is an overall 1 to 10-point rating of the clinical teaching. A high score would indicate that students felt the CEs were using those behaviors during their rotations, whereas a low score reflected less frequent or absent use of those behaviors during their rotations. The S-SRQ (Cliffe et al., 2016) is a validated 18 question scale that ranges from 1 to 7 (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = agree, 7 = strongly agree). A high score indicates more positive opinions about the supervisory relationship, whereas a low score indicates negative opinions about the supervisory relationship.

The authors developed and administered a third measure, the Clinical Education Feedback Form (CEFF; see the Appendix for the full form), to ascertain responses more narrowly about (a) how much participants enjoyed the experience ("Liked It," 5 questions), (b) how much participants learned from the experience ("Learned It," 6 questions), and (c) how helpful the peer mentors were ("Peer Mentors," 5 questions). These questions followed a similar 1-7 point (strongly disagree to strongly agree) format and were all presented in a stylistically similar manner. Two questions were phrased negatively and were reverse scored as an average was taken[2]. We assessed these scales for internal consistency by calculating Cronbach's alpha (Learned It $\alpha = .83$, Liked It $\alpha = .92$, and Peer Mentors $\alpha = .87$). Alpha values greater than 0.70 reflect strong internal consistency (Tavakol & Dennick, 2011). There was one additional question about the time commitment for their clinical placements during their clinical rotation as well as optional qualitative comments. These results

[2] One participant responded all "strongly agree" to these questions including the reverse scored ones. This participant's data was removed from analysis in just the CEFF.

are presented by cohort because the two cohorts had different experiences that could potentially yield different subjective impressions or reflections on the supervisory relationship.

Intervention Fidelity. Similar to how intervention complexity has evolved in the field, intervention fidelity, a measurement of how accurately clinicians deliver an intervention, has also changed over time. For instance, to measure clinician fidelity to the traditional articulation approach, Lousada et al. (2013) quantified: (a) the session length, (b) that the clinician targeted the correct sounds, (c) "activities" (p. 177; e.g., practicing the sound in isolation vs at word level), and (d) use of reinforcement; they found 100% fidelity for the sampled sessions. In contrast, Verschuur et al. (2020) measured clinician fidelity to a contemporary autism intervention by tracking the percentage of the time, coded in 10-second intervals, that the interventionist (a) followed the child's lead, (b) implemented a three-part contingency, and (c) interspersed maintenance and acquisition tasks. This interval coding framework is useful to characterize how a clinician can implement a dynamic intervention on a moment-by-moment basis, so we adopted a similar interval coding framework for our study, which is described next.

The raw dose frequency of student-delivered teaching opportunities, defined as how often a student implemented a teaching opportunity, were extracted from video recordings of the TAG intervention sessions by blinded research assistants who achieved training to inter-rater reliability kappa values of ≥ 0.70 (described in detail in Fissel, 2018). The presence or absence of teaching opportunities related to language, literacy, gestures, modeling, and prompting were coded using partial interval coding procedures at 10 second intervals in ELAN (Lausberg & Sloetjes, 2009). Partial interval coding examines whether or not a behavior occurs within a defined time frame. For this study, research assistants identified if a teaching opportunity occurred and the role of the person who delivered the teaching opportunity (i.e., the CEs, the group leader, or a member of the group). Role was used to differentiate if the CEs or students were delivering instruction. Intervals in which a teaching opportunity was coded indicated that a targeted teaching opportunity specified in the intervention was present. If an interval was not coded for any targeted teaching opportunity, it indicated that the student was not using a targeted teaching opportunity.

Data and Analyses. To answer research question one, means and ranges on all survey measures are reported. To answer research question two, dose frequency data were extracted from a final data set of 24 of 32 sessions. Eight of 32 sessions were missing due to holidays, students conducting pre-post child assessments, or data were missing due to experimental error (e.g., missing session recordings). By extracting the dose frequency using 10-second partial interval coding, 5,554 data points were collected. Of these we excluded 3.33% of the data points due to coding error (e.g., the role of the person delivering the teaching opportunity was not coded). The final number of data points across all sessions of 5,369. Dose frequency values were then converted to a percent of all intervals within a session and were further differentiated by who delivered the teaching opportunity: student group leader, student group member, or CE (Carter et al., 2011). The percentage per role indicates what percent of the time in each session a role implemented teaching opportunities. For example, 50% for CE would indicate that the CE implemented teaching opportunities 50% of the time in all possible intervals regardless of the total number of teaching opportunities in the session. These data were analyzed by role (group members, CE, group leader), session type (TAG-SR vs TAG-MSG), and session number. Preliminary evidence for the TAG-SR suggests that a master clinician consistently delivered greater than 80% of teaching

opportunities in a 30-min group shared-reading session (Fissel, 2018), and these data were used to make predictions about "ideal" and "sufficient" fidelity by students for the TAG-SR and TAG-MSG. Student dose frequencies comprising greater than 80% were considered ideal and above 70% were considered sufficient[3]. Demonstrating a teaching opportunity in 70% of the intervals in a session was described as meeting the fidelity criteria for the session.

Results

RQ1: Acceptability of the M^3 Model. For the S-SRQ, as stated above, the questions on the S-SRQ range from 1 to 7. Higher scores indicate agreement with positive perceptions of the supervisory relationship. Q1 students reported an average rating of 6.28 (range 5.89 – 7), which is between "agree" to "strongly agree". Q2 students reported a mean of 6.79 (range 6.5 – 7), which aligns with ratings of "strongly agree". Overall, the results indicate a strong supervisory relationship for both cohorts, supporting hypothesis 1.

Results of the MCTQ are shown below by cohort in Table 1. High scores indicate agreement that the CEs demonstrated those teaching techniques. Results indicated that the students agreed that the CEs provided a wide range of teaching techniques and provided a safe learning environment. Scores were mostly in the near maximum to maximum range. In addition, there was a highly positive opinion of the overall clinical teaching. Overall, the results indicate a high degree of satisfaction with clinical teaching, supporting hypothesis 1.

Table 1

Average MCTQ Scores by Group

Cohort #	Modelling	Coaching	Articulation	Exploration	SLE	Overall Teaching
Cohort 1	4.67 (.47)	4.25 (.96)	4.42 (.79)	4.5 (.57)	4.75 (.5)	9.25 (.96)
Cohort 2	4.84 (.17)	4.6 (.55)	4.6 (.43)	4.9 (.22)	5 (0)	9.6 (.55)

Note. Means are presented with standard deviations in parentheses. Possible scores ranged from 1-5 on all subscales and 1-10 on overall teaching.

The CEFF Liked It and Peer Mentors Composites subscale composites ranged from 1 to 7 with higher scores indicating a more positive student perception. On average, both groups reported over a 6 out of 7 to liking the placement (Cohort 1: $M = 6.29$, $SD = .64$; Cohort 2: $M = 6.25$, $SD = .65$). In addition, they indicated that the interactions with peer mentors were highly beneficial (Cohort 1: $M = 6.4$, $SD = .63$; Cohort 2 $M = 6.25$, $SD = .53$). Both findings support hypothesis 1.

[3] As with many other interventions in the field, optimal intervention intensity is still being explored (see Parker & McGowan, 2014). Other intervention protocols suggest that a sufficient dose schedule is much less. For instance, Waddington et al. (2020) suggested that at least one trial every 30 seconds, which would be 33%, was sufficient for a parent training target. Verschuur et al. (2020) found that only 5 out of 41 therapists met criteria for 80% fidelity to Pivotal Response Therapy when their coding scheme required three simultaneous areas being coded in a given interval.

In reporting time commitment, the first group of students reported spending on average 10.5 hr per week (range 9-15) on the group activities including preparation work, debriefing, paperwork, and direct therapy time. The second group reported a similar time commitment at 10.75 hr per week (range 8-13.5). This amount of time was within an acceptable range for the 3-credit hour commitment, indicating the program is efficient at the graduate level. Overall, the results from all surveys support hypothesis 1. Students perceived a strong benefit to the intensive and closely supervised experience despite the historically purported threats of in-the-room supervision.

RQ2: Student Implementation of the Intervention While Participating in the M^3 Model.
For the TAG-SR fidelity measures, figure 2 presents the percent teaching opportunities by session and role of the person delivering the teaching opportunity. Students met criteria of over 70% teaching opportunities for all sessions (9/10) except for session 4. Session 4 was the first opportunity that a student led the group, and the CE provided 21% of the teaching opportunities. However, eight out of ten sessions were in the ideal range. Overall, students provided strong fidelity to the protocol from the start of the protocol, confirming hypothesis 2.

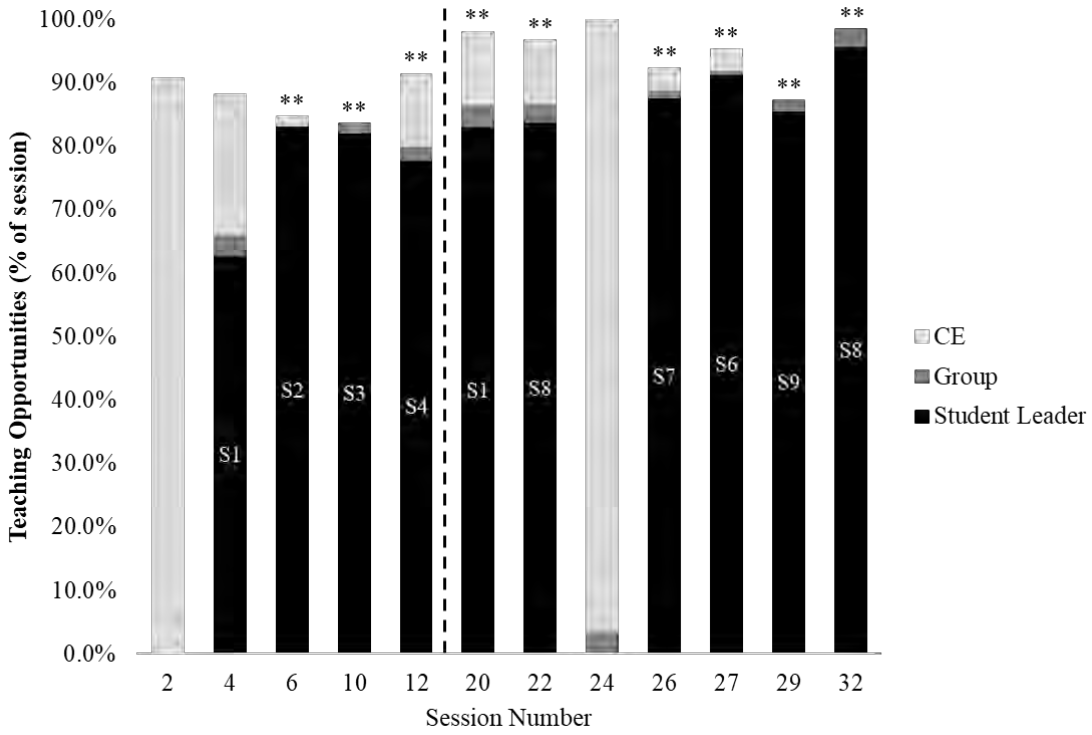
For the TAG-MSG fidelity measure, figure 3 presents the percent teaching opportunities by session and role of the person delivering the teaching opportunity in. The first cohort group plus group leader achieved over 70% in just 2/7 sessions. The CEs more extensively supported the Q1 cohort relative to any other cohort. With the CE support, the students achieved over 70% in five out of seven sessions.

In the second cohort, the group leader achieved over 70% in 3/4 sessions without group support (which includes the peer mentor running the first session with 90% the first session). During session 23, the group plus the student leader achieved 69.6%. In total, students met the fidelity goal in 5/11 sessions without group support. In 8/11 sessions, the student leader plus the group provided over 60%. These results partially support hypothesis 1; cohort 1 did not achieve the hypothesized result, but cohort 2 was more successful.

Student Report of Learning. The CEFF Learned It composite reflected how much students felt they learned from their experience. Overall, students agreed or strongly agreed that they learned valuable clinical skills (CEFF subscale composites maximum score is 7; Cohort 1: $M = 6.29$, $SD = .64$; Cohort 2: $M = 6.25$, $SD = .65$). Although specific techniques (e.g., use of labeling feelings for behavioral regulation) were not assessed, this supports hypothesis three because students reported acquiring clinical skills from this experience.

Figure 2

Fidelity to the TAG-SR Protocol during the M³ Clinical Education Experience



Note. The division between the two cohorts are indicated above using a vertical dashed line. The participants are marked with de-identified codes and reflect the student leader of the session. The CE led the session in sessions 2 and 24, which was planned a priori rather than a reactive change in the session. ** = the student leader was over 70% without group support. CE = clinical educator.

Discussion

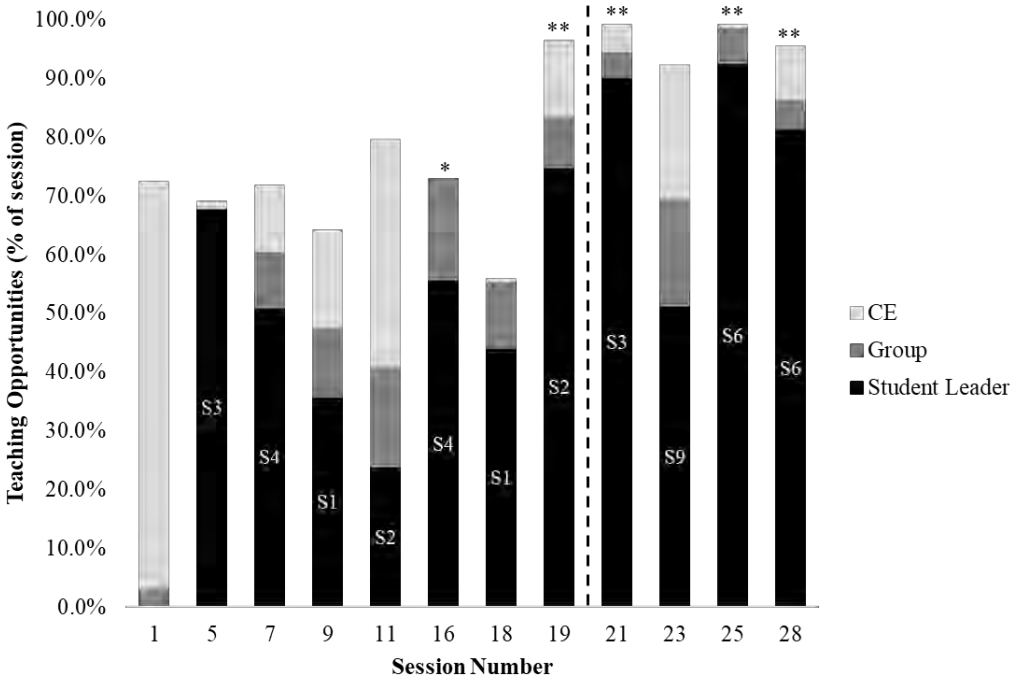
This feasibility study examined the implementation and acceptability of the M³ clinical education model, which included focused supervision in-the-room, multiple levels of mentorship, multiple clients, and intensive feedback. Nine speech-language pathology graduate students learned to implement the TAG-SR and TAG-MSG protocols in a group therapy setting. As predicted in hypothesis 1, survey results indicated that students found the educational protocol acceptable, reporting that they benefited from the methods of supervision, and reported a strong supervisory relationship even though nontraditional clinical education methods were used.

In hypothesis 2, we predicted that students would demonstrate fidelity to the targeted interventions for both the TAG-SR and TAG-MSG protocols in response to the M³ model. Interval dosage data for the TAG-SR indicated that after CE implemented the M³ model, during the next session students quickly achieved and maintained mastery delivering high levels of teaching opportunities; well above 70% dosage benchmark predicted by hypothesis 2. However, students' implementation of the TAG-MSG was much more variable than their implementation of the TAG-SR. While

students met the fidelity in 3 out of 4 sessions in the MSG protocol in Q2, students only achieved the targeted fidelity in 2 out of 7 sessions with group support in Q1.

Figure 3

Fidelity to the TAG-MSG Protocol during the M³ Clinical Education Experience



Note. The division between the two cohorts are indicated above using a vertical dashed line. The participants are marked with de-identified codes and reflect the student leader of the session. The CE led the session in session 1, which was planned prior rather than a reactive change in the session. * = the student leader was over 70% with group support. ** = the student leader was over 70% even without group support. CE = clinical educator.

The nature of teaching opportunities afforded by the MSG protocol differed from those of the SR protocol, which may explain the lower MSG dosage levels in Q1. Compared to the MSG protocol, the SR protocol has more structure, teaching opportunities are more frequent and quicker, and the children can respond more rapidly. For example, during shared reading, children sat at a horseshoe table and were physically oriented to the group leader and book. This type of seated learning environment establishes boundaries that provide physical structure for the range of behavioral responses a child may display and facilitates physical orientation to the group leader and text. Additionally, the texts used in the SR protocol were adapted to provide repeated (verse) and gradually more complex teaching opportunities. These textual features allowed the group leader to quickly and iteratively administer teaching opportunities but also allowed the children to better predict and execute targeted responses with increasing accuracy and speed. In contrast to the SR protocol, the MSG protocol is hosted in open space with fewer physical boundaries, greater opportunities for shared control (i.e., more choices), and a wider range of response options to play and communicate about games with both peers and the group leader. These increased options promote child agency with greater demand for self-regulation, which is often difficult for both

autistic children and those with speech/language disorders. In Q1 when children were first learning how to play games, they experienced longer periods of dysregulation, which may have limited the number of teaching opportunities a student could deliver. As children learned to play games, a greater number of teaching opportunities could be delivered, which may explain the increase in student dosage in Q2.

Alternatively, it may be that the fidelity metrics should be adjusted for the games protocol. The different games require different pacing, resulting in a different pattern of teaching opportunities that were delivered during the MSG protocol. For example, duck-duck goose requires shorter and more frequent child responses than freeze dance, in which clients must show less frequent, but longer responses (e.g., freeze for 5 seconds after 10 seconds of music). Therefore, dosage is likely dependent on the children's stage of learning the games, and the type of game or games taught impact the dosage. The relatively lower dosage of the CE's teaching opportunities in the MSG compared to SR, along with greater variability supports the conclusion that the dosage requirements of the MSG protocol are different from those of the SR protocol. Exploring other ways of conceptualizing fidelity in these two protocols may be beneficial and better reflect student learning.

Qualitative Growth in Clinical Skills. Although our study included broader metrics targeting feasibility, the CEs observed qualitative changes in the student's implementation of both protocols from the beginning of the quarter to the end that may be a useful reference for future research. Students started their quarter having a more limited clinical presence, reporting feeling not confident, using limited prompting or modeling strategies, and responding inconsistently to clients in a contingent manner. By the end of the semester, students reported feeling confident, and they were much more fluid in their clinical responses. Cumulatively, students showed a clear clinical presence with growth in their speed of contingent responses and responses being better aligned with each clients' goals. Students also made gains in adapting their behavior to unexpected child behaviors including their ability to engage students during teaching and affirm children who demonstrated behavioral dysregulation. Specifically, students learned to employ several strategies proactively and reactively to support children's behavioral self-regulation, such as promoting alternative modes of child communication (promoting non-verbal protesting instead of requiring verbal protesting), validating the child's behavioral expression of emotions (e.g., "I know, this is hard"), leveraging directions that promoted synchronous group redirection to task (e.g., one-two-three, follow me, everybody…), and contingently modifying the sensory environment of the group intervention room (e.g., dimming the lights, offering a structured movement break). Future studies could examine the growth of specific skills in relation to what is taught explicitly in supervisory conferences, skills modeled by the CEs, and skills modeled by a peer mentor. For instance, a researcher could track which strategies a student uses to support behavioral regulation, the time point at which the student began using these strategies, and the relative success of these strategies for the client over time. Such a measure could be especially meaningful as it would capture CE teaching, student learning of targeted dynamic skills over time, and client learning.

In-the-Room Mentorship. The results of the survey measures suggest that despite the theoretical threat to the supervisory relationship of in-the-room supervision (Anderson, 1988; McCrea & Brasseur, 2020), the students reported overwhelmingly positive experiences in response to having their CE in-the-room for in-the-moment feedback. Much as Donaldson (2015) posited, when

students are provided with preemptive expectations of in-the-room supervision, the relationship remains positive. Students reported high agreement with different areas of clinical teaching and overall clinical teaching ratings for the CEs. However, traditional wisdom within the field of speech-language pathology has paradoxically affirmed the need for the synchronous supervised practice to promote experiential learning while also recommending CEs provide most of their teaching through explicit teaching during supervisory conference discussions (Anderson, 1988; McCrea & Brasseur, 2020). Although these models have early research support (e.g., Gillam, 1990), they may downplay the importance of implicit learning avenues for entry technical skills needed for modern practice patterns.

In addition to the student report measures, the pattern of fidelity results indicated the in-the-room mentorship was helpful. For instance, following high levels of in-the-room supervision by CE in a session, student group leaders showed commensurately high dosage of teaching opportunities in the next session (e.g., TAG-SR session 4, CE: 22%, group leader: 63%; then session 6, CE: 1.5%, group leader: 83%). However, what was unanticipated was the patterns of support the CEs provided. Although the CEs anticipated they would provide high levels of support early but then gradually fade over time, our data showed that, in the moment, the CEs responded based on what the students needed to support their clients in the session. Rather than having a set plan for fading support within the session or tracking teaching opportunities, the CE support was tied more to students' contingent responding. As clients began to demonstrate different behaviors, the students needed different levels of support to provide appropriate responses such that a linear way of fading out was not felt appropriate. The benefits of immediate and scaffolded student feedback to unexpected events are only possible with live, in-the-room supervision. In-the-room supervision with the option for immediate feedback (as in the cognitive apprenticeship model; Collins et al., 1991; Gessler, 2009) is a common educational practice when the skills to be learned are complex and could quickly become problematic if a misstep is taken. As the scope of practice in speech-language pathology expands to require the delivery of dynamic interventions for increasingly complex populations like autism, CEs should increasingly prioritize observational situated teaching and learning over static supervision approaches.

Multilevel Mentorship. In this study, students received support from multiple interventionists with different levels of intervention proficiency including: (a) two different CEs, (b) peer mentors who had learned to deliver the intervention in the previous quarter, and (c) peers who were simultaneously learning to deliver the TAG-SR and MSG protocols. Participants in this study not only reported strong supervisory relationships with their CEs, but they also reported to benefit from the peer mentoring as well. Although peer assisted learning models such as peer collaboration where students share responsibilities have emerging support (Ladyshewsky, 2020; Markowski et al., 2021; Wolford et al., 2024a), peer mentoring has been relatively underexplored in our field. Peer mentors provide another model of clinical practice and can ease the workload on the CE by providing peer mentoring advice within a clinical rotation. For instance, peer mentors provide another avenue for students to discuss sessions or intervention topics in a more informal setting without the same power dynamics when working with the faculty CEs (Cook et al., 2019). Although this study did not quantify all of the activities of the peer mentors, peer mentorship and collaboration benefits may have provided hidden value to students' acceptability and implementation of the TAG protocols. For instance, in this experience, the peer mentors felt more comfortable sharing concerns of the new students with the CEs, which then the CEs addressed to

the group. Future studies should aim to quantify what formal and informal support peer mentors provide throughout an experience.

Opportunities for peer mentorship may also be important in graduate school from a professional or programmatic standpoint. Students who are interested in becoming CEs themselves someday do not currently have to pursue an additional degree after their masters. Graduates could start supervising students in under two years after their own graduation (with two hours of continuing education; ASHA, n.d.-c), so embedding mentorship experiences in graduate school as well as explicit instruction on supervision has become more important.

Multi-Client. Our data showed that students successfully intervened with all clients in the group, even though a given student only had a few opportunities to lead a specific type of group during the 10-week rotation. Even though the group leader changed each session, students made gains in their technical skills and enjoyed their rotation. Most students required just one session to acquire proficiency implementing the TAG protocols as a leader: the second time that a student led the group, they either increased their teaching opportunities or met the fidelity criteria, despite not having run the group for that protocol during weeks prior. Therefore, it seems the protocol is efficient in teaching many students how to lead a group therapy session within a single immersive experience.

The group-based nature of the intervention protocol for clients may also have helped students understand how autism presents differently with different clients and enhance their future clinical work. Isolating students to 1:1 sessions may limit their ability to generalize the important features of autism rather than understanding the concrete strategies. The group protocol aligns with contemporary studies on clinical education focused on autism that also stress the importance of group-based sessions (Benigno et al., 2019; Brown et al., 2018; Donaldson, 2015; Wilson, 2017).

Although most of the discussion has been about the group leader, the group members also were benefiting. In both cohorts, the group members, not just the group leaders, participated in delivering teaching opportunities. These behaviors coupled with the student report measures provide evidence that group members are engaged and beneficial during sessions and not just passive observers. These findings align with broader research across healthcare fields on group clinical educational models, described as collaborative models, that demonstrated students can learn while sharing responsibilities for delivering clinical services within a clinical rotation (e.g., Briffa & Porter, 2013; Markowski et al., 2021; Wolford et al., 2024a).

Limitation and Future Directions. The purpose of the study was to assess feasibility (in implementation and acceptability) of the M^3 model. Therefore, the data are descriptive in nature without a baseline phase or comparison group, which limits any assertions of effectiveness or efficacy. An early efficacy study could compare the M^3 model and traditional models using expanded measures such as: broad fidelity measures, identifying client growth, and specific skills that students learn from the educational models. Direct comparison of the M^3 model to the continuum model with different complex intervention protocols and populations would further inform when and for whom this model of clinical education is most beneficial.

Another future direction is that the M^3 model could be trialed in other practice areas in speech language pathology. Although autism is an area where clients require a high level of support and dynamic therapy, contemporary interventions across the scope of practice are also more complex and challenging to learn. As stated above, graduate students need to acquire the skills to implement complex interventions on a relatively quicker time scale. Therefore, the increased support may be viable in practice areas where there are complex dynamic therapies and group interventions.

A final future direction would be to explore how feasible the model is in terms of practicality for the university clinic or school setting. Practicality refers to how easily the model can be used given current resource constraints (Bowen et al., 2009). Because a more traditional setup is often used in university clinics, the expectation is that a single CE would observe about 50% of a session of a student-client dyad and possibly have multiple sessions going simultaneously (Donaldson, 2015; Uhl et al., 1987). In our study, we had two CEs, two peer mentors (for the initial 2 weeks), five students and five clients. A practicality study could explore the time and resources needed for the CEs and the scheduling constraints for multiple clients, students, peer mentors, and CEs in a given time period.

Conclusion

Although this study is descriptive in nature, the M^3 model shows positive early feasibility markers and indicates that collaborative group-based protocols could train students to implement complex protocols while meeting acceptability metrics for the graduate students. The M^3 model efficiently trains multiple students and provides services to multiple clients by capitalizing on implicit learning pathways with in-the-room teaching, initial and ongoing training, and use of peer models. As SLPs increasingly work with individuals who need complex dynamic interventions, it's important for researchers to respond to calls that we assess options in clinical teaching to best meet the needs of our contemporary graduate students (ASHA Ad Hoc Committee, 2020, 2023; Williams, 2021).

Disclosures

The authors have no relevant competing financial or nonfinancial interests to disclose.

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Appendix

Clinical Education Feedback Form (CEFF)

Answer the following questions based on how you feel about your clinical education this quarter.	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor	Slightly Agree	Agree	Strongly Agree
Clinical Experience Scale							
1. I learned valuable clinical skills	1	2	3	4	5	6	7
2. These skills are NOT relevant to a potential externship or job with pediatric clients	1	2	3	4	5	6	7
3. I found myself having fun at times within the sessions	1	2	3	4	5	6	7
4. I have a better understanding of use of environmental supports	1	2	3	4	5	6	7
5. I am more prepared to work with autistic clients or clients with social-communication needs	1	2	3	4	5	6	7
6. I am confident in my knowledge and skills to implement a group treatment protocol for autistic clients	1	2	3	4	5	6	7
7. This assignment was an unpleasant experience	1	2	3	4	5	6	7
8. I developed group therapy skills that I couldn't have in individual treatment	1	2	3	4	5	6	7
9. I liked this clinical placement	1	2	3	4	5	6	7
10. Working within the group this quarter as an enjoyable experience	1	2	3	4	5	6	7
11. I enjoyed the time during the sessions this quarter	1	2	3	4	5	6	7
For the following questions, indicate how you feel about the students who assisted at the start of the quarter. Those students…							
12. Were valuable resources within the therapy session	1	2	3	4	5	6	7
13. Helped me know what to expect in and out of the session	1	2	3	4	5	6	7
14. Modeled therapy techniques for me first, so I knew what to do	1	2	3	4	5	6	7
15. Were helpful	1	2	3	4	5	6	7
16. Stopped me from being as independent as possible because they were in the session at the start	1	2	3	4	5	6	7

How many hours per week do you spend with this assignment this quarter including direct therapy, prep time, debrief time, and documentation?

Do you have any other feedback relevant to your clinical education this quarter?