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Exploring the Professional Learning Community in a Special Education School Serving Pupils with Autism

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Abstract:

Researchers, policy-makers, and practitioners have underscored the need for schools to become professional learning communities (PLC) as leverage for school change in dynamic environments. Professional learning community is defined by the networks of learning processes among its community members, where teachers continuously deliberate with one another on how to solve problems that relate to teaching and learning. The purpose of the current study was to explore the facilitators and impediments of PLC in a special education school for pupils with autism spectrum disorder (ASD). Semi-structured interviews (84) and observations (18) were conducted over a period of two years. Data collection and analysis occurred simultaneously as an ongoing process throughout both years of inquiry. Generating themes was an inductive process, grounded in the various perspectives articulated by participants. Participants indicated that organizational resources (allocating time and place for collaborative learning), a learning culture, and an administrative support were major factors that inhibited PLC. There is a need to broaden the research on PLC to various self-contained special education schools, as well as inclusive schools.

Keywords: *professional learning community; special education.*

Introduction

In an attempt to address the call for greater interactive professionalism as a humanistic, ethical goal of contemporary schools operating in dynamic, high-accountability educational environments, the notion of the professional learning community (PLC) has come to the forefront of school change discourse (Roy & Hord, 2006). In contrast with the often prevailing pedagogical isolation experienced by autonomous teachers, particularly in secondary schools where roles and responsibilities are highly distributed, the PLC is defined by networks or webs of learning processes that transpire among its members (Andrews & Crowther, 2006; Mitchell & Sackney, 2006; Roy & Hord, 2006; Stoll, et al., 2006).

It has been argued that learning communities have powerful potential to develop teachers' professional growth, which consequently can lead to measurable improvements in student achievement (Andrews & Lewis, 2002; Mitchell & Sackney, 2006; Stoll, et al., 2006). Organic, open_organisational structures such as the PLC, in contrast to mechanistic ones, permit substantial formal and informal communication, interaction, and participation in decision making structure may be relatively more complex to create, once in place they offer greater adaptability and flexibility than mechanistic structures, especially in rapidly changing, unpredictable environments (Lunenburg, 2012).

Toward this goal, some researchers and school leaders have attempted to transform the traditional mechanistic framework of schools into a more collaborative PLC framework focusing on mutual knowledge exchange, where teachers learn together and coordinate their efforts in order to improve their students' learning (McLaughlin & Talbert, 2001). Unfortunately, the majority of teachers today continue to learn primarily from their own individual and isolated experiences rather than from – and with – their peers. Thus, teachers

tend to remain socially, emotionally, cognitively, and physically isolated in contemporary schools (Roy & Hord, 2006; Schechter, 2012). This clearly highlights the continued importance of further empirical scrutiny to determine how schools can move away from isolated types of teacher learning and thinking toward more collective ones.

In particular, learning communities regarding teaching/learning issues is a core organizational feature in special education schoolwork (Borko, 2004; Sachs, Levin, & Weiszkopf, 1992). In the field of special education, each school employs a diverse staff encompassing administrators, homeroom special education teachers, teaching aides, vocational teachers (e.g., carpentry), physical education teachers, arts and crafts teachers (e.g., music and drama therapists), dieticians, educational and clinical psychologists, educational counselors, social workers, nurses, physiotherapists, occupational therapists, speech therapists, and support staff (e.g., secretarial, custodial). Such a multidisciplinary faculty must work collaboratively and maintain continuous dialogue to assure optimal functioning for the child with disabilities over the course of the entire school day and progress over the long term. This need for cooperation requires an organizational structure that establishes learning networks for joint thinking and learning to enhance students' welfare (Tsai, 2001). Whereas a growing number of studies have been conducted focusing on how to promote learning communities among teachers in general public schools, interestingly, the notion of learning communities has not yet undergone deliberate empirical research within special education schools (Odom, Brantlinger, Gersten, & Horner, 2005).

The current study attempted to address this paucity of research literature by empirically investigating PLC within a special education school that serves a student population with autism spectrum disorder (ASD). Considering the complexity of this neurobiological disorder's symptomology, with its social, communication, and behavioral problems, multidisciplinary collaboration is vital to the special education staff members who serve the

ASD population, calling for systematic investigation of PLC within such settings. Specifically, the purpose of this study was to explore the *facilitators* and the *impediments* of PLC in a special education school for pupils with ASD.

Conceptual Framework

Professional Learning Community

Collaborative learning is imperative for survival and competitiveness in dynamic, complex, and uncertain environments. In today's information-rich society, no person can possess the wealth of skills and knowledge available. Put simply, the full range of existing information that is required to achieve even reasonably effective learning for all potential students is almost impossible for one individual to master (Gallucci, Van-Lare, Yoon, & Boatright, 2010).

From a socio-cultural perspective, the individual learning context cannot be separated from the group learning context because learning does not occur in isolation. Hence, it is appropriate to study individual learning within the context of a group, as well as to study group-level learning (Horn, 2007; Stein & Coburn, 2008). Learning, then, is socially constructed, dependent upon interactions, and socially mediated (Moll, 2001; Vygotsky, 1986).

Historically, the system of public education was constructed on the basis of what Richard Elmore called "*the ethic of atomized teaching:*" autonomous teachers who close the doors of their classrooms and teach what they wish and as they wish (Whitehurst, 2002). In other words, the teaching profession is a highly isolated profession in which teachers are expected to handle their own students and make any necessary adjustments to ensure that students in the classroom progress academically and socially (Dukes & Lamar-Dukes, 2007).

In response to this autonomous culture, for the last two decades, scholars have used the PLC term to describe desirable attributes of educational organizations that focus on teacher learning and school improvement (Fullan, 2001; McLaughlin & Talbert, 2001; Shulman &

Shulman, 2004). The notion of PLCs has been popularized as a viable response to external and internal pressure on teachers to improve student achievements (e.g., DuFour, Eaker, & DuFour, 2005; Van-Lare & Brazer, 2013) to the extent that PLCs lie at the center of contemporary school reform movements. Thus, the idea of teachers working collaboratively in teams has evolved from school-wide teams preoccupied with general operations to grade-level and subject-centered teams whose mission is to improve student achievement. In this manner, the notion of PLC has come to the forefront of school change discourse (Roy & Hord, 2006; Timperly et al., 2007).

Put differently, as traditional mechanistic models of school organization contrast with the advocated value of social exchange, researchers have argued for the reorganization of schools into professional webs of interactions (Louis, 2006), thereby reculturing schools into PLCs (DuFour et al., 2005). Similarly, Louis (2006) argued that schools' capacity for innovation and reform depends on their ability to collectively process, understand, and apply knowledge concerning teaching and learning. Therefore, to revise their existing knowledge and to keep pace with environmental changes, schools must establish structures, processes, and practices that facilitate the continuous collaborative learning of all their members (Silins & Mulford, 2002). Such collaborative learning, in turn, is expected to enhance professional development by helping break down teacher isolation barriers, altering teaching practices, and contributing to student learning (Hipp, et al., 2003; Mitchell & Sackney, 2006; Stoll, et al., 2006).

DuFour, et al. (2005) and Roy and Hord (2006) identified the following four core characteristics of a PLC. (1) Collective learning consists of reflective dialogue focusing on instruction and student learning, where teachers reflect on instructional practices and examine tacit assumptions about teaching and learning. (2) In deprivatization of practice, teachers provide feedback through networks of professional interactions and share knowledge beyond

their own classrooms, for example becoming mentors. (3) Peer collaboration is where teachers collaborate on school projects that focus on professional reform and improvement initiatives. Collaborative teams engage in action research and collective inquiry into the important questions of teaching and learning; thus, continuous improvement cycles are built into the routine practices of the school. (4) Shared leadership and facilitative-supportive actions are enacted on the part of the principal and the administration team. While all four of these core characteristics are interrelated and should be aligned to produce the capacity for a PLC, no single method can be applied to all schools wishing to create such a community (DuFour, DuFour, Eaker, & May, 2010).

It has been argued that learning communities have the potential to considerably develop teachers' professional growth, which consequently can lead to positive measurable improvements in students' achievements (Andrews & Lewis, 2002; Mitchell & Sackney, 2006; Stoll et al., 2006; Vesico, Ross, & Adams, 2008). In light of this potential contribution of a PLC, efforts have been made to change the mechanistic framework of schools into more collaborative PLC frameworks, where teachers learn together and coordinate their efforts toward improved student learning (Blank, 2013; McLaughlin & Talbert, 2001). Nevertheless, uncertainty remains among school leaders and researchers about the development and sustainability of PLC within school contexts (Craig, 2012; Friend & Cook, 2007; Louis, 2006; Wood, 2007). Thus, it is of the utmost importance to expand on empirical examination of this call for schools to move away from isolated learning towards a more collective type of thinking regarding teaching and learning issues.

Conditions Fostering and Inhibiting PLC

A variety of structures necessary to support learning communities has been identified by researchers (Curry, 2008; Wiggins & McTighe, 2006). Structures and resources facilitate the development and sustainability of the collective learning process where key descriptors like

time, scheduling, space, staffing, funding, and equipment/technology are seen as essential. Physical conditions may include time to collaborate, physical proximity of staff, size, roles and responsibilities, and communication. They may also include availability of resources, schedules and structures that reduce isolation, policies that foster collaboration and enhance effective communication, and intentional arrangements for collaborative decision-making.

Another key structure in learning-centered schools is the opportunity for professional exchange of ideas on the teaching and learning process (Clark, Moore, & Carlson, 2008; Dimmock, 2000). This process can be enhanced by physical proximity of classrooms to facilitate both formal and informal professional conversations. Organization of classrooms within a building by grade level or content areas can do much to facilitate interactions among teachers (Hord & Hirsh, 2008). In addition, comfortable work spaces can enhance the creativity process as well as provide necessary resources for collaboration and planning (Novak & Murray, 2009; Stoll, et al., 2006).

A particularly essential structure for PLC improvement is time for teachers to collaborate; likewise, time is one of the key challenges for schools when implementing the PLC process. Research suggests that it is far preferable to structure time allocations within the regular workday to allow staff to collaborate regularly (Rigelman & Rubin, 2012; Stoll et al., 2006). Put differently, time is perhaps the most salient issue in the context of productive collegial interactions (Collinson & Cook, 2007; Scribner, Hager, & Warne, 2002), but due to teachers' heavy workloads, these interactions generally turn into mere updating mechanisms. This occurs especially in the contemporary education system's age of accountability, where administrators face an often chaotic and turbulent environment both inside and outside schools, including external pressures for change and reform to meet high-stakes standards for teacher efficacy and student achievement or else receive sanctions (e.g., funding reductions, negative publicity), and while also facing internal disagreement within the school as to how

best to advance these objectives in order to receive accolades or even compensation (Davies, Ellison, & Bowring-Carr, 2005). In such a milieu, administrators tend to colonize the blocks of time that were allocated for collaborative learning and use them to advance their administrative agenda, instead of focusing on instructional practices (Giles & Hargreaves, 2006).

While time and space are readily acknowledged essential structures, it is also necessary to support the PLC process by providing adequate materials and human resources. In particular, structures that facilitate review and analysis of data are an integral aspect of the process. Ease of access to data reduces teachers' time in searching for data and increases their time in reviewing and analyzing data. A district's capacity to collect data and array it in an understandable format is an important consideration. When needed skills are not available within a school, external expertise can be requested from central office staff, teacher leaders in other districts or schools, community members, and educational consultants (Hord & Sommers, 2008; Stoll & Louis, 2007).

Hord and Sommers (2008) also stressed that communication structures are vital to a well-functioning collective learning. Effective communication helps to share decisions about curriculum, instruction, and overall teaching and learning (Little, 2003; McLaughlin & Talbert, 2006). In this line, ineffective communication can perpetuate practitioners' skepticism toward any kind of communal learning. The social arrangements wherein teachers share and create knowledge are fraught with competition for professional legitimacy and political power, often inhibiting authentic interactions. Because legitimacy is conferred by its stakeholders, rather than given automatically to individuals or a group, learning in the communal arena can induce fear and vulnerability in light of possible change in members' perceived professional legitimacy (Roy & Hord, 2006; Schechter, 2012).

To conclude, the special education context dealing with the ASD population is characterized by an inherently collaborative structure by virtue of the necessity for substantial cooperation between different professionals. Precisely for this reason, special education schools serving pupils with autism, with their unique characteristics and particularly pronounced needs for collaborative learning as a means of assisting in the advancement of each individual student, may shed light regarding the factors/determinants that may either facilitate or inhibit a productive learning community.

Methodology

Patton (2002) asserted that the case-study approach becomes particularly useful when attempting to understand a particular problem or unique situation in greater depth. Moreover, a case-study strategy serves as fertile ground for theoretical development, thus generating new thinking and ideas (Hodkinson & Hodkinson, 2001). Hence, in the current research endeavor, the case-study method was selected to explore the *facilitators* and the *impediments* of PLC in a special education school for pupils with ASD.

Sampling

The Friendship School (pseudonym) is a public secondary school in central Israel with 87 pupils of ages 12-21 years and almost 110 staff members. Children study according to their abilities and not their age. The school day starts at 7:30am and ends at 16:45pm daily, including summer vacation. The school employs a staff that includes homeroom special education teachers, paraprofessional teaching aides, paramedical professionals, administrators, support staff, and more.

The school is divided into 10 classes spanning three levels of ASD functioning: low, intermediate, and high. Three classes serve low-functioning pupils with ASD, with two homeroom teachers and two teaching aides per class, one teacher-aide team in the morning and one teacher-aide team in the afternoon. Similarly, three classes serve pupils functioning at

the intermediate level, with two teacher-aide teams per class. Finally, four classes serve high-functioning pupils with ASD, with two teacher-aide teams per class. All the teachers who work with students at the same functioning level share information and work together. Each level has its own physical learning environment; however, they all function in the same school complex. This unique multi-level school setting, with its three different levels of functioning that are considered as one school, provides an opportunity to explore practitioners' perceptions concerning their school's collective learning processes and structures as a function of joint and separate learning forums and as a function of pupils' disability severity.

The two learning forums that the current study investigated in depth were: (a) the educational class meetings that took place twice a month and (b) the pedagogical meetings that were held three times a year (every three months). These two learning groups were sampled because of their unique atmosphere of collective learning and their contribution to the collaboration between staff members.

Educational class meetings were held every 2-3 weeks for the four primary educational team members in each of the 10 classrooms, comprising the two homeroom teachers and the two teaching aides working in each class (the morning and the afternoon teams). Because the staff members only worked for part of each day, urgent daily information was passed from one staff member to the other through phone calls, the class's staff notebook, and updates throughout the day. The educational class meetings for all four primary team members in each class were essential to share more detailed information about the pupils and about any pedagogical or administrative changes. At these class meetings, every 2-3 weeks, all four class staff members met, learned together, and discussed different issues.

Pedagogical meetings were held three times annually, every three months, to provide an opportunity for each class's primary educational staff (the two homeroom teachers and two teaching aides) to meet with the other staff members including subject-matter teachers,

paramedical professionals, and so forth in order to gather and report general information concerning each student in the class. About one hour was dedicated to discussing each class. One last pedagogical meeting was held at the end of the school year with all of the school staff members. In this “*general assembly*,” the goal was to see the pupil or the whole class from different perspectives, focusing on various aspects of the whole curriculum, such as how they perform in sports, art, and music.

Data Collection

Data were gathered from interviews and observations to ensure the trustworthiness and soundness of the study (Guba & Lincoln, 1989). In order to maintain an ethical approach in this special education school serving students with ASD, approval was first obtained for human subject research from the Office of the Chief Scientist at the Israeli Ministry of Education. Next, the school principal was approached and agreed to fully participate. Each teacher participated voluntarily and received full retreat options. Participants were ensured that all information would remain anonymous.

Interviews

A wide range of educators and treatment professionals was interviewed (conducted individually) to elicit data from all the participants about their involvement in the process of PLC. In the final sample, semi-structured interviews were held over the two years of data collection, tapping 42 interviewees (33 females and 11 males) in the Friendship School, who were each interviewed twice (once in each of the two academic years), yielding a total of 84 interviews. These interviewees participated in both targeted learning forums, the educational class meetings and the pedagogical meetings. That is, interviewees included the crucial stakeholders in the special education setting, the homeroom class teachers and teaching aides forming each class’s primary team, who must continuously communicate with the other staff members working daily with their class and who also occasionally meet in a collective forum

together with the larger staff (e.g., paramedical professionals like occupational or speech therapists) with whom they need to collaborate in order to achieve the best results for their students. Moreover, the administration members who participated in the interviews comprised the principal as well as the vice principal. Thus, the sampling consisted of 20 homeroom special education teachers, 12 paraprofessional teaching aides, 8 vocational teachers, and 2 administrators (the principal and vice principal).

The semi-structured interview style was deemed best suited to the needs of this study because, as Merriam (2009, p. 90) pointed out, "*this format allows the researcher to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic.*" Indeed, this format left leeway to be flexible when the respondents carried the discussion to unanticipated areas. It also allowed the different staff members to answer in their own words, according to their own values and life philosophies, unhampered by rigid restrictions of a formal survey/questionnaire yet within the boundaries of the current research parameters. Finally, this format provided new areas to explore with later interviewees.

Based on Kvale and Brinkmann's (2009) types of interview questions, the current semi-structured interview questions on PLC included: introductory questions (e.g., What is the atmosphere in school?), follow-up questions (e.g., Do the group members accept other points of view?), probing questions (e.g., Can you give me an example of such a meeting?), specifying questions (e.g., What is the principal's role? What are other factors that inhibit or facilitate productive learning?), direct questions (e.g., Do you feel participants were open to discuss professional issues in the learning group?). Each interview lasted between 60-90 minutes. Interviews were transcribed as soon as possible after the actual interview took place.

Observations

Observations of PLC forums took place over a period of two years; 18 scheduled observations were conducted altogether. It was important to observe these activities and

meetings in order to confirm or question what had been heard at the interviews and also to expose other aspects of PLC that may not have been raised in the one-on-one interview setting. The researchers focused on the educational class meeting and pedagogical meeting forums where teachers and other staff members (administrators, teaching aides, etc.) met to discuss and make decisions about teaching and learning to be implemented in class. During these meetings, teachers reported the progress and/or difficulties they encountered. They discussed each child, made decisions, and followed up on implementation of previous decisions. At the end of each meeting, participants shared their thoughts about the benefits and impediments of their collaborative learning. At the Friendship School, the 45-minute educational class meetings (low, intermediate, and high functioning levels) were each observed twice, yielding 6 observations each year and 12 in total. Regarding the pedagogical meeting forum, 6 observations were conducted at the more general meetings that were held three times a year.

Data Analysis and Trustworthiness

Data collection and analysis occurred simultaneously as an ongoing process throughout both years of inquiry (Charmaz, 2006; Denzin & Lincoln, 1998). Specifically, the analysis was performed in two phases: 1. *vertical analysis*, where participants' voices were analyzed separately; and 2. *comparative horizontal analysis*, used to find common themes, contrast patterns, and shed light on the differences among various voices (Miles & Huberman, 1994). The horizontal process involved identifying recurring patterns, ideas, and perspectives in the data (Rossman & Rallis, 1998). In this way, generating themes was an inductive process, grounded in the various perspectives articulated by participants. Special attention was given to data that challenged the developed conceptualization, thus crystallizing the analytical themes.

At different intervals along the data collection process, the researchers re-read all interview transcripts and observation field notes collected up till that point, in an attempt to obtain a broad picture of the data and to extract major themes. At the end of the data collection period, with those themes in mind, the researchers then revisited the 300 pages of interviews, extracting some 50 pages of quotes most relevant to the themes at hand. Next, a pattern clarification process was undertaken to identify repetitions of the themes within the data gathered from the interviews and observations. In order to ensure the internal validity of the data analysis, theme generation was conducted independently by the two researchers (Cohen, et al., 2000). Analytical themes generated by each researcher were compared. Whenever there was a difference in categorization, it was discussed in order to reach agreement.

The utilization of two methods for gathering data in this study – by means of interviews and observations – provided triangulation for this qualitative research (Guba & Lincoln, 1989). Furthermore, member checking (Baxter & Jack, 2008) with all interview participants ($n = 42$) was conducted in order to reevaluate the data. In other words, the tentative findings were given back to interviewees to ask for their feedback and evaluation of the collected data. Finally, Merriam (2009) described the importance of an audit trail, a transparent description of the empirical steps taken from the inception of a research project, through its development, and up until reporting of the findings. Thus, the researchers maintained a detailed log of: how the data were gathered in the data collection stage; how categories were derived in the data analysis stage; and how decisions were made at all stages.

Results

Barriers to PLC in the Friendship (Secondary) School

When the interviewees were asked about what should be done differently, they said that although professional learning is constantly ongoing, the process requires additional

allocations of time, locations, and tools for collaboration. For example, one of the veteran homeroom teachers in school said: “*One of the problems is time, and part of it is that you have to work on it [collaboration]. It doesn’t come naturally. I try to do my best to bring people together; but this is not an ideal situation.*” Similarly, a teacher of a class with an intermediate level of functioning described: “*If I turn to somebody for help, everybody is ready to help, but there is not an organized place to do it and no directions for how to turn for help.*” In addition, another teacher from an intermediate-level class mentioned a lack of focus: *Sometimes the discussion becomes very noisy and moves to personal issues, rather than openly discussing professional issues.*”

Although the principal described her vision for the school’s future as one that “*develops skills of self-learning connected to the whole organization... at a very high level,*” she admitted that at the present time the school had not yet reached this holistic level of applying knowledge and skills learned via the PLC forums: “*I don’t know if we are there yet. It means being involved in whatever you have learned. Perhaps in the structural organization we haven’t used all the opportunities.*” The principal cited limited personal resources as a barrier to fully implementing collaborative learning in the organization: “*This is the most difficult part on the job. There is discussion but there is a lack of psychological/emotional resources to share the things you learned.*”

Perhaps related to the limited mental resources among staff members in order to apply what one learned in the collective learning forums, a veteran teaching aide who had eventually gone back to school and become a licensed teacher of a high-functioning class pointed out the heavy everyday burden lying on the staff members’ shoulders, which led participants to merely seek to survive the school day:

One of the biggest problems in our school is that it doesn’t have a goal. The main goal is survival: of the teachers, of the pupils. Anything beyond survival is considered a bonus.

There is no vision for the long run and no cognitive pluralism. It is hard to say what you think in our staff discussions.

This sense of being criticized and alone during staff discussions was echoed by a teaching aide who worked with low-functioning students: “*The atmosphere is of anarchy and, as such, some are winning and some are losing.*” Thus, these staff members pinpointed the principal’s lack of clear vision and shortcomings in her leadership skills as a barrier to PLC. A teacher from the high-functioning level related specifically to the organization structure as a barrier to collaborative learning: “*One of the biggest disadvantages is that there is no hierarchy, there is not an ordered process of learning and decision making.... It seems that there is more of a trial and error work style.*”

In one of the observations conducted on the second pedagogical meeting with a class of lower-functioning students, one of the physical education teachers said: *Maybe the goals are unsuitable, there are too many issues to deal with... incorrect division of resources, or only intuitive work without any rational planning.*” Thus, it appears that barriers were perceived by stakeholders working with pupils across all three levels of functioning, and different staff members pointed out the same problem of insufficient hierarchy in the school to scaffold the channels of communication and decision making.

A number of key staff members identified criticism of other professional sectors or of the collective learning process itself as barriers to PLC in the Friendship School. For example, a novice homeroom teacher expressed a wish for increased collaborative learning but cited mutual attitudes between members of different professional sectors as a possible barrier:

I would like to see more collaboration between the homeroom teachers and the subject-matter teachers. This issue has been mounting for many years. Each sector feels that the other one doesn't do enough or doesn't value the subject matter of the others.

The vice principal, who started as a teacher 15 years earlier, emphasized some individuals' negative, depreciating attitudes toward PLC and novice staff members' anxiety about the process of sharing in collective groups:

Some people view the collaboration as a burden or a waste of energy....and for new teachers it is even more difficult. They don't know what to share with others, what will be considered a good question, and what will influence their acceptance in the school.

A veteran teaching aide who had worked in all levels of functioning broadened this issue, stating that "*lack of communication in the first place, hostility among members, and lack of motivation for learning*" can be detrimental to professional learning among staff members. A teaching aide in a low-functioning class elaborated on these prevalent attitudes and her chagrin when encountering them:

Many subject-matter teachers don't accept others' opinions. I don't understand that because we work together; I am there in order to help. And on the other hand, sometimes they give me the feeling of "Don't interfere, sit aside" and that "The teacher knows best." Among the teaching aides, there is a feeling of low motivation, which wasn't there in the past, a feeling that you are not really appreciated. They [the administrators] say thank you but they don't really mean it, so you learn that you shouldn't volunteer to say what you think aloud.

From this teaching aide's point of view, learning groups were not a forum where she felt that teaching aides' abilities and contributions were taken into consideration by the administration team. In addition, the principal added: "*What delays learning is lack of openness, lack of the ability to learn from colleagues, lack of flexibility, irrelevant contents, and objections to others' viewpoints.*" The pedagogical coordinator added several other "*obstacles to the learning process... lack of flexibility, lack of willingness to accept others' points of view, and the continuity of the process.*"

A chief barrier to genuine learning and benefit from collaborative learning, which was highlighted by many staff members, was a judgmental climate in the group. One of the homeroom class teachers who worked with intermediate-level students described "*a climate that doesn't allow you the possibility of expressing yourself, that doesn't encourage exposure that hides class work.*" She linked such a climate, where it felt unsafe to share and expose problems, to the "*lack of professional learning as a goal of the school's vision.*" Her colleague from the same class said:

Some teachers think that exposure [in the group] will affect their relationships with their colleagues. Other people won't take part in the learning process because they aren't willing to be criticized, or they feel threatened, a feeling that exposure will damage their future.

This teacher went on to suggest that staff members must find a common language in order to express their innovative ideas but at the same time to be ready to be criticized and not to be afraid of it. In trying to consider the negative consequences of such reticence and possible factors leading to anxieties about exposure, a teacher with 7 years of experience suggested that pressure to share is unhelpful:

If people are not ready to share, it delays the process. By sharing, we learn one from the other; it's not just a one-way process, it's a mutual process of learning.... Pressure also delays learning processes; you can't force a person to share.

Another impediment to sharing was voiced by one of the novice teachers, who had just entered the school: "*The more you are professionally lonely, the less you enter organizational learning processes.*" This novice teacher explained the problematic situation of teachers' isolation at the beginning of their career and identified collaborative group participation as an important step that he himself should take in order to feel he was an integral part of school life.

A homeroom teacher of a high-functioning class aptly summed up a number of the barriers highlighted by the data analysis, including the difficulty in sharing in a group with a judgmental or critical climate, and the problems arising when no clear goal guides discussion:

If someone has a very different approach, he/she won't find his/her place in the school's community. He/she can say things, we are a democracy, but I doubt the implication of these ideas.... If there isn't good communication or a clear goal, no openness, you can't express your thoughts.

Facilitators of PLC in the Friendship (Secondary) School

As seen in the previous section, although the PLC process faces many obstacles in its implementation, which are not easy to overcome, the aim of the school members is to find a way to make the best of their collaborative learning in order to use it effectively for the benefit of both staff members and pupils. To develop and maintain the professional learning, there is a continuous need to promote, guide, and follow the whole process from the beginning and throughout its trajectory of growth. In this regard, the vice principal identified some important facilitators of PLC in the Friendship School:

I have the feeling that the learning groups develop through an ongoing process. We are always checking our tools and approaches, which are continuously changing and updating.

I think this is encouraging and keeps up high motivation at work. When school enables learning, different staff members feel important and they can build relations. Sometimes it's Sisypic work, especially with autism. For example, the teachers' room is supposed to be a place for just relaxation, but even there you can get some sense of the organizational learning processes that are going on and you can feel the positive atmosphere and learn about the different links between staff members.

The vice principal continued and pointed out that as soon as staff members face a problem, they need to find a solution, which is one of the best catalysts for seeking

collaborative learning opportunities and for becoming innovative. She also cited the importance of ongoing opportunities, whether formal or informal, for staff members to consult with one another and strengthen their collaborative ties.

The principal expressed a similar point of view concerning the important facilitative role of problems in the learning process:

Where we see a difficulty, that is where there will be the most effective learning. When everything is calm and “regular,” the staff won’t be open to change. Only where there is a conflict, a problem, something that should be changed, can we discuss things, look for alternatives, and learn more effectively. In my opinion, objections are what promotes learning the most.

As mentioned above regarding a positive atmosphere, the art subject-matter teacher accentuated the significance of positive feedback as playing a facilitative role:

It’s important that you work with staff who you enjoy being with, who discuss everything openly, and that the work is equally divided. You get positive feedback from the staff and the children, which is very essential with our population especially.

Rather than focusing on the interpersonal dimension, one of the teaching aides, with 3 years of experience working with low-functioning students, highlighted the intrapersonal dimension, describing the characteristics of staff members like motivation and flexibility as crucial facilitators of PLC:

The most important thing is workers’ will and their readiness to learn, to develop and to see situations differently, in other directions. All of these influence their being part of a learning group, their motivation to learn new things, to change their way of working, and eventually – their outcome at work.

Nevertheless, a novice teacher from an intermediate-level class addressed both interpersonal and the intra-personal catalysts:

First of all, we should have a common goal. We need a good atmosphere for learning, not only one of fun. If we share and we learn from our successes, there will be greater motivation to meet again and do something together.

Similarly, the inclusion coordinator described links between the readiness to share and communicate and more meaningful learning:

It depends on the group's willingness to share a conflict. In order to overcome it, there is a need for fluent communication. The higher the group's ability and openness to sharing conflicts, the more meaningful the learning process is. If the group or sector has a problem broaching difficulties, then the learning remains more superficial.

Approaching the issue of conflict and communication in the group from a different perspective, a novice teacher of a high-functioning class claimed: "*Only opposition promotes learning.... By strengthening communication, we can see the importance of dialogue and of fluent communication. That's the way you can overcome difficulties.*"

A teacher with 10 years of experience from the low level of functioning also referred to the role of the type of group:

The levels of openness depend on the personal attitude. Some will feel free to reveal their thoughts and difficulties in the pedagogical meetings, where they feel among their peers, while others will feel free to discuss these problems in larger groups/forums.

Mutual support from staff members holding different positions, who can see the pupils' and the system's needs from diverging viewpoints and help with problem solving, is another PLC facilitator, which was described as promoting learning in the class environment in particular and in the school in general. For example, the yoga teacher related: "*The subject-matter teacher gives his/her opinion or point of view, which strengthens the homeroom teachers who work with the pupils, and this collaboration adds a lot to the learning.*" In addition, a teacher who serves in the school administrative team emphasized the value of

group participants' confidence that their problems would indeed find solutions via the group work:

At the school level we talk about the fact that we need to bring things to an end. If problems arise, we solve them, we don't leave anything unsolved. This atmosphere in the school promotes learning. If there's a good and open environment, people will talk and share their problems. I can really see this in the pedagogical meetings. If people know that they get the correct feedback or solution to their problems, they will talk about their issues. It requires a high level of professionalism.

The principal clarified this expectation of receiving assistance in problem solving, along with some constructive criticism:

I think that when staff members receive external guidance it gives them objective feedback, from which they may learn about their stage of learning. Sometimes this feedback has to be sharper; without trying to avoid criticism, and then it can lead to a better dialogue.

Furthermore, the school counselor expressed the opinion that “*objective feedback is critical in organizational learning.*” She claimed that “*there has to be a stage of raising problems, openness, taking responsibility, and sharing your point of view.*”

The pedagogical coordinator summarized several important PLC facilitators, including the need for a clear goal, the members' intrapersonal characteristics like motivation, the organizational resources allotted to these collective activities, and the entire culture of the PLC framework:

The goal of the learning group promotes the process. The relation, the commitment of the members, division of the resources and roles, the movement between the talking about the process, and doing it in practice, enhances the motivation and the feeling of belonging. Good professionalism and culture of feedback to an individual or to an entire group, encourages a lot.

Discussion

This study was the first attempt to address the gap in the literature on the topic of PLC in special education. The following discussion focuses on three conclusions, which may contribute to the field of PLC in special education. The current findings support the existence of and the capacity for systematic professional learning through institutionalized structures and procedures in the Friendship special education school. These included monthly faculty meetings, sectorial meetings according to professional areas, meetings of those working in a joint space, and many more. Such structures and procedures sustain the PLC in schools and may contribute to students' performance (Lomas, Hofman, & Bosker, 2011; Mitchell & Sackney, 2006; Stoll et al., 2006). The professional learning forums enable Friendship to determine where and when to conduct their collective learning, dialogue, and action. Valuable information can be captured, shared, interpreted, and retrieved in school's PLCs.

The Friendship secondary school has developed its own professional learning structures aimed at promoting rich and varied interactions among staff members. In this secondary school, diverse learning groups focus on professional learning and development, such as the pedagogical meetings, which enable all members of the school's educational-paramedical staff to learn from one another and discuss important issues for the benefit of the pupils. As argued by Ferguson (1996), professional development should be ongoing and dynamic in order to allow educators to diversify their skills and thus build up the synergy needed for effective collaboration (see also Bryk, 2015).

Furthermore, another important factor in promoting PLC consists of facilitating interactions among staff members (Edwards, 2012). Allocating the suitable time and space for creating PLCs and conducting discussions at all levels (i.e., class level, sectorial level, school level) is essential for the development of the learning process and, in particular, is a crucial

facilitator of openness and disclosure within the meetings. Therefore, in its structure, the school schedule should embed time for learning forums and places where staff members can conduct them and advocate their cooperation. Such cooperation allows teachers and other members in the learning groups to communicate openly and find solutions to issues raised in the meeting. Thus, these temporal and physical structures and opportunities, when built into the everyday schedule and into the physical plant of the school, were pinpointed by the study participants as leading to a sense of ownership and accountability regarding the collective learning process (e.g., Lee, Zhang, & Yin, 2011).

However, the same factors may have a negative effect on the learning process when not used appropriately. If time and space are not allocated before the beginning of the process, they may be seen as obstacles to the PLC (Stoll & Louis, 2007). Teachers in special education schools are under tremendous pressure in their daily work. Hence, adding another task during the school day (e.g., learning meetings during or at the end of the school day), for which no specific time and place were allocated in advance, may impose a burden on the staff and thus become counterproductive (Schechter & Feldman, 2013). By integrating the professional learning process within the context of existing structures, special education schools can avoid creating extra work (Burnette, 2002) and thus promote the PLC at different levels.

As evidenced by the current study, the principal's role is highly significant for the learning process. Thus, the principal and his/her administrative team are key elements in the process of professional learning. They allocate time and space for the collaborative dialogue that enables the PLC to operate and to develop the professional learning process. One of the most important roles of school principals in special education is planning the professional learning process from a holistic perspective (Darling-Hammond et al., 2009). This means that planning should encompass all learning groups, from the smallest (i.e., class meetings, sectorial meetings, administrative meetings) to the largest learning group (i.e., pedagogical

meetings). The principal in this study strongly influenced the learning process. Although she does not actively participate in all learning groups, she is informed by senior position holders about the planning, development, and outcomes of the various groups, and if necessary she becomes an active participant (Hipp, et al., 2008). Thus, the principal strives to allocate time and space for various types of collaboration and dialogue among teachers, paramedical professionals, teaching aides, and so forth but does not appear as prominently in all the diverse forums.

Moreover, the Friendship principal takes into consideration the horizontal and vertical teaming as regards the learning process. Horizontal teaming refers to meetings between staff members of the same position (e.g., sectorial meetings, homeroom teachers' meetings), where the participants learn about issues that are relevant to them. In most cases, the principal is present at these meetings and intervenes whenever she deems it appropriate. In class meetings, however, the principal is not present but the decisions are reported to her. Each micro-school team (e.g., all first grade staff, all staff working with high-functioning children) has lunch, recess, etc. together, which allows for vertical teaming and collaboration between teachers of different levels. The principal's role in such matters is to allow time and space for staff members to develop collaboration among them.

Implications

This study addressed the conceptual framework of PLC as learning structures and procedures at the organizational level. The current study stemmed from the disparity between, on the one hand, the fact that the notion of PLC has been raised to the forefront of school change discourse, but, on the other hand, the only limited available reports about its conceptualization and evaluation in the realm of special education. This study is of particular importance because it comprises a first attempt to focus not only on the exploration of PLCs in the special education realm but also on a specific disability (ASD). Considering the vital

role of interpersonal interaction in the PLC framework, such explicit study of ASD setting aimed to clarify how PLC processes and structures may differ because the underlying relationships in a special education school differ from those in a regular school. Put differently, in light of the special education system's unique goals, structure, and pedagogy, which require ongoing cooperation between different professionals (e.g., psychologists, teachers, teaching aides, paramedical professionals, administrators), PLC can capture the dynamic learning processes among and within faculty (Wiseman, Arroyo, & Richter, 2012).

School administrators should strive to allocate time and space for staff members within different sectors to share thoughts, deliberate, collaborate, and learn together. Furthermore, enabling teachers to collectively discuss ways to improve teaching and learning requires a shift in the principal's role. In light of the deep-rooted fragmentation in schools' structure, principals need to orchestrate the time and space for PLCs, and to create as well as sustain networks of professional learning forums for all staff members. As argued by O'Brien et al. (2006), principals are key players in both introducing learning forums into the school structure and promoting a learning culture necessary for productive collaborative learning. In other words, principals need to invest in the professional learning process of their teachers and to establish structural learning communities based on a more conducive learning culture.

In light of the dynamic environment in special education, the PLC perspective may be of major importance for assessing, developing, and sustaining collaborative learning in special education schools. The special education structure is built in such a way (morning team and afternoon team, each of which comprises two teachers and two teaching aides) that continuous collaboration and communication between the various team members is essential and inevitable. In this regard, all staff members of the school can work together in planning, developing and implementing a professional learning program (O'Brian, et al., 2006).

Generalizing from the case study examined in the current research is quite problematic, and the findings of this research warrant further systematic investigation. It is important to apply the PLC framework to inquiry into specific disabilities and at different school levels (elementary, secondary). Do different target populations in special education require a different structure of PLC? Is the process deductive (led by the school principal and the administrative team) or is it inductive (suggested by the staff members)? What are the organizational structures that promote collaborative learning (e.g., educational class meetings)? What is the necessary learning culture to promote productive learning? Do school practices and changes occur because of participation in these learning structures and processes? Hence, future research should scrutinize the effects of extensive collaborative learning on various outcomes, for example on teachers' level of commitment to school and their perceived collective efficacy, which were already linked with student achievements in regular education schools (Schechter, 2008). Does collaborative learning mean to be a form of deep reflective professional growth (double-loop learning) or are these learning processes simply in place to transmit low-level understandings (single-loop learning) of how we do things around here? What is the role of learning communities during change periods in special education schools (e.g., staff turnover, increase/decrease in the number of students/teachers)? Similarly, it would be interesting to study under what conditions special education schools would increase or decrease their extent of collaborative learning. For example, does perceived environmental uncertainty impact the extent of collaborative learning processes in special education schools?

Besides the need to investigate PLCs further in various self-contained special education schools, there have been attempts at examining this process in inclusive schools. Such schools integrate disabled children within regular classes in various permutations. In these schools, there is much interaction between special education teachers and regular homeroom teachers.

It is, therefore, important to continue investigating the PLCs in inclusive schools too, as implementing this process may help develop new relationships among staff members.

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Dr. Niv Feldman, A teacher of special education students. Dedicated his life to love, care, and promote special education children. He passed away in 2015.

Meta-cognitive Strategies in Problem Solving for Children with Learning Difficulties in Mathematics at the Primary Level

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Abstract

Many International Organizations have pledged for education for all children irrespective of gender, race, social background, disabilities or any such factor. Mauritius has joined the international move and has taken a number of initiatives to facilitate education for all children, including those with special needs. It has been found that our mainstream classes at the primary level do include children with learning difficulties in mathematics. Taking into consideration the importance of mathematics in the school curriculum and opportunities that it offers for further education and job opportunities in Mauritius, it is imperative to develop ways and means to help these children in their learning of mathematics. A strategy training program comprising of cognitive and meta-cognitive elements to solve word problems in mathematics has been designed and a sample of Standard IV pupils have been trained with this program. Data obtained from pretest and post-test and observations conducted through the training sessions have shown that this strategy training has been effective in helping children with learning difficulties in mathematics in problem solving. It has also helped these children to develop a positive attitude towards mathematics and have successful experiences with mathematics. These children need to be given opportunities and guidance to overcome the barriers to education and teachers need to have positive expectations from these children and provide all the necessary support to help them.

Introduction

The education for all children has been the concern of many nations for quite some time. All children are not the same; some learn fast, some slow, some need manipulatives while others prefer other modes. Some have difficulties in reading, some in mathematics while others in other subjects. Our normal system of education places children with learning difficulties at a disadvantaged position as compared to those who can cope with the system. This result in them lagging behind and ultimately dropping out of the system. Much needs to cater for the needs of these children and support them in their learning. Some children have difficulties because of impairments or deprivation but they too need to be given the opportunity to succeed in life through appropriate education. Teachers need to find ways and means where these deficiencies could be dealt with to ensure that these children too have the opportunity to develop their full potential. The right to education for every individual can be argued to be of prime importance and can be traced down to Universal Declaration of Human Rights (1948), World Conference on Education (1990), Convention on the Rights of Child (1989) etc. Race, gender, economic status cannot act as a barrier to education and more so a disability that a child has. Each and every education system needs to ensure that equal opportunities are given to children with disabilities for their education. We refer here to the United Nations Standard Rules on the Equalization of Opportunities of Persons with Disabilities (1993). The commitment to Education for All was further reaffirmed in World Conference on Special Needs Education (1994) in Salamanca, Spain. Mauritius, as many other countries in the world, has adopted policies aiming to promote the rights of children and, especially, children with disabilities to full and equal participation in society. It has ratified the Convention on the Rights of the Child in 1990.

The provisions and principles of The Convention on the Rights of the Child advocate for the protection of children rights and to help them meet their basic needs and expand their opportunities to reach their full potential.

Concern for children with special needs in Mauritius can be traced back to 1978 in the Report of the Commission of Enquiry in post-primary and secondary sectors of Education: The Road

Ahead (Special Education Needs and inclusive education in Mauritius: The policy and strategy document, 2006). Several reports which followed have consistently emphasized the need and concern for the education of children with special needs. Several legislations have been passed in Mauritius to help children with special needs in their education and their integration in the society. These include Child Protection Act (1994), Training and Employment of Disabled Persons Act (1996), Ombuds person for Children Act (2003), Education Act (Amended 2004). A number of Units have been created to help these children and these include The Association de Parents d'Enfants Inadaptés de L'île Maurice (1970), The Centre d'Education et de Développement des Enfants Mauriciens (1972), The Bethleem Diocése Crèche (1979), The Centre d'Education et Développement des Enfants Mauriciens (1984), the Child Development Unit (1995), the Ombudsperson for Children's Office (2003), the Observatory for the Rights of the Child, the National Children's Council. Several facilities are also provided to help children with special needs which include financial support and provision of equipments like wheel chair, hearing aids and white canes. It should be noted that education is free from the pre-preprimary, primary, secondary and tertiary levels in Mauritius (except for the private institutions). Furthermore, transport is free for all students. Buildings are being retrofitted to facilitate access to people with disabilities and special parking zones reserved for these people.

Based on my 22 years experience as a teacher trainer with different groups of primary teachers (both pre-service and in-service) and through interactions with them, I found that there are students who experience difficulties in learning mathematics at that level. The percentage of passes at the Certificate of Primary Examination (CPE) level for the past 12 years is shown in Table 1.

Table 1: Percentage of passes in the CPE examinations

Year	2004 5	200 7	2006 8	200 0	2009 2	201 3	2011 201 3	2014 72.9	2015 74.2
% passes	63.4	65.3	68.5	66.2	67.4	68.1	68.5	68.6	68.8

It can be found that around 30% of the children taking part at the end of the primary examinations do not succeed. This trend has been so for many years and this is a matter of great concern for all stakeholders in Mauritius. Many steps have been taken ranging from introduction of different projects (for example, Enhancement Program, Summer School) to the development of a National Curriculum Framework and reviewing of all curriculum materials at Primary level.

The percentage of passes in mathematics at the CPE level for the past 12 years is shown in Table 2 below.

Table 2: Percentage of passes in mathematics in the CPE examinations

Year	2004 5	200 7	2006 8	2009 0	2011 2	2014 3	2015
% passes	73.9	73.1	73.6	72.6	75.8	77.1	76.2

An analysis of the data shows that around 20-25% of the students taking part in the primary mathematics examination fail during the past twelve years. However, around 53% of the students score a maximum of grade C in mathematics at that level (Hurchand, Ramful, Bholoa & Nenduradu, 2012). This shows that a significant percentage of students do have difficulties in mathematics right from the primary level. An analysis of the CPE reports shows that a significant number of students at primary level have not acquired conceptual understanding of different mathematical concepts. A study needs to be carried out to identify what difficulties students at primary level experience in mathematics and identify ways of helping them to overcome these difficulties.

Literature review

Learning mathematics with understanding has been the subject of many studies (Treagust, Duit, & Fraser, 1996; Fennema & Romberg, 1999; Jaworski, 2003; Stylianides & Stylianides, 2007). Studies conducted to identify ways and means to help children make sense of mathematics have made several recommendations “*Teach to the developmental characteristics of students, actively involve students, move learning from concrete to abstract and use communication to encourage*

understanding” Reys, Lindquist, Lambdin, & Smith, 2009, pp. 25-29). It has been argued that “*failure to learn basic mathematical skills can contribute heavily to later learning problems in mathematics. This is due to the systematic, hierarchical nature of mathematics, with higher level skills being dependent on the student’s mastery and attainment of proficiency with basic facts*” (Braten & Thronsten, 1998, p. 152). The inability of students with learning difficulties in mathematics to develop and/or use appropriate strategies has also been highlighted by Braten & Thronsten, (1998).

Research (Geary, 2004, cited in Hannell, 2005) has shown that 5-8 % of pupils in a class have dyscalculia. It has also been argued that many pupils with dyscalculia have significant difficulties with the language of mathematics. In fact (Garnett, 1998, cited in Hannell, 2005, p. 6) stipulated that “*Pupils with mathematical difficulties often cannot, or do not, use their own internal language to manage the mathematical tasks they are attempting*”. Moreover, it has been found that pupils with dyscalculia frequently have memory deficits. The deficits may be in working memory, short-term memory or long-term memory. Geary, 2004, cited in Hannell, 2005, p. 11) argued that “*Many children with MLD (mathematics learning disabilities) have difficulties in retrieving basic arithmetic facts from long-term memory; a deficit that often does not improve*”. Several characteristics have been identified (Henderson, Cane & Bough, 2003; Hannell, 2005) regarding pupils with dyscalculia. They are slow as compared to others in the class. They tend to rely on tangible counting supports such as fingers or tally marks. They refrain from asking questions or participating in discussions. They have difficulties in remembering basic mathematical facts. They tend to rely on imitation and rote learning instead of understanding. They can ‘do’ sums mechanically but cannot explain the process.

They have difficulties in understanding the language of mathematics and experience difficulties transferring from the concrete to abstract thinking. They also have difficulties making connections between the pictorial representations for a numerical value.

Several studies have provided support for schema based word problem solving instruction that emphasizes conceptual understanding (Jitendra & DiPipi, 2002, 2003). Other studies advocated the use of meta-cognitive strategies to help children with learning difficulties. In fact they (Kirk et al. 2006, cited in Woolfolk, Hughes & Walkup, 2008, p. 320) noted that “*For learners with*

learning difficulties, executive control processes (that is, meta-cognitive strategies) such as planning, organizing, monitoring progress and making adaptations are essentially important, but often underdeveloped". Research (Ozsoy & Ataman, 2009) has shown that instruction of meta-cognitive strategy has resulted in an increase of problem solving skills of students at primary level. Meta-cognition involves three kinds of knowledge: (1) declarative knowledge: knowing *what* to do, (2) procedural knowledge: knowing *how* to use the strategies, and (3) conditional knowledge: knowing *when* and *why* to apply the procedures and strategies (Bruning et al. 2004, cited in Eggen & Kauchak, 2010). Meta-cognition is the strategic application of this declarative, procedural and conditional knowledge to accomplish goals and solve problems (Schunk, 2004, cited in Eggen & Kauchak, 2010).

Methodology

A case-study approach was adopted for the study. It combines both a quantitative and a qualitative approach. Three primary schools were chosen based on their performance in the CPE examinations. After a few visits to the school to explain the purpose of the study, the Headmaster of each of the three schools was requested to identify one Standard Four class in the school. The classroom teacher of each of the classes was then explained the purpose of the study and was briefed about the training program.

. The marks of the students in each class in their Standard Three examinations were collected from the school management. These were analyzed and the mean and standard deviation of the marks for each class was calculated. The students who scored below one standard deviation from the mean for each class were considered as those having learning difficulties in their learning and were included in the sample. Once the list of students was prepared, it was shown to the classroom teacher who confirmed that these students were indeed encountering problems in the learning of mathematics. There was one classroom teacher who suggested two more names to be added to the sample as they also were lagging behind in their studies. I did not consider them as they were not satisfying the selection criteria of having scored below one standard deviation from the mean. Consequently there were 16 children in all in the whole sample.

The pre-test and the post-test

A questionnaire was designed based on concepts of mathematics up to Standard III and was used as a pre-test. The questionnaire was designed to include basic concepts in mathematics at that level together with word problems that a learner at that level is supposed to deal with. The purpose was to find out to what extent the children have mastered these concepts and what types of mistakes the children commit. It should be noted that the pre-test was administered to all the children in each of the three Standard Four classes. The questionnaire consisted of 12 questions as follows:

Table 3.a Questions

<i>Question</i>	<i>Underlying mathematical Concept</i>
1	Interpretation of a picture abacus
2	Writing number in words
3	Addition <ul style="list-style-type: none"> - Without carrying - With carrying
4	Subtraction <ul style="list-style-type: none"> - Without borrowing - With borrowing
5	Word problem on addition of numbers
6	Word problem on subtraction of volumes
7	Word problem on addition of masses
8	Word problem on multiplication related to volumes
9	Word problem on subtraction related to length
10	Word problem on division of numbers
11	Word problem on subtraction related to money
12	Word problem related to charts

The framework mentioned in Ansell & Pagliaro (2006) was used in designing the word problems. A post-test similar to the pre-test was also designed. Once the pre-test was administered in each of the three Standard Four classes, training sessions were conducted in each school to empower them with strategies for solving a word problem. A strategy called The Make My Maths Easy (M³E) Strategy was developed to solve mathematical problems which combine both cognitive and meta-cognitive elements based on the one proposed by Montague (1992) (cited in Wright, 2011)

Table 3.b Cognitive strategy and meta-cognitive prompts

<i>Cognitive strategy</i>	<i>Meta-cognitive Sample Prompts</i>
1. Read the problem The student needs to read the problem and study it carefully. S/he can use the following prompts to check whether this is properly done	Say: "I will read the problem. I will reread the problem if I don't understand" Ask: "Have I read it thoroughly?" Have I highlighted the key words?" Check: "I have highlighted the key words and will move forward".
2. Understand the problem The student needs to understand the problem fully: what have been given, what has been asked?	Say: "I need to understand the problem" Ask: "Do I fully understand it?" Check: "Now that I understand the problem, I move forward"
3. Say the problem in your words The student needs to restate the problem in your own words.	Say: "I will restate the problem in my own words" Ask: "Have I used all the highlighted key words while restating the problem in my own words?" Check: "I have re-stated the problem in my own words that will help me solve it"
4. Plan a solution The student needs to plan to solve the problem	Say: "I will make a plan to solve the problem" Ask: "What is the first step of this plan? What is the next step?" Check: "I have designed a plan with the right steps to solve the problem"
5. Execute the plan The student needs to follow the plan to find the solution to the problem.	Say: "I will complete the answer the problem" Ask: "Does my answer sound right?" Check: "I carried out all the steps of the plan in the correct order"
6. Check the answer	Say: "I will check all the steps of my answer"

The student needs to review the computation steps to verify the answer. S/he needs also to assess whether the answer is logically acceptable.	Ask: “ Did I go through each step in my answer and checked the work?” Check: “ I am satisfied with my answer”
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The students were trained in how to use this strategy in 13 sessions (each of 30 minutes) in the three schools.

The post-test was then administered to the students in the sample following the training sessions. Data obtained from the pre-test and post-test were analyzed using appropriated statistics and these will be discussed at a later stage. Two students together with their parents were interviewed to probe further on the effectiveness of the strategy training program.

Findings

The table below shows the total score of each of the 16 children n the sample in the pre-test and the post-test.

Table 4. Total score of the students in the sample in both pre-test and post-test

Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pre-test	12	2	12	7	6	7	8	3	1	11	1	7	6	10	7	2
Post-test	11	13	18	7	7	20	9	12	3	12	2	9	14	14	21	10

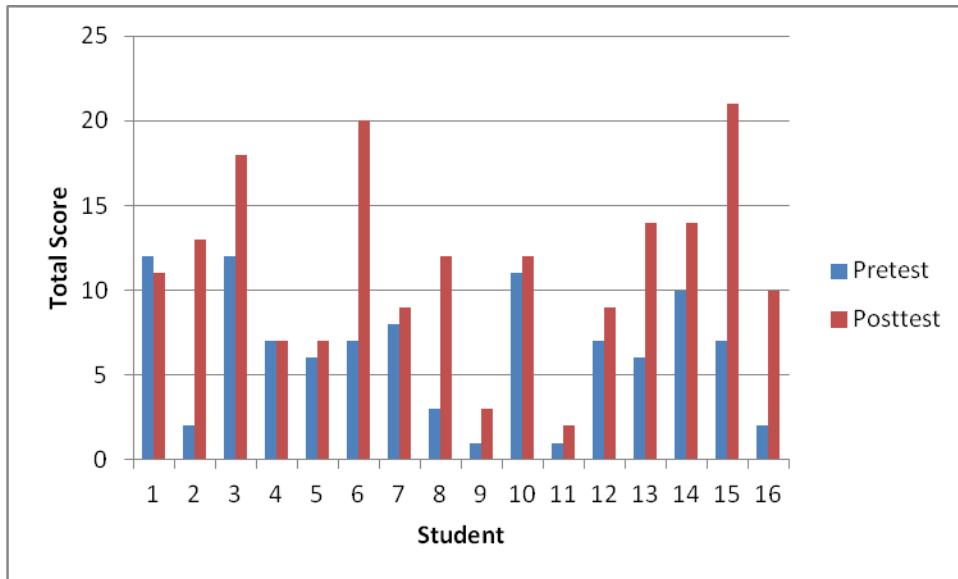


Fig. 1: Bar Chart for the total scores in pre-test and post-test

It was found that the students have performed better in the post-test as compared to the pre-test. To perform statistical analysis, a test of normality (Shapiro-Wilk test) was carried out for the scores of pre-test and post-test and both were found to be normal (p-value of 0.162447 and 0.82166 for pre-test and post-test respectively, both > 0.05). Thus, paired t-test was found to be appropriate.

The following data were obtained from the scores for pre-test and post-test:

Table 5. Results of the pre and post test

Pre-test	Post-test
Mean= 6.375	Mean = 11.375
Standard Deviation = 3.739	Standard Deviation = 5.402
n = 16	n = 16

The following hypothesis test was performed:

H_0 : (no difference in mean mark of pre-test and post-test)

H_1 : (mean mark of pre-test less than mean mark of post-test)

Using a paired t-test, p-value = 0.00049

Since this value is less than 0.05, it can be concluded that there is sufficient evidence at 5% level that the mean performance of the students have increased from the pre-test and the post- test.

This provides evidence that the strategy has been effective in helping the children in their problem solving in mathematics.

Case studies

To probe further, two children in the sample, a boy who has made significant progress from the pre-test to the post-test and a girl who did not show any significant improvement in her performance, were interviewed. The parents also were interviewed to find out background information on the children.

Case study one

Student 1 is a boy, 8 years old, who resides at Residence Kennedy, Quatre Bornes. He lives with his family which comprises of his father (42 years old), mother (38 years old), his 3 sisters and 3 brothers. He is 5th in his family. His father is unemployed and had undergone a surgical operation. His mother is a housemaid and she is the only one working in the family. Child 1 has three sisters and two brothers in secondary schools and one sister who has recently taken part in the CPE examinations and is awaiting results. The family is very modest and all the children have to be involved in helping the parents in their household work. The region where he resides can be described to be a deprived one. There is high rate of unemployment and a lot of cases of broken families. Drugs, alcohol and prostitution are very much present in this region. Child 1 was born through normally delivery and attended pre-primary school for two years before joining the primary school in the region. The school is a ZEP school as its performance at CPE level is below 40% for the past 15 years. The father described Child 1 to be having problems with studies since he joined the primary school. He has always been lagging behind and rarely studies at home after school. He spends most of his spare time playing football on the ground which is just next to their house. The teacher also described child 1 as playful and not interested in studies.

During the training sessions we could notice Child 1 developing a liking for mathematics and participating in the classroom discussion. At first he was having problems with basic concepts in

mathematics, for instance number names of one digit number, basic additions and subtraction facts and language problems. He showed interest during the training sessions and was learning the number names. During the training sessions he was using his fingers to add or subtract two numbers. His performance in the pre-test and post-test question-wise is shown in the Table 6 below:

Table 6. Performance of Child 1 in the two test

Q	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Total
Pre-test	1	0	1	0	0	0	0	0	0	0	0	0	2
Post-test	1	1	2	1	3	0	1	0	2	0	0	2	11

Q=question

A graphical representation of the same data is shown below.

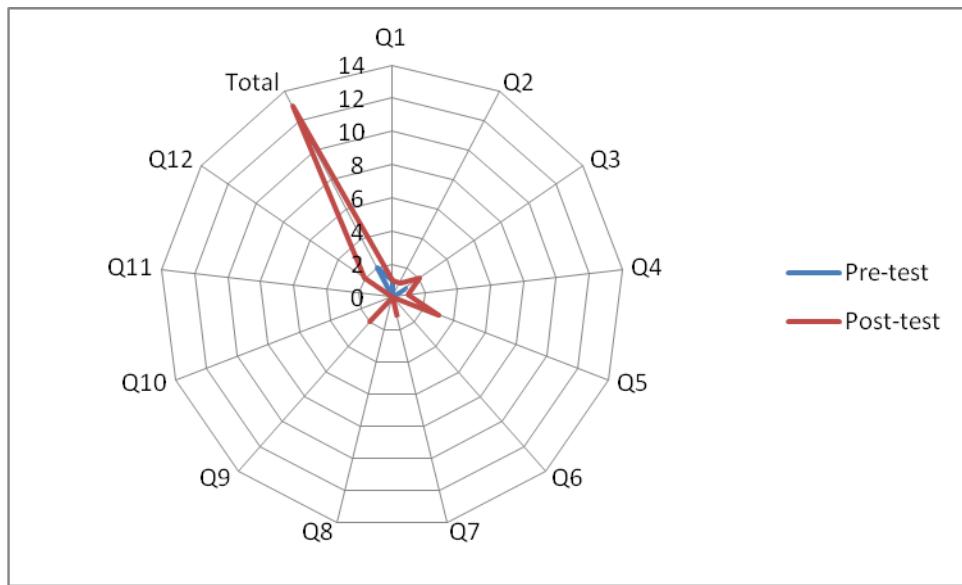


Figure 2. Graphical representation of pre- and post test results of Child 1

One can note that, in spite of his background at home which does not provide enough support to his education, Child 1 has made significant progress from the pre-test to the post-test. During the interview he did acknowledge that the training sessions have been beneficial to him. Close monitoring of his work and corrective feedback have helped him develop a liking for mathematics.

Case study two

Child 2 is a girl, 8 years old, who resides at Palma Road, Quatre Bornes. She lives with his family which comprises of his father and his grandmother. The parents are divorced since she was three and a half years old. The father is a machine operator in a private company and works till late often. Consequently she stays with her grandmother for most of the time. She attended pre-primary school since she was two and a half years old. She has been described by her dad as being very studious but she was three and a half years old her parents divorced. Since then she has been performing badly in her studies. She then joined the primary school in her locality and

she has been lagging behind in her studies. She spends most of her time playing with her friends in the neighborhood. The father said that the few occasions he has to make study at home he has found that she forgets things very often. For instance she does not remember her multiplication tables in mathematics. Child 2 described mathematics as being a difficult subject and the subjects she likes most are English and French.

During the training sessions, Child 2 has been found to be very participative but answers questions too fast without giving herself time to think and reflect. She is very popular among her friends and likes to help them often. She declared to have found the RUSPEC strategy very helpful, however her performance in the post-test has not improved significantly. His performance in the pre-test and post-test question-wise is shown in the Table 7.

Table 7. Performance of Child 2 in the pre- and post-tests

Question	Q1	Q2	Q3	Q4	Q5		Q7	Q8	Q9	Q10	Q11	Q12	Total
Pre-test	1	0	1	0	3		0	0	0	0	0	1	6
Post-test	1	0	0	1	3		1	0	0	0	0	0	7

A graphical representation of the same data is shown below.

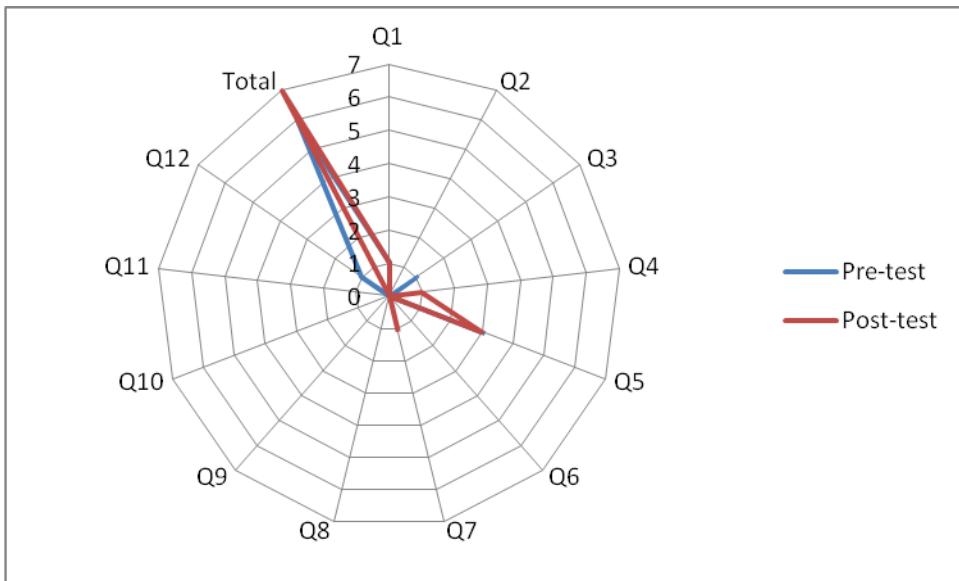


Figure 3. Graphical representation of the performance of Child 2 in the pre- and post tests

It can be noted that this child has not made any significant progress. During the training sessions she was found to be still having problems with the basic concepts in mathematics. However, she was one of the students in the sample who has been volunteering the most to answer questions. She likes to answer questions, help her friends but does not take enough time to think and process the question that has been asked before answering.

Main Findings

One of the main outcomes of the study is the lack of conceptual understanding in mathematics at the primary level. This is in line with a study conducted in Mauritius at the secondary level (Bessoondyal, 2008). During the present study, one could find children who could do calculations in mathematics at the primary level but they could not explain the process. They had heavy reliance on concrete objects to perform addition and subtraction. This is in keeping with studies conducted by Henderson, Came & Bough (2003) and Hannell (2005). Non-mastery of basic mathematical concepts have been found to be detrimental to the formation of further mathematical concepts because of the hierarchical nature of mathematics, as noted by Braten & Thronsten (1998). Through discussions with the children involved in the training program, it was found that one of the major causes of their difficulties in learning mathematics is the perception of mathematics as a difficult subject, in line with research conducted by Mundia (2012). Repetitive failure in lower classes resulted in the development of a negative attitude towards

mathematics and the perception that mathematics is a difficult subject. Memory was also found to be an area of concern for children with learning difficulties, as pointed out by Dowker (2004). They cannot remember basic mathematical facts and have to resort to counting on fingers or using tally marks to do a simple sum like, say $3 + 5$, in line with research conducted by Hannell (2005). Many of the characteristics described by Hannell (2005) for children with dyscalculia were found to be present among many children in the sample, some of which are: being slow in the class, having problems copying work from whiteboard, unable to explain mathematical processes and not participating in classroom discussions. It should, however, be noted that 3 children in the sample were very enthusiastic in answering questions during the training sessions. Very often they did not wait for the question to be asked completely when they were already responding. While building on this enthusiasm to participate, they were encouraged to listen to the complete question, think and then answer.

Another major outcome of this study is the difficulties children encounter with problem solving, in line with research conducted by Gooding (2009). Understanding the word problem itself has been found to be a major obstacle. Children were found to be operating with some verbal cues and tend to jump to a mathematical operation to be used, without proper analysis of the question. For instance, in response to a question like "*Ali has 18 marbles. Rita has 13 marbles. How many more marbles does Ali have than Rita?*"¹, there were some children who used the mathematical operation ADDITION because of the word **MORE**. Children tend to be operating with a set of associations, which they have created. Moreover, there were instances when children, who at first could not solve a problem set in English, could do so when the problem was translated in Creole (a local dialect).

Another major finding of this study is the efficiency of a strategy training program in helping children in their learning of mathematics, in line with research conducted by Johnson (1998). Together with statistical analysis conducted on data obtained from pre-test and post-test, the motivation and participation of the children in the sample did show that strategy training does help in enhancing learning of mathematics. Use of meta-cognitive strategies was found to be useful in solving word problems in mathematics, in keeping with studies conducted by Ozsoy & Ataman (2009) and Eggen & Kauchak (2010).

Conclusion

This study has shown that children at the primary level in Mauritius do encounter difficulties with conceptual understanding of mathematical concepts. Furthermore, in line with research, there are children with learning difficulties in mathematics in our mainstream classes. This study has revealed that the difficulties can go down to very basic concepts of even Standard I and these children are at present in Standard IV. This can be said to be as a result of ‘automatic promotion’ at the primary level in Mauritius. This study has shown that these children are facing a number of problems ranging from memory deficits, language of mathematics, perception of mathematics as a difficult subject, repeated failure and low self-esteem. If the needs of these children are not catered for, their negative experiences with mathematics will continue with the children developing a negative attitude towards mathematics which further affects their performance in the subject. With the international concern and the commitment of our country for the education of ALL children, opportunities need to be provided so that these children too can succeed in their schooling and consequently in life.

In this study a strategy training program was conducted with a sample of children of Standard IV who were having learning difficulties in mathematics. They were empowered with strategies which combined both cognitive and meta-cognitive elements to solve word problems in mathematics. Data obtained from this study provided evidence of the effectiveness of this strategy training in helping those children in solving word problems in mathematics. It has also helped the children experience success in mathematical activities and develop a positive attitude towards mathematics. We, all stakeholders, need to continue on this right path and provide further support to these children to enable them to succeed in the schooling system and in life.

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Preliminary Study of Social Skills Generalization with Pivotal Response**Treatment****Sunyoung Kim****The University of Alabama****Gregory L. Lyons****University of California, San Francisco****Jenna Lequia****New York Medical College****Saili S. Kulkarni****California State University Dominguez Hills****Abstract**

This study used a concurrent multiple baseline design to examine the effects of a peer-mediated pivotal response treatment on social interaction skills of a child with autism in inclusive educational settings. Two typically developing peers were trained to implement the intervention with researchers' prompts in non-instructional settings, such as lunch and recess. In addition, Low Effort (LE) sessions, consisting of low invasive prompting provided by researchers to the peers, were conducted in instructional settings to promote generalization (i.e., art, physical education; PE). Results indicated an immediate increase in social interactions following the

peer-mediated pivotal response treatment and maintenance of these interactions during lunch and recess. Some generalization of the interactions also occurred during low effort sessions.

Keywords: autism, pivotal response treatment, socialization, generalization

Introduction

Children with autism spectrum disorders (ASD) often exhibit significant difficulties in social interactions (American Psychiatric Association, 2000). In particular, students with ASD may face specific challenges in multiple areas of socialization, such as the initiation and maintenance of conversations, and play with peers (Banda, Hart, & Liu-Gitz, 2010; Thorp & Stahmer, 1995). As a result, students with ASD are at increased risk for peer rejection and social isolation in general education settings (Rotheram-Fuller, Kasari, Chamberlain, & Locke, 2010). For successful social inclusion, educators may need to modify or accommodate the environment during non-instructional times of the school day (e.g., recess) by training and/or explicitly involving peers without disabilities (Lang, et al., 2011).

Challenges associated with social and play behaviors of students with ASD may involve a lack of motivation derived from attention difficulties or a history of unsuccessful interactions (Koegel, 2007; Schreibman, 1988). Accordingly, the current study utilized peer-mediated pivotal response treatment (PRT), which has been developed to enhance children with ASD's motivation to acquire critical developmental areas, including socialization, play, and language (Koegel & Koegel, 2006). PRT is a multi-component intervention incorporating various components of naturalistic behavioral interventions, including the environment (e.g., typical classroom), change agents (e.g., peers), and natural reinforcement. Additionally, PRT includes following the child's lead and incorporating child choice, but does not include specific scripts and arbitrary reinforcers.

PRT allows “*a significant amount of choice over the nature of the interaction and stimulus materials, reinforcing attempts to respond, and varying tasks frequently*” (Pierce & Schreibman, 1995, p. 285).

However, researchers examining social skill interventions have reported that the acquired social and play behaviors of many children with ASD and their peers may not automatically generalize to novel playmates, settings, and to times when the interventionist is not present. For example, a meta-analysis of social skills interventions for children with ASD in school settings found that generalization of intervention effects is a pressing issue, but that generalization was greater for interventions conducted within the natural environment (Bellini, Peters, Benner, & Hopf, 2007). However, research in PRT specifically, which is conducted in natural environments (e.g., recess) also shows that generalization may be a critical issue for researchers and practitioners. For example, Pierce and Schreibman (1995) found that one of the study participants did not generalize acquired social behaviors when the child met untrained peers. A more recent PRT study found that teaching children with autism to initiate interactions with peers helped improve generalization of interaction to times when an adult facilitator was not present at recess (i.e., the training context; Koegel, Kuriakose, Singh, & Koegel, 2012). Although the initiation-focused PRT intervention improved the acquisition and generalization of social behaviors without adult facilitators, the study did not assess generalization to other inclusive contexts within the students’ school day.

Some previous PRT intervention studies have utilized unstructured “*non-instructional*” times of the school day, such as recess, to help children acquire meaningful socialization behaviors (e.g., Koegel, Vernon, Koegel, Koegel, & Paullin, 2012). Certainly, recess presents an important yet still understudied inclusive context in the education and treatment of students with ASD (Lang, et al., 2011). Researchers have suggested many advantages in improving

socialization during recess (e.g., Harper, et al., 2008; Lang et al., 2011). Specifically, non-instructional school settings offer valuable opportunities for students with autism to practice and experience positive peer interactions in a natural setting. However, these regularly scheduled free times are often underused, such that students with ASD remain less interactive than typically developing peers (Lang, et al., 2011). Based on current PRT research, non-instructional times such as recess and lunch settings may be the most appropriate milieu for full peer-implementation of PRT components.

However, questions remain regarding the generalization of intervention effects from non-instructional contexts (e.g., recess) to instructional periods within school settings. Answering such questions is important, as children with ASD may not only lack consistent social facilitation at recess, but also may not be provided many opportunities for social engagement and interaction with peers across the school day (Chiang, 2009). Ideally, the acquisition of socialization behaviors in non-instructional contexts would generalize to instructional portions of the school day where typically developing peers often continue informal socialization under different stimulus parameters. Because students spend significant amounts of time in instructional, teacher-directed periods (e.g., art, PE, math), generalized use of social interaction behaviors from non-instructional to instructional settings may foster successful development of peer relationships and provide a practical mechanism for improving the social inclusion of students with ASD throughout the school day. However, there may be reasons to suspect that generalization of interactions from recess to instructional class time may be a challenge, even when peers are well trained and motivated to interact with students with ASD (and vice versa) during non-instructional times of the school day.

The current study sought to assess whether acquisition of interactions during non-instructional portions of the school day would generalize to instructional portions of the school

day. However, in order to address the potential for a lack of generalization, the present investigation planned *a priori* to utilize a Low Effort (LE) generalization strategy in the generalization settings, which is a strategy that has been employed in the positive behavior support literature, but has yet to be explored within the social skills literature (Schindler & Horner, 2005). “*Effort*” is defined as the “*technical and procedural demands of the intervention*” (Schindler & Horner, 2005, p. 41). This study design and strategy allows researchers to assess the *interaction effect* of implementing a higher effort (HE; i.e., high degree of adult prompting and full PRT implementation by the peer) strategy in primary skill-acquisition settings and a lower effort (LE; i.e., low intensive adult prompting) strategy in generalization settings. Researchers suggest, “*interventions requiring less effort to implement may be practical in one setting, but only after an intervention requiring more effort and skill from mediators is applied in another setting*” (Schindler & Horner, 2005, p. 37). As demonstrated by Schindler and Horner (2005), the LE strategy in the generalization setting improved generalization of reduced problem behavior *only after* the intervention with HE was introduced in the primary intervention setting. Embracing this generalization strategy in peer-mediated PRT may promote setting generalization by creating the interaction effect between acquisition of interactions in primary settings and generalization of the acquired social interactions in less targeted settings.

The aim of this study was to evaluate the acquisition and generalization effects (i.e., across settings) of peer-mediated PRT on the social interactions of a child with autism and his peers in natural educational environments with an *a priori* planned use of an understudied generalization strategy (i.e., the interaction effect between HE intervention in non-instructional settings and LE prompting in the generalization settings). The acquisition of appropriate interactions was primarily measured in non-instructional settings, specifically recess and lunch. In addition, we assessed whether the social interactions between the peers and the focus child

with autism automatically generalized to more instructional portions of the school day (e.g., group instruction in various subjects), and then assessed whether the use of the LE generalization strategy improved this generalization.

Method

Participants, Settings and Materials

Focus child. The focus child for this study was Tim, a seven-year-old European American boy with autism. He attended a full inclusion elementary school in the Midwestern United States. Tim received occupational and speech therapy to address his symptoms of ASD and to facilitate his access to general education curriculum. According to his recent individualized educational program (IEP), he used oral language to answer and ask questions, comment, and exclaim. Although many of his utterances were complete and intelligible, he frequently used incomplete sentences (e.g., his language skills lacked developmentally appropriate complexity) and/or added unnecessary words that decreased his intelligibility. During recess and other free times, Tim occasionally interacted with his peers, but usually played alone with a few preferred items, demonstrating resistance to new tasks or activities.

Peer mediators. Two typically developing peers participated in the study as peer mediators. The peers were European American males, eight (Brad) and seven years old (Noah), and attended the same classroom as Tim. Their classroom included 50 children with and without disabilities who were in first to third grade and three general educators.

Settings and materials. The peer-mediated PRT intervention took place in non-instructional settings (i.e., the lunchroom and playground during lunch and recess). Generalization sessions (i.e., *generalization probes* and *LE generalization sessions*) took place in instructional settings (i.e., the gym for PE, the art classroom for art class). PE and art class were chosen as the instructional settings because these settings involved more teacher-directed instruction and

activities, but also because we expected higher levels of informal interaction than other instructional school periods. Thus, these classes were favorable for examining generalization of interactions from non-instructional school settings.

Materials used for the sessions were play or classroom materials (i.e., natural stimuli). In acquisition settings (lunch or recess), participants could access favorite snacks and play materials (e.g., m&m's®, chips), playground facilities, and items/activities (e.g., swing, bubbles). Favorite snacks/materials were selected based on Tim's interests and preferences, along with the mutual interest shown by the peer mediators (e.g., cars, printed bug cards). Tim's interests and preferences were assessed by informal parent reports and observation by researchers. In generalization settings, they used only the naturally occurring class materials for the day.

Procedures

Experimental design. We employed a concurrent multiple baseline design across peer mediators to examine the effect of PRT and concurrent setting generalization. Further, the design assessed whether setting generalization of social interactions improved based on an interaction between a higher effort intervention mediated in the non-instructional acquisition setting and lower effort generalization strategy in the instructional setting. The LE generalization sessions and generalization probes during baseline were counterbalanced between tiers in order to provide a control for sequence effects (see Figures 1 and 2).

Baseline. During recess and lunch, Tim and the peer mediators were given an initial instruction to play or have lunch, respectively. The baseline interactions between Tim and Brad were observed during lunch, whereas the interactions between Tim and Noah were observed during recess. The researchers' prompts or PRT instructions for the peer mediators were not delivered during baseline. Each baseline probe lasted for 10 min, two to four times per week, over two to three weeks.

Peer training. The two peer mediators received separate training sessions between baseline and peer-mediated PRT sessions. We adapted the PRT manual by Koegel, et al., (1989) to train the peers. PRT opportunities are always multi-component, and this study consisted of the following antecedent and consequence components:

1. Follow Tim's lead (antecedent PRT component): Peer mediator follows Tim's interests or asks him questions in order to choose preferred activities or items that they would both enjoy. For example, the peer and Tim would play with a sticky ball when the peer noticed that they both were interested.
2. Give choices and/or ask questions (antecedent PRT component): Peer mediator gives choices between and within activities, and provides opportunities for verbal interaction by asking the focus student questions. For example, the peer mediator may ask, "*Tim, do you want to play with a sticky ball or dinosaurs?*" or, "*Which car will you race, the red one or the blue one?*"
3. Share and take turns (i.e., shared control; antecedent PRT component): Peer mediator alternates turns and shares by using the material concurrently with Tim during play. Through taking turns, the focus child is exposed to examples of appropriate responding, interactions, and play, and can learn how to share materials. For instance, when they play with the sticky ball, they share one ball, take turns throwing and catching; on their turn the peer shows Tim new ways to throw the ball. Sharing an item and taking turns also provides an easy way for the peers to provide natural reinforcers contingent on social interactions (i.e., it provides multiple opportunities for social interaction that can be reinforced by the peers). So, in the same example, prior to throwing the sticky ball back to Tim (to take his turn), the peer might wait for Tim to say, "*Throw a curve ball!*" or the peer would ask Tim how the ball should be thrown prior to throwing the ball back to Tim.

4. Deliver desired activities/items contingent on interaction (i.e., natural reinforcement; consequence PRT component): The peer mediator delivers reinforcement by providing the desired chosen items/activities contingent on social interaction. For instance, the peer gives Tim a bug card only when Tim asks or answers the peer's question about the bug card. These reinforcers are logically related to the activity.

During the peer training sessions, the researcher provided verbal explanations to the peers and modeled the desired behaviors. Then the peer mediators and the researcher role-played. The researcher provided verbal or modeling feedback, particularly praise. A visual cue card for each peer was also presented to assist the peer mediators in learning the strategies. The cue cards summarized the aforementioned PRT strategies for each peer, which were called '4 play rules' by the peers (i.e., "*play things my friend likes, give choices, share and take turns, ask and answer first*"). Except for the class materials in art or PE, several preferred materials that would be available at recess and lunch were accessible during peer training. Further, training focused on interactions that might occur during either recess or lunch. Training continued until the peer mediators demonstrated over 80% mastery of skills across peer-training sessions. Each session lasted 15 to 30 min, and the peer mediators reached mastery after three to five training sessions occurring over one to two weeks.

Peer-mediated PRT (HE). Tim and the peer mediators were told to play during recess or to eat together during lunch (just as in baseline sessions). Each peer mediator met Tim in each session during lunch (Brad) or recess (Noah). As in the study by Harper et al. (2008), the researcher in this study asked the peer to explain the strategies prior to each peer-mediated PRT session at recess and lunch. The researcher also provided verbal prompts (e.g., in order to prompt conversation during a bug card game, the adult might say to the peer, "*Tim might have watched bug cartoons last night.*") and showed visual cue cards only to peer mediators if they did not

initiate interactions within 30s of the last interaction. The verbal and visual prompts to the peers resembled the examples used during peer training. Researchers observed the sessions and only provided prompts to peers when necessary. This facilitation, the expectation that peers fully implement PRT, as well as the peer training and child chosen materials specific to recess and lunch, represented the HE intervention. PRT, as the HE intervention, was only conducted during the non-instructional portions of the school day. Each peer-mediated PRT (i.e., HE intervention) session lasted for 10 min and the sessions continued for four to six weeks, one to three times a week. Peers were praised and provided feedback after each session.

As the peers and focus child acquired interaction skills, three *no-adult-facilitation probes* were conducted at recess and lunch to examine whether adult facilitation was indeed needed for peer mediators to interact with Tim in the non-instructional settings. During no-adult-facilitation probes, the researcher did not interact with the peer mediators or provide the visual cue cards, although the researcher asked the peers to explain the four PRT components prior to each peer-mediated PRT session.

Maintenance. Additional probes, resembling the baseline sessions, were taken over the week immediately following the PRT intervention to assess whether gains were maintained in the absence of researcher-provided reminders/feedback to the peer mediators. Consistent with baseline, Tim and the peers were told to play or have lunch, during recess and lunch respectively. Researchers observed the interactions between Tim and Brad during lunch and the interactions between Tim and Noah during recess. The 10 min maintenance probes occurred three times over one week. It was not feasible to assess long-term maintenance given that the school year was ending.

Generalization. Instructional settings (i.e., art class and PE) were used to measure generalization of social interactions between Tim and the peers from the non-instructional

settings. These classes were teacher-directed and focused on instruction, and were selected based on scheduling alignment and on the assumption that informal socialization occurs during these types of instructional periods. The peers were not trained during this time of the day, and they were not trained according to the types of activities and setting variables that might be present during these instructional periods. We assessed whether interactions would carry over from non-instructional times of the school day where the PRT intervention (HE) was being implemented. Each generalization session lasted 10 min and occurred one to two times per week. There were two types of sessions to measure generalization: Generalization probes and LE sessions. The generalization probes, which did not involve prompts by the researchers, and LE prompting sessions in the same generalization settings, were compared to evaluate whether the LE generalization strategy improved generalization of the social interactions to instructional settings.

Low effort (LE) sessions. LE sessions, or low-intensity prompting (Harvey, Lewis-Palmer, Horner, & Sugai, 2003; Schindler & Horner, 2005), were mediated only in the instructional settings (e.g., PE and art) to promote generalization of Tim and the peers' social interactions, only after their interactions increased during the peer-mediated PRT at recess and lunch. At PE and art, the researcher facilitated interaction by giving fewer prompts to the peers (i.e., verbal, visual cue card) than during recess and lunch; at three fixed times (1, 5, and 8 min into each 10 min session). If the participants were already interacting at the fixed times, the researcher did not provide prompts to the peers. This LE prompting strategy was designed to be minimally invasive and time intensive, and to emulate a usual and feasible level of prompting by an educator attempting to address social interaction goals.

Through LE sessions, we assessed the LE generalization strategy effectiveness in facilitating the generalization of the interactions developed during peer-mediated PRT (i.e., HE intervention) in the non-instructional settings (i.e., recess and lunch). Effectiveness was

evaluated *only after* interaction skills were developed within the PRT sessions (i.e., HE) at recess and lunch (i.e., interaction effect; Schindler & Horner, 2005). We examined and compared the students' social interactions in the instructional generalization settings (i.e., PE and art) both before (i.e., during baseline) and after the peer-mediated PRT in non-instructional acquisition settings (i.e., HE settings; recess and lunch).

Generalization probes. Tim's interaction with Brad was observed in art class, whereas his interaction with Noah was observed in PE class. During these probes, researchers observed Tim and the peers' interactions without the LE strategy. In doing so, we examined whether the interactions would automatically generalize from the non-instructional settings to the instructional settings, as well as whether the LE strategy was needed for improving generalization. As with the LE sessions, the researchers conducted the generalization probes in the instructional settings both before and after the peers mediated PRT in the non-instructional acquisition settings (i.e., after the HE intervention began). It was important to conduct generalization probes in the instructional settings simultaneously during the acquisition baseline (in non-instructional settings) in order to establish a level of social interaction specific to the generalization settings *prior* to the onset of intervention in the acquisition settings. Without this component, we would not be able to infer whether observed social interactions in the instructional settings was the generalization effect of the PRT intervention, or the result of extraneous variables in those settings.

Dependent Measures

Peer mediators' initiations. The number of initiated verbal or nonverbal opportunities for interaction provided by each peer (i.e., asking questions, taking turns, giving choices) was measured during each 10-min session. Peer initiations were defined as beginning conversation verbally or physically (e.g., tapping on peer's shoulder, showing an objective to peer), or

introducing a new play theme. Observers scored verbal or nonverbal opportunities as initiations when they were not in direct response to a question, they occurred at least 3s after a preceding interaction, and/or they clearly changed the topic/play theme (Pierce & Schreibman, 1995). Negative initiations (e.g., throwing objects at peers) or murmuring to himself were not scored.

Focus child's responses. Observers also scored the frequency of Tim's responses to peer initiations. Positive nonverbal (i.e., gestural affirmations, such as nodding in response to peer mediator's prompt) or verbal responses were scored, but negative responses were not scored (i.e., verbal and physical protest, screaming and crying, saying contextually unrelated things to the peer's initiation, unintelligible murmuring). However, negative responses were rare. Clarifying questions to peer mediators' initiation (e.g., What did you say?) were also scored as responses.

Focus child's initiations. The number of Tim's play initiations and conversation initiations were measured. Congruent to peer initiations, focus child initiations were defined as beginning conversation verbally or physically or starting a new play theme without the peers' prompts. For example, showing an object to the peer with or without verbalization, verbally asking a peer mediator to play (e.g., saying "*let's play*"), touching a peer's body to get attention (i.e., pulling peer's hand, tapping on peer's shoulder), verbally asking a question on a new topic or after 3s from the last communicative act, and initiating turn taking were scored in this category. Negative initiations (e.g., hitting peer's body, screaming, or throwing objects at peers), echolalia, or murmuring to himself were not scored. Again, negative initiations were quite rare. Other criteria were identical to "*peer initiations*" described above.

Peer mediators' responses. We scored the peer mediators' responses to Tim's initiations. Criteria to score this variable were identical to the "focus child's responses" described above.

Child affect. Tim and the peer mediators' interest and happiness were rated by the researchers to evaluate the enjoyment of social interaction through observing the children's

eagerness to interact with one another (Koegel, Sze, Mossman, Koegel, & Brookman-Frazee, 2006). We measured child affect based on observation of the interactions. Using the subjective affect rating scale (i.e., a five-point scale) by Dunlap and Koegel (1980), child affect was scored for every session across all phases for each participant.

Inter-observer Agreement, Fidelity, and Social Validity

Two researchers independently scored 33% of the sessions across all phases by reviewing video clips of the sessions. Inter-observer agreement for the frequency of each interaction variable (i.e., initiations and responses by the peers and the focus child) was measured by counting the number of interactions observed by each researcher during each 10-min session. The smaller tally was divided by the larger and multiplied by 100 to obtain a percentage (Kazdin, 1982). The inter-observer agreement for peer's initiation was 90% (range: 75–100%), focus child's response was 91% (range: 80–100%), focus child's initiation was 93% (range: 80–100%), and peer's response was 92% (range: 72 –100 %). In order to control for chance agreements, categorical reliability for child affect was calculated using Cohen's Kappa coefficients. Mean kappa coefficients were .70 for focus child's affect, .67 for Brad's affect and .71 or Noah's affect, all representing acceptable levels of reliability.

Two types of treatment fidelity data were collected. First, researchers completed a researcher implementation checklist following each session during 40% of peer-mediated PRT sessions and no-adult-facilitation probes in non-instructional acquisition settings. The mean of treatment fidelity was 100%. Second, the fidelity of peer implementation of the PRT components during recess and lunch was measured by reviewing 33% of the video-recorded peer-mediated PRT sessions and no-adult-facilitation probes for each peer mediator. Using a checklist, researchers checked off the correct occurrence of each of the PRT components. The mean treatment fidelity of peer implementation was 84% for Brad (range: 75–100%) and 96% for

Noah (range: 75–100%). Fidelity of peer implementation was only conducted in the HE intervention settings (i.e., recess and lunch) because these are the only settings we expected the peers to fully implement PRT. We were primarily interested in the generalization of their interactions to the instructional PE and art class settings.

The researchers assessed social validity via a questionnaire that was initially developed by Kennedy (1994, 2005) and modified for the present study. The researchers provided the questionnaire to Tim's general educator, PE teacher, and art teacher after intervention. The response to each question was scaled from 1 to 5 points and higher scores indicated greater acceptability and positivity. The mean response rating across items on the questionnaires was 4.1 (range: 3–5). An open-ended question section to gather extended and unstructured answers was also included. All teachers reported that the intervention was helpful and supportive in increasing Tim's social interaction, not only with the peer mediators, but also with other classmates.

Results

Results of the study indicate increased social interactions for Tim and his peer mediators in the non-instructional settings (i.e., lunch, recess). In addition, child affect improved for both Tim and the peers. However, generalization of the interactions to instructional settings varied. Brad and Tim showed generalization at low levels during the no-facilitation generalization probes, and immediately increased generalization during LE generalization sessions in art class. For Noah and Tim, however, the increased interaction did not substantially generalize to the PE setting, even with the LE generalization strategy in place. Improved child affect, however, did seem to generalize for both peers.

Peer Mediators' Initiations and Focus Child's Responses

Figure 1 depicts the number of the peers' initiations and Tim's responses. The first and second tiers show the concurrent data of the number of interaction between Tim and Brad. The

third and fourth tiers present the concurrent data of the number of interaction between Tim and Noah. The results of the intervention in the non-instructional acquisition settings are depicted in the first and third tiers for each peer (i.e., HE settings; recess and lunch).

During the initial baseline in the lunch setting (tier 1), Brad initiated interactions at stable low levels ($M = 1.17$ occurrences per each session, range: 0 to 5 occurrences). Tim also responded to Brad infrequently during baseline, resulting in stable low levels ($M = 0.67$, range: 0 to 2 responses). Similarly, during baseline in the recess setting (tier 3), Noah initiated interaction with Tim at stable near zero levels ($M = 0.56$, range: 0 to 4 initiations) and Tim rarely responded to Noah ($M = 0.1$, range: 0 to 1 responses). Following the peer-training sessions, however, Tim immediately demonstrated improved and increasing social interactions. During peer-mediated intervention sessions at lunch, Brad increased his initiations, as evidenced by an immediate increase and general upward trend ($M = 20$ initiations, range: 10 to 25 initiations), and maintained his initiations during the no-adult-facilitation probes ($M = 19.67$, range: 8 to 33 initiations) and maintenance ($M = 15.33$, range: 14 to 16 initiations).

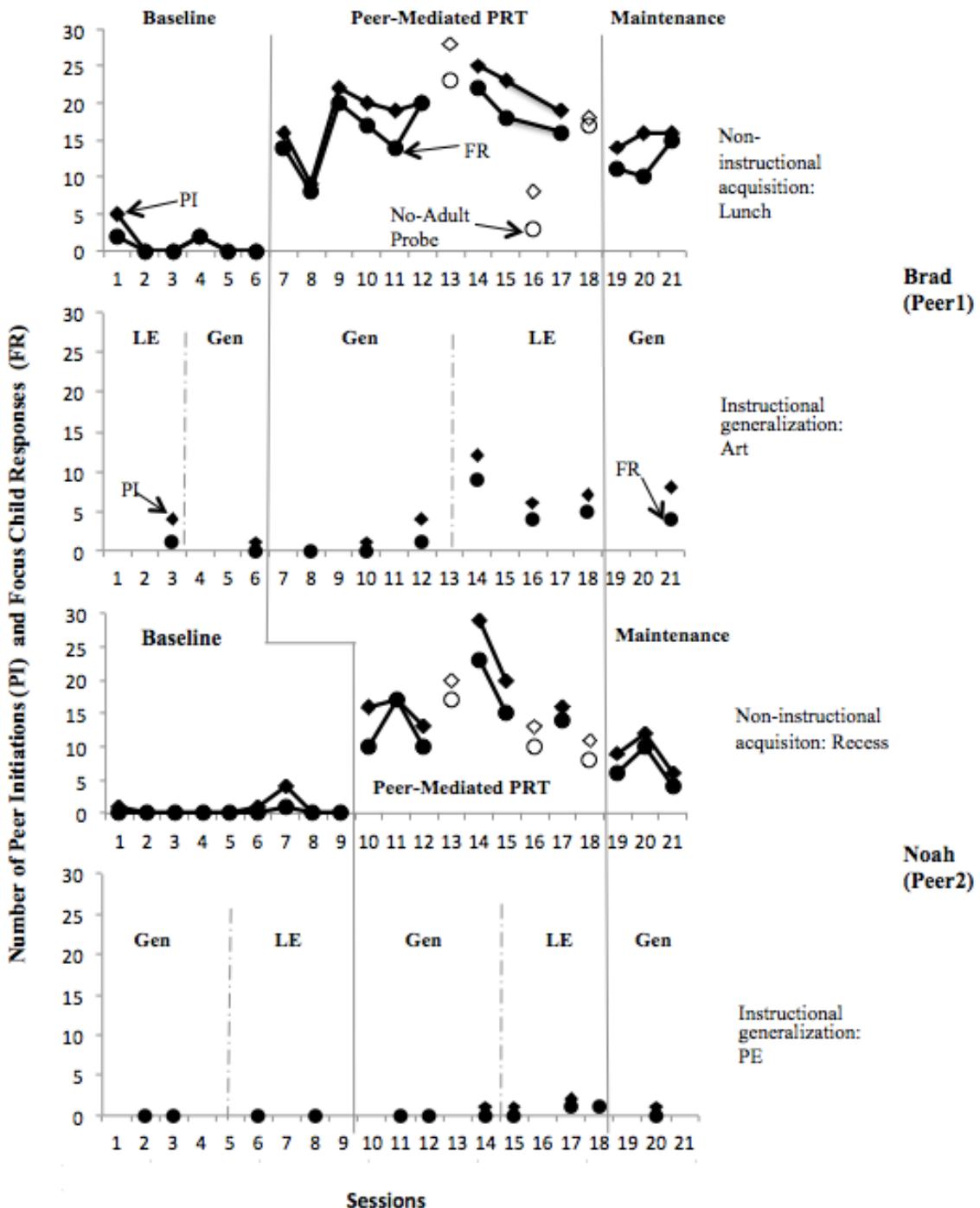


Figure 1. The Frequency of Peers' Initiations and Focus Child's Responses

The frequency of peers' initiations and focus child's responses within 10-min session probes. The first and third tiers represent non-instructional acquisition settings. The second and fourth tiers represent instructional generalization settings. PI, FR, Gen and LE represent peer's initiation, focus child's response, generalization probe, and low effort probe respectively. The open symbols represent no-adult-facilitation probes.

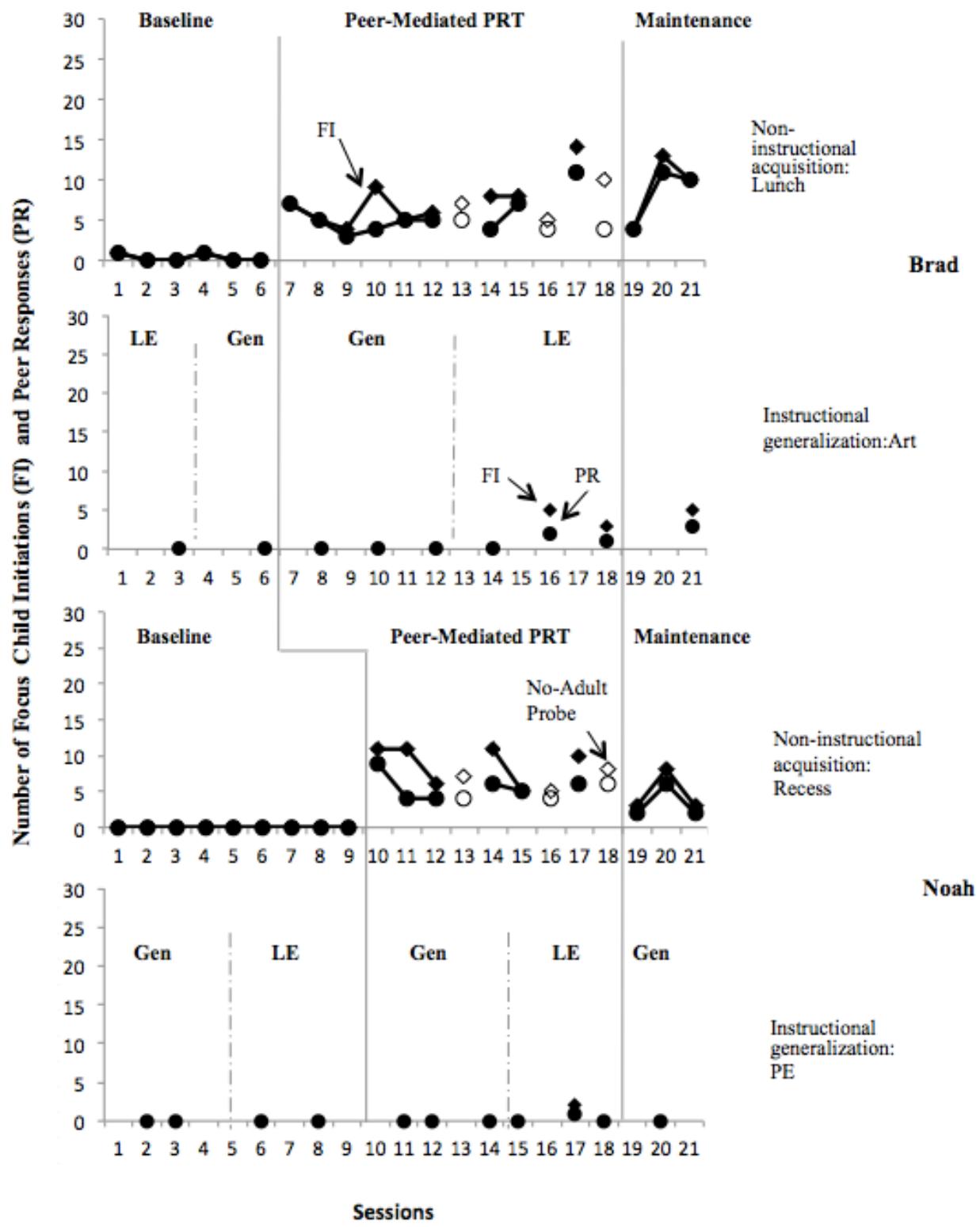
During peer-mediated intervention sessions at lunch, Tim also showed a high level of responses to Brad ($M = 17.33$, range: 10 to 23), and he maintained his responding during the no-adult-facilitation probes ($M = 16.33$, range: 3 to 29) and maintenance ($M = 12$, range: 10 to 15). During peer-mediated intervention at recess, Noah also immediately increased his initiations, as evidenced by an immediate increase and general upward trend before leveling off ($M = 19.33$, range: 15 to 29). Noah also maintained his level of initiations during the no-adult-facilitation probes ($M = 15.33$, range: 11 to 20). However, during maintenance at recess, the frequency of Noah's initiations decreased slightly ($M = 9$, range: 6 to 12), yet remained substantially higher than baseline sessions. This occurred because Tim and Noah voluntarily enjoyed physical activities (e.g., tag, soccer) with other peers across the playground, which may have created fewer opportunities for one-on-one social interaction during the three maintenance sessions. Tim's responses to Noah increased during the peer-mediated intervention sessions at recess ($M = 14.83$, range: 10 to 23). Due to the decrease in initiations, Tim's responses to Noah also decreased slightly during the no-adult-facilitation probes ($M = 7.67$, range: 5 to 10) and maintenance ($M = 6.67$, range: 4 to 10), yet remained high relative to baseline and in terms of the percentage of responding.

The second and fourth tiers in Figure 1 present the generalization of acquired social interaction skills to generalization settings that occurred concurrently with the first and third tiers, respectively. Generalization probes assessed whether the social interactions automatically generalized, and whether the LE strategy improved the generalization, to instructional settings. Researchers conducted probes in the generalization settings at the same time as the baseline observations in the non-instructional acquisition setting in order to assess whether peer-mediated PRT had an impact on social interactions in the generalization settings. Prior to peer-mediated PRT in the non-instructional acquisition settings, peer initiations and Tim's responses did not

occur or occurred at very low levels in both generalization settings (i.e., art and PE). Brad initiated one interaction during a generalization probe in the art class and Tim did not respond. Noah did not initiate interaction during probes in the generalization PE class before he was trained. Once the peers were trained and mediated PRT in non-instructional acquisition settings, Brad gradually generalized his social initiations at a low level ($M = 1.67$), but Noah still did not interact during generalization probes in the generalization setting. Before the peer training, Brad initiated four interactions with Tim during LE sessions in the art class and Tim responded once, and Noah did not initiate interaction during LE sessions in PE class. After the peers were trained and began implementing PRT in the non-instructional acquisition settings, Brad's initiations ($M = 8.33$) and Tim's responses ($M = 6$) substantially increased during LE generalization sessions in art class, demonstrating an interaction effect between the HE (i.e., peer-mediated PRT with more frequent adult facilitation prompts at lunch) and the LE generalization strategy (i.e., minimal prompting during art). Noah's initiations ($M = 1.33$) and Tim's response ($M = 0.66$), however, rarely occurred during LE sessions during PE, even after Noah was trained and implementing PRT during recess, thus failing to demonstrate an interaction effect and the generalization of their social interaction to the instructional PE setting.

Focus Child's Initiations and the Peers' Responses

Figure 2 depicts Tim's initiations and the peers' responses. The first and third tiers in Figure 2 show the results in non-instructional acquisition settings. During baseline in the lunch setting, Tim rarely initiated social interaction ($M = 0.33$, range: 0 to 1), but Brad responded to all of the interaction opportunities provided by Tim ($M = 0.33$, range: 0 to 1).

**Figure 2.** The Frequency of Focus Child's Initiations and Peers' Responses

The frequency of focus child's initiations and peers' responses are presented. FI and PR represent focus child's initiation and peer's response respectively.

After peer training, Tim and Brad demonstrated rapidly improved social interactions during the peer-mediated intervention at lunch. Tim immediately improved and increasingly initiated social interaction with Brad during intervention ($M = 7.22$, range: 3 to 14) and he maintained his initiations during the no-adult-facilitation probes ($M = 7.33$, range: 5 to 10) and maintenance ($M = 9$, range: 4 to 13). Brad responded to Tim with an increased level ($M = 5.66$, range: 3 to 11), and he maintained his responses during the no-adult-facilitation probes ($M = 4.33$, range: 4 to 5) and maintenance ($M = 8.33$, range: 4 to 11). In the recess setting, Tim did not initiate social interaction during baseline. During peer-mediated PRT at recess, Tim's initiations to Noah rapidly increased and remained fairly stable ($M = 6$, range: 6 to 11), and he maintained his initiations during the no-adult-facilitation probes ($M = 6.67$, range: 5 to 8) and maintenance ($M = 6.66$, range: 3 to 8). Noah responded to Tim with a mean of 5.67 occurrences per peer-mediated PRT session at recess (range: 4 to 9), and he maintained the number of responses during the no-adult-facilitation probes ($M = 4.67$, range: 4 to 6) and maintenance ($M = 3.33$, range: 2 to 6).

The second and fourth tiers in Figure 2 present the generalization of Tim's initiations and the peers' responses to instructional settings. Before the peers were trained to implement PRT at lunch and recess, neither Tim's social initiations nor the peers' responses occurred during generalization probes in the generalization settings. After the peers were trained to implement PRT at lunch and recess, Tim's increased social initiations in non-instructional acquisition settings (i.e., lunch and recess) did not automatically generalize to instructional generalization settings (i.e., art and PE) during generalization probes.

Before the peers were trained to implement PRT in the non-instructional acquisition settings, Tim and the peers' initiations and responses occurred at low levels or did not occur during LE sessions in the instructional generalization settings. Tim initiated only one interaction

during an LE session in the art class and Brad did not respond and did not initiate social interaction with Noah during LE sessions in PE class. After the peers were trained to implement PRT at lunch and recess, Tim's increased social initiations in the acquisition settings slightly generalized with the LE generalization strategy to only one generalization setting (i.e., art). Tim initiated social interaction with Brad in art class at lower levels than the acquisition setting (i.e., lunch), but at higher levels than the initial baseline probes in both settings ($M = 2.66$, range: 0 to 5), and Brad responded with a mean of one occurrence during each LE session. This demonstrates an interaction effect between HE implementation in the non-instructional acquisition settings and the LE prompting strategy in the instructional generalization setting. Tim rarely initiated with Noah during LE sessions in PE class ($M = 0.66$, range: 0 to 2) and Noah responded to Tim with a mean of 0.3 occurrences (range: 0 to 1), even after Noah was trained and implementing PRT (i.e., the HE implementation) in the non-instructional acquisition setting (i.e., recess), thus failing to demonstrate an interaction effect for the generalization of Tim's initiations using LE prompting in the generalization setting (i.e., PE).

Child Affect

Two dimensions of affect were scored for Tim and the peer mediators: interest and happiness. As Baker, Koegel and Koegel (1998) reported in their early work, the current study also showed a high correlation of the two dimensions. Therefore, following Baker and colleagues (1998), we averaged the two dimensions for each 10-min session. Scores of 3.4–5 indicated a positive score (very interested and happy), 1.7–3.39 indicated a neutral score, and 0–1.69 indicated a negative score (uninterested and unhappy). Figure 3 depicts the children's affect. The data show that the participants' affect ratings increased during peer-mediated interventions in acquisition settings. The increase in affect was maintained during the no-adult-facilitation probes

and maintenance in acquisition settings, and automatically generalized to one of the generalization settings (i.e., art).

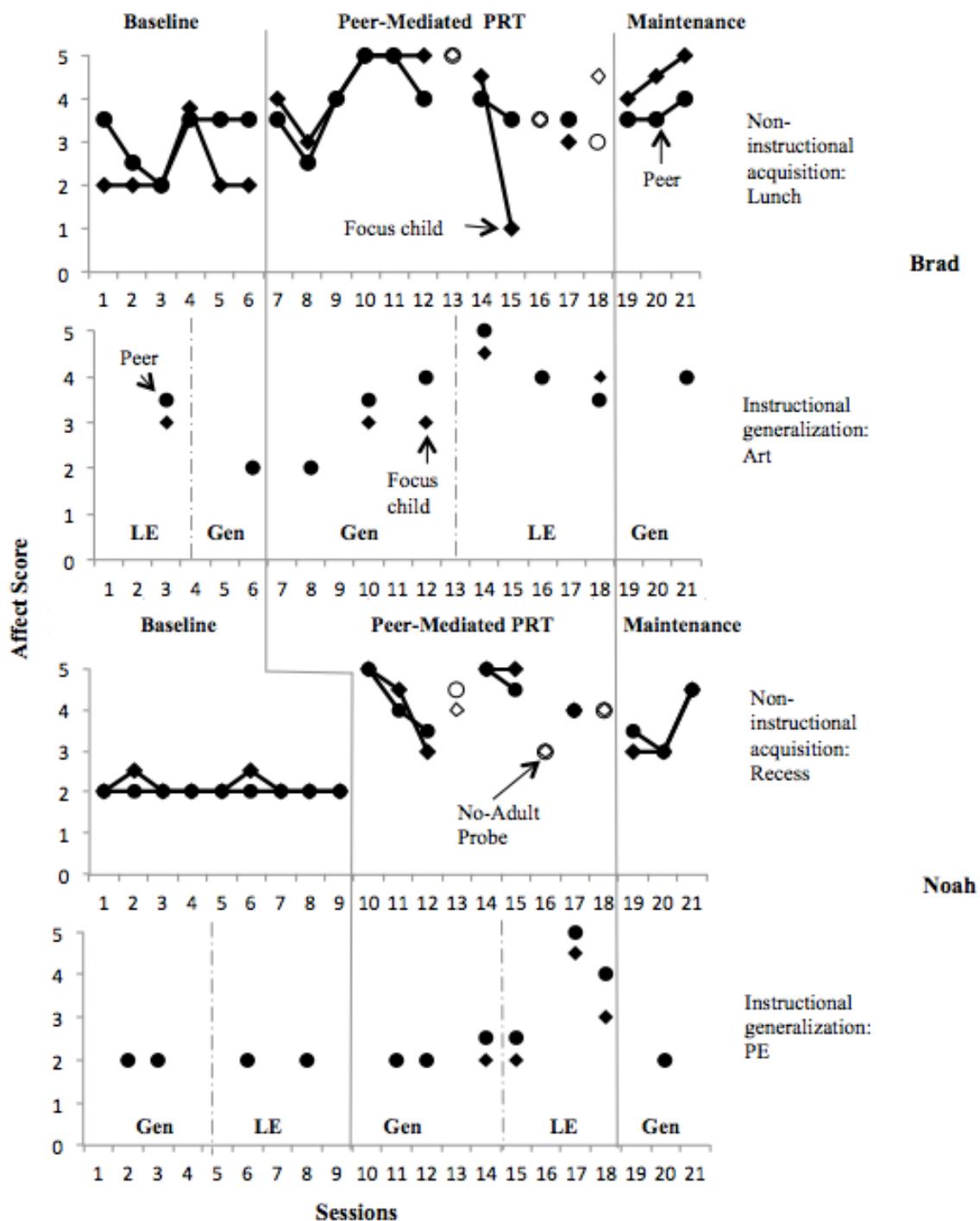


Figure 3. Affect Score for Focus Child and Peers

The focus child and his peer mediators' affect scores across all sessions and settings are presented.

In the lunch setting with Brad, Tim's average affect score was 2.29 (neutral) and Brad's was 3.08 (neutral) during baseline. During the peer-mediated PRT at lunch, Tim's average affect score was 3.83 (positive) and Brad's was 3.89 (positive). During no-adult-facilitation probes at lunch, Tim's average affect score was 4.33 (positive) and Brad's was 3.83 (positive). The increased affect scores also maintained in the lunch setting, where Tim's average score was 4.5 (positive) and Brad's was 3.67 (positive). During recess with Noah, Tim's average affect score was 2.1 (neutral) and Noah's was 2 (neutral) during baseline. During the peer mediated PRT at recess, Tim's average affect score was 4.42 (positive) and Noah's was 4.33 (positive). During no-adult-facilitation probes at recess, Tim's average affect score was 3.66 (positive) and 3.83 (positive) for Noah. These increased scores were also maintained at recess, where Tim's average score was 3.5 (positive) and Brad's was 3.67 (positive).

During probes in instructional generalization settings, before the peers were trained to implement PRT in the acquisition settings, Tim's affect score was 2 (neutral) and Brad's was also 2 (neutral) in the art class. Tim's average score was 2 (neutral) and Noah's was 2 (neutral) in the PE class. The scores gradually increased or remained the same after the peers were trained and began implementing PRT in the non-instructional acquisition settings. Tim's average score was 2.67 (neutral) and Brad's was 3.17 (neutral) during generalization probes in art. Tim's average score was 2 (neutral) and Noah's was 2.16 (neutral) in PE. During LE sessions in generalization settings, before the peers were trained and began implementing PRT in the acquisition settings, Tim's score was 3 (neutral) whereas Brad's was 3.5 (positive) in art class. Tim's average score was 2 (neutral) and Noah's was also 2 (neutral) in PE class. The affect scores, however, increased when the LE strategy was mediated in the generalization settings, but only after the peers began implementing PRT in the acquisition settings. In art class, Tim's average score was 4.17 (positive) and Brad's was 4.17 (positive) during LE sessions. Similarly, Tim's average score was 3.17

(neutral) and Noah's was 3.83 (positive) in PE. These data suggest an interaction between the HE PRT implementation at lunch and recess (i.e., non-instructional acquisition settings) and LE prompting strategies during art and PE (i.e., instructional generalization settings) on child affect. In the maintenance phase, the affect scores for Tim and Brad during generalization probes in art class remained positive.

Discussion

Peer-mediated PRT effectively increased the social interactions of a child with autism and his peers during non-instructional times of the school day, specifically lunch and recess. Results from this study support previous research indicating increases in social interaction from baseline levels during peer-mediated PRT (Pierce & Schreibman, 1995, 1997; Kuhn et al., 2008). Prior to the peer implementation of PRT, Tim demonstrated a low level of social interaction in both non-instructional and instructional settings. Once peers were trained and the peer-mediated PRT was introduced at lunch and recess, Tim's social interaction immediately increased in those non-instructional settings. Notably, their interactions developed with the decreased numbers of researcher's prompts to peers, which might indicate they engaged in more frequent voluntarily interactions (i.e., from the mean of 6 times in the first three sessions to the mean of 3 times in the last three sessions). Although the number of interactions seemed to slightly decrease during the no-adult-facilitation probes and maintenance, social interactions were maintained at an increased level relative to baseline. Importantly, during intervention we found that Tim's initiations increased toward peers, despite the fact that peers and facilitators did not directly teach Tim to initiate. Collateral increases in initiations may indicate that the peers successfully mastered PRT aimed at motivating Tim to interact.

The LE generalization strategy was somewhat effective for the generalization of Tim and Brad's acquired interaction skills in the art class setting. The low invasive prompting strategy

helped Brad facilitate the generalization of interactions from the lunch setting to art class, even though the prompts to peers were provided only 1-2 times across LE sessions. This generalization allowed Tim to practice interaction more frequently and extend his developing friendship with Brad across educational contexts. However, the same generalization did not occur for Tim and Noah in the PE setting. This limited generalization seemed to be due to the PE class being structured in a way that discouraged interaction. Instead, PE was focused on physical activity and following a strict set of rules. Anecdotally, most students did not interact during PE, even though we expected frequent informal interaction. Further, Tim and Noah rarely had proximity to appropriately interact in PE. In contrast, during art students were informally allowed to interact for independent work following the teacher's instructions. Students could help and comment on each other's work during that time. This result is meaningful because interaction in some instructional contexts might be less relevant to those classes' main goals (e.g., music, PE). Future research on generalization of social interaction skills across school contexts should establish peer comparison data in each setting to show relative levels of interaction.

Researchers should consider investigating contextual/cultural differences across school settings in which social interaction is differently accepted and valued (Chan et al., 2009). Future research might also investigate the diverse school contexts in which social skills interventions may contribute directly to the achievement of educational goals (e.g., math; Schmidt & Stichter, 2012). Furthermore, because the current study found varied results for the interaction effect (i.e., HE/LE), future studies might investigate additional strategies for setting generalization. For example, interventionists may consider collaborating more closely with teachers in order to arrange instructional contexts to be more conducive to social interaction, particularly in terms of proximity. The use of pre-teaching strategies, such as LE with video-modeling or self-management, or specific efforts to train the peers with respect to the generalization contexts, may

also improve generalization of interaction skills. However, such additions may be more invasive and require greater effort to produce the desired generalization effect.

As Figure 3 indicates, both Tim and his peers' affect increased positively, showing improved interest and happiness following the peer-mediated intervention, which maintained without adult facilitation. Although the generalization of social behaviors varied, positive child affect generalized, particularly during the LE sessions. The children learned how to play with mutually interesting items/themes and naturally reinforced each other for positive interactions during the acquisition sessions, which may have helped to maintain interaction and promote positive social relationships (Baker et al., 1998). The positive results in child affect, along with the social validity results reported by teachers, suggest that the intervention was meaningful and socially valid. This study demonstrated that increases in socialization at recess/lunch did not adversely impact Tim or his peers' affect during instructional portions of the day, which may be a concern of some educators (Lang et al., 2011). Researchers also found anecdotal improvements in the interaction quality over the course of intervention, whereby later interactions indicated the development of meaningful relationships. For example, Tim began appropriately joking with Noah and even once shared that he was having a bad day because he had hurt himself. Importantly, one of the highest quality interactions occurred during a generalization probe. During art (i.e., an instructional generalization setting), Brad invited Tim to his birthday party, Tim accepted, and then they began discussing birthday party activities. Future studies should analyze quality changes related to behavioral indicators of friendship development, as well as examine how social interactions carry over from PRT opportunities to more informal natural interactions. Moreover, researchers should evaluate the additive role the motivational PRT components have on general peer-mediated interventions that do not include PRT components.

Challenges related to recruiting an additional peer (i.e., classmates) and additional students with autism who were included in general education limit this study. This study showed two demonstrations of a main intervention effect with only one participant with autism; however, three demonstrations are the standard to infer a functional relation between the intervention and dependent variables (Kratochwill, et al., 2010) and three participants with autism would have been ideal (Horner, et al., 2005). Therefore, our ability to infer a functional relation between the peer-mediated PRT and the acquisition of social interaction is limited. Lack of an additional demonstration of an effect is somewhat mitigated by the immediacy of the effects for both peers and the richness of the generalization data collected, which was the primary concern of this study. The results add preliminary evidence to the limited literature on generalization of social interactions across natural settings, particularly inclusive school contexts.

Furthermore, data were collected only on the interactions between Tim and the peer mediators, and not on the interactions between Tim and other peers with whom Tim might have interacted. The ultimate goal of this intervention was to promote Tim's socialization across his natural educational environments, so we did not prevent interaction between Tim and other peers. However, anecdotally, Tim had few additional interactions beyond those that were recorded, particularly during baseline. Future research might assess the role of including several peers or groups of peers from the focus child's classroom as peer mediators. Research should evaluate the benefits of either focusing on a few peers versus many peers. Additionally, future research should evaluate whether the increased socialization generalizes to untrained classmates.

Lastly, this study did not measure the long-term maintenance of the intervention. Long-term maintenance was not assessed due to the termination of the school year. Because the teachers indicated in the social validity questionnaire that the intervention would likely produce permanent effects and they would be willing to use the intervention in the future, further research

might assess the generalization and maintenance effects by using natural adult facilitators, instead of researchers. For instance, various school personnel such as teachers, para-educators, or lunch monitors could be coached to facilitate in the varied settings (e.g., Robinson, 2011).

Despite these limitations, the findings of this study add to the previous findings on the use of peer-mediated PRT for improving the socialization of children with autism in inclusive school settings. We found that peer-mediated PRT improved the acquisition and maintenance of socialization of a child with ASD in his inclusive educational settings. Although the LE generalization strategy was only partially successful, it is noteworthy that the child with autism exhibited high levels of responding to peer mediators across generalization settings, and that the focus child's initiations indirectly increased without being directly targeted by peers or adults. The current study adds to the literature by evaluating the use of recess/lunch as primary intervention contexts, as well as the generalization of social interaction across educational situations so that included students with autism have frequent opportunities to interact meaningfully and positively with their peers throughout the school day.

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Do Executive Functions Differentiate Gifted Children, Children at Risk of LDs, and Average Children?

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Abstract

The Executive Functions (EFs) cognitive ability was studied with a group of gifted children (n=27), children at risk of learning disabilities (LDs) (n=27), and control/average children (n=27). These children were enrolled in Kindergarten 2 and had the mean age of 63 months . The main purpose of this study was to evaluate group differences on EFs measure. Secondly, this study aimed to investigate how EFs correlates to intellectual performance and age among all children who participated in this study. The three groups of this study were matched on grade, age, and father's level of education. The findings indicated that there are statistically significant differences among the three groups of this study in terms of their performances on DCCS Test (the study measure of EFs). These differences are in favor of gifted children then average children, and the worst performances were documented for children at risk of LDs. In addition,

both participants' age and intelligence were positively correlated with their performances on the study measure of EFs. Implications of the findings are also discussed.

Keywords: Executive Functions, Gifted children, children at risk of learning disabilities, Jordanian children, intelligence.

Introduction

Early childhood is considered a critical period of growth and development for children. During this time, children's brains are continuing to develop and thus, intervention is likely to make the most impact (National Scientific Council on the Developing Child, 2004). Through early identification and intervention we can prevent, ameliorate, and lessen the impact of a number of developmental risk factors for young children (Guralnick, 1998) as well as accelerate growth in young children who are potentially gifted (Brighton, Moon, Jarvis, & Hockett, 2007). Not only are we able to improve children's developmental functioning, which results in improving school readiness; early intervention also helps families and caregivers increase their ability to support their child's development and is cost effective (Guralnick, 1997). In fact, when young children receive early intervention services, they are less likely to require special education services in the future (Hallahan, Kauffman, & Pullen, 2011).

Recurring themes and findings from the literature provide a strong rationale for an increased focus on the needs of young children who show signs of potential. Numerous authors underscore the importance of early educational intervention for gifted children, arguing that gifted education should follow the lead of special education in recognizing individualized needs as early as possible in order to provide responsive instructional environments to allow for potential to be actualized (Brighton, et al., 2007; Levine & Kitano, 1998; Porter, 2005). Some

children develop observable gifts and talents in areas such as spoken language/linguistics, reading, and mathematics, distinguishing them from their same-age peers who follow a more common developmental trajectory. Evidence suggests that failure to recognize and nurture these early developed talents can result in negative emotional and social consequences such as masking behaviors, code-switching and possible long-term underachievement (Porter, 2005).

On the other hand, although learning disabilities are typically formally identified after children reach school age, there are usually many signs of developmental difficulties that can indicate the presence of a learning disability. During the preschool years, most children become more independent and begin to attend more to people outside of their own family. During this stage, most children develop a variety of gross motor skills, use more complex language to express themselves, understand the concept of make believe, interact with other children, and take turns during play. They also begin to learn letters, sounds, and concepts about print. Children who are struggling during this stage of development may speak later than other children, have speech articulation difficulties, experience slow vocabulary growth and difficulty finding the word they need to express an idea, experience difficulty rhyming, and have difficulty learning numbers, days of the week, the alphabet, shapes, and colors. Problems with fine motor skills, such as buttoning, zipping, keyboarding, controlling a pencil, and using scissors, may also appear. Socially, they may experience difficulty with routines or following directions, have difficulty empathizing with others, and experience exaggerated frustrations when they struggle with a task (Abu-Hamour, 2014; Mather & Goldstein, 2008).

Thus, it is a necessity to identify these children (gifted children or children at risk of learning disabilities) as early as possible by valid and reliable assessment tools, then provide them with appropriate interventions. Assessment is a systematic process of collecting data that

can be used to make decisions about children (Reynolds, Livingston, & Willson, 2006; Salvia & Ysseldyke, 2009). We assess children to learn what we need to do to serve their needs. We also assess students to determine if what we are doing is effective. Therefore, screening tools in the early ages should accurately identify children at risk for failing to develop learning skills or those who will be gifted. Fortunately, several decades of research consistently point to strong relations between children with special needs (specifically, gifted children and children with learning disabilities) and other cognitive abilities such as executive functions ability (Salvia & Ysseldyke, 2009).

Executive Functions

Executive functions (EFs) refer to a set of cognitive processes that are important for behavioral and cognitive regulation. EFs components are defined differently, and usually include updating representations of the working memory, inhibiting responses, and shifting between tasks or mental sets (Perrotin, Tournelle, & Isingrini, 2008; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). Updating requires actively manipulating relevant information, rather than passively storing information in working memory. Inhibition requires stopping a response that is relatively automatic. Shifting requires changes between mental tasks, although the specific operations that need to be switched back and forth are quite different across tasks. Researchers pay attention to EFs' neural mechanisms and their relationship with other cognitive constructs. EFs are the foundation of many high level cognitive functions, which include planning, decision making, meta-cognition, and strategies (Dawson & Guare, 2004; Garner, 2009). Studies from developmental psychology and cognitive neuroscience suggest that EFs can be elicited in children as young as at the age of five years if suitable tasks are used (Anderson, 1998).

Furthermore, EFs also play an important role in a child's cognitive functioning, behavior, emotional control and social interaction. Their role in school learning is widely recognized by

literature (Anderson, 2002). EFs are necessary for successful learning and are related to two major categories of functions and capabilities. In the first category, there are functions that are related to the capability of planning and handling activities efficiently, either directly or not. The second category is about how easily a person puts into action an already formed or externally indicated action plan, ignoring alternative courses of action (which may seem easier); for example, intervening stimuli, desires and so on that are not related to the ongoing task (Denckla, 2007). Executive functions are those skills necessary for purposeful, goal-directed activity. Anderson, (2002), required for the successful achievement of complex, higher order cognitive goals, including planning future actions, keeping these plans in mind until executed, problem-solving, self-monitoring to check on progress, mental flexibility, and the ability to inhibit irrelevant actions. On the other hand, executive dysfunction refers to deficits in the ability to inhibit well-learned patterns of behavior and derive new ways of solving problems. Individuals become trapped in repetitive cycles of well-learned behavior (perseveration) and lack flexibility to accommodate and re-accommodate their behavior to novel situations. The direct implications of EFs on gifted children with high intellectual ability and children who are at risk of learning disabilities are discussed in the following sections.

EFs and Intellectual Ability

Mounting evidence suggests that high intellectual aptitude supports the demonstration of higher order cognitive skills in EFs such as reasoning and attention (Dawson, Soulieres, Gernsbacher, & Mottron, 2007; Kalbfleisch, Van Meter, & Zeffiro, 2007). Intelligence is not an academic skill but rather a broad construct that refers to the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience (Gottfredson, 1997). Recent advances in current theory and research on the structure of human cognitive abilities have resulted in a new empirically derived model commonly referred to as the

Cattell-Horn-Carroll Theory (CHC theory) (McGrew, Laforte, & Schrank, 2014). Currently, most well-known intelligence tests (e.g., Woodcock-Johnson Cognitive and Achievement Tests—4th edition; Wechsler Intelligence Scale for Children—5th edition; Stanford-Binet Intelligence Scale—5th edition) work to be aligned with a stratified model of intellectual abilities defined and refined by Cattell, Horn, and Carroll. For example, the fundamental criteria for developing cognitive abilities in the Woodcock-Johnson Cognitive and Achievement Tests (WJ IV) were derived from the CHC theory of cognitive abilities as described in the WJ IV examiner's manual (Mather & Wendling, 2014). CHC Theory is a three-level model of human cognitive abilities that includes general intelligence (g), nine broad cognitive abilities, and more than 100 narrow cognitive abilities (McGrew, 2005). The broad CHC abilities measured by the WJ IV are: Long-Term Retrieval (G_{lr}), Auditory Processing (G_a), Fluid Reasoning (G_f), Processing Speed (G_s), Short-Term Working Memory (G_{wm}), Visual-Spatial Thinking (G_v), Comprehension-Knowledge (G_c), Reading-Writing (G_{rw}), and Quantitative Knowledge (G_q) (see Abu-Hamour, Mattar, & Al Hmouz, 2015 for review).

Intelligence is also not simply the straightforward amalgamation of discrete cognitive processes but rather different cognitive processes appear to be more strongly associated with general intelligence. For example, working memory involves holding information “*on-line*” in the short term memory and concurrently processing that information (Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001). The relationship between performance on tasks of working memory and intelligence has been demonstrated to be in the range of 0.55 and above by several researchers (Ackerman, et al., 2001; Conway, Kane, & Engle, 2003).

It is generally agreed that intelligence is related to EFs (Friedman, et al., 2006). Specifically, numerous studies have found moderate to strong relations between intelligence and

working memory updating ability (Ackerman, Beier, & Boyle, 2005; Engle, Tuholski, Laughlin, & Conway, 1999). The evidence comes from different subjects, tasks and research approaches. With respect to inhibition, Salthouse, Atkinson, and Berish (2003) found that inhibition was strongly correlated with intelligence in aging adults. Dempster (1991) stated that "*intelligence cannot be understood without reference to inhibitory processes*". As for shifting, there have been mixed results from literature, perhaps depending on the participants and tasks. While Salthouse et al. (1998) found a high correlation between shifting tasks and intelligence, other studies have found either little relation (Rockstroh & Schweizer, 2001), or a weak correlation between them (Miyake, et al., 2001). Recently, Floyd, Bergeron, Hamilton, and Parra (2010) conducted a study that examined relationships among cognitive abilities as measured by the WJ-III Tests of Cognitive Abilities (WJ-III COG; Woodcock, McGrew, & Mather, 2001) and executive functions as measured by the Delis–Kaplan Executive Function System (DKEFS; Delis, Kaplan, & Kramer, 2001). Their study sample consisted of an independent general education sample of 100 children and adolescents. Floyd and colleagues conducted both an exploratory factor analysis and a confirmatory factor analysis on 25 tests of the WJ-III COG and the DKEFS. Results of these extensive analyses indicated that all 25 sub-test scores measure a general construct, and 24 of the 25 sub-tests measure at least one of the five broad CHC theory factors. However, the research on the relationship of IQ to performance on executive function tests is still sparse and further investigation is needed in this area (e.g., investigating the relationship of EFs and general intellectual ability among preschoolers). In this aspect, researchers showed that performance on executive function tasks or demonstration of executive function behaviors develops with age (see Zelazo, 2006, for review).

EFs and Learning Disabilities (LDs)

Although LDs are typically formally identified after children reach school age, there are usually many signs of developmental difficulties that can indicate the presence of a learning disability. During the preschool years, most children become more independent and begin to attend more to people outside of their own family. During this stage, most children develop a variety of gross motor skills, use more complex language to express themselves, understand the concept of make believe, interact with other children, and take turns during play. They also begin to learn letters, sounds, and concepts about print.

Children who are struggling during this stage of development may speak later than other children, have speech articulation difficulties, experience slow vocabulary growth and difficulty finding the word they need to express an idea, experience difficulty rhyming, and have difficulty learning numbers, days of the week, the alphabet, shapes, and colors. Problems with fine motor skills, such as buttoning, zipping, keyboarding, controlling a pencil, and using scissors, may also appear. Socially, they may experience difficulty with routines or following directions, have difficulty empathizing with others, and experience exaggerated frustrations when they struggle with a task. Furthermore, students with learning disabilities in elementary school may experience difficulties such as struggling to learn connections between letters and sounds, confusing basic words, making frequent reading and spelling errors, struggling with basic computation, being slow to acquire and retain new facts and learn new skills, over relying on memorization, and having poor physical coordination (Abu-Hamour, 2014).

Recent research has shown that learning difficulties and behavioral problems are both associated with deficits in executive function (Mazzocco & Kover, 2007; Powell & Voeller, 2004). For example, deficits in inhibition, working memory and cognitive flexibility have been

strongly associated with mathematical difficulties in children with a normal IQ (Bull & Scerif 2001). Difficulties in reading and writing skills have been related to working memory and inhibitory control deficits (Altemeier, Jones, Abbott, & Berninger, 2006; Rucklidge & Tannock, 2002). Executive dysfunction has also been demonstrated in a range of behavioral problems. Barkley (1997) for example, has proposed that attention deficit/hyperactivity disorder arises from a deficit in inhibition, that in turn results in secondary EF deficits, such as impaired working memory.

Significance, Context, and Purposes of the Study

School systems now are playing more of a role in assessment and intervention with preschool children, partly in response to legislation requiring educational services for very young children with handicaps (e.g., '*Law on the Rights for Persons with Disabilities*' for the year of 2007 in Jordan, and Public Law 99-457 in U.S) and partly in response to the notion that early intervention can facilitate appropriate development. There are two major reasons to assess young children with preschool tests such as EF test: (1) to identify gifted children or students at risk of learning disabilities and (2) to ascertain the readiness of non-disabled children to enter school. EF tests are typically administered either before entering school or during kindergarten and are used to predict initial school success, and to identify youngsters who may not be ready to participate in a regular school experience.

It is a myth that gifted students will make it without positive and supportive interventions from school and family. Although gifted students may achieve in school, schools are failing these students, as well as society and schools themselves, when they do not provide gifted students the opportunities to achieve their full potential as early as possible. The evidence in Jordan indicates that schools are not responding fully to the educational and learning needs suggested by the

defining characteristics of giftedness (Abu-Hamour & Al-Hmouz, 2014). The early identification of these students should be the first step to help these students because there is always risks associated with not identifying young children's giftedness.

Researchers have drawn attention to the emotional and social consequences for highly gifted young students when their talents go unrecognized and undervalued in the preschool and early school years (Neihart, Reis, Robinson, & Moon, 2002). Gross' (1999) longitudinal research suggests that as early as the first few months of preschool, children later identified as highly gifted might often begin to mask their abilities in an effort to fit in with peers and meet teacher expectations. These children might select picture books in the classroom even though they are reading text-laden books at home, or they might develop different "*codes*" for speaking at home and school in order to mask their linguistic sophistication (e.g., code switching). Highly gifted youngsters are sensitive to early messages that their attempts to express boredom, point out multiple approaches to a problem, or use sophisticated humor are likely to be perceived as disruptive or disrespectful behaviors by teachers, rather than as markers of high ability. Since they are likely to engage in social comparisons earlier than their age peers, young gifted children are vulnerable to feelings of isolation and difference when their abilities are not recognized and valued at school. In preschool and primary grades, gifted children often become frustrated when they are unable to find peers who share their interests or understand their advanced sense of humor (Robinson, 1993).

Similarly, the condition of LDs are universal problem that occurs in all languages, cultures, and nations in the world. Accumulating research shows that in all cultures there are children who seem to have normal intelligence but have severe difficulty in learning oral language, acquiring reading or writing skills, or doing mathematics. The problem appears in

children learning an alphabet-based system of written language, such as Arabic (Abu-Hamour & Al-Hmouz, 2014; Abu-Hamour, Al-Hmouz, & Kenana, 2013), and with children learning a logographic (pictorial) system of written language, such as Chinese or Japanese (Tsuge, 2001). However, very little current research has examined the use of new tests (e.g., EF) to identify students with LDs in Jordan and Arab world. As discussed previously, early identification of problems leads to greater odds of successful intervention efforts. Early identification refers to both identifying problems when children are young, as well as identifying early signs of problematic behaviors. Several researchers indicated that early signs of potential learning problems can be reliably detected (e.g., Fletcher & Vaughn, 2009). In addition, researchers had shown that the sooner LDs is detected and intervention is begun, the better the chance to avoid school failure and to improve chances for success in life (Mather & Goldstein, 2008).

Unfortunately, the trend in Jordan and other Arab countries has been reluctance to screen for early signs for students with special needs (gifted students or students at risk of LDs) in very young children. Consistently, researchers in Jordan have stated in numerous reports and articles that the Jordanian educational system is in need of valid assessment tools to identify students with special needs and provide them with an appropriate intervention (Abu-Hamour & Al Hmouz, 2014; Abu-Hamour & Mattar, 2013). EF tests that have been used in English speaking countries effectively, should be investigated for Arabic speaking countries. To the best of the author's knowledge, no studies had investigated the use of EF test in Arabic language previously. The present study was conducted to add to the limited literature targeting EF ability in children with special needs (gifted children or children at risk of learning disabilities) at preschool age.

The main purpose of this study was to evaluate group differences on EFs measure in gifted children, children at risk of LD, and control group. Secondly, this study aimed to

investigate how EFs correlates to intellectual performance and age among all children who participated in this study.

Method

Participants

The total sample included 81 children ranging in age from 4.7 to 5.9 years who placed in KG 2. There were three groups of children identified for the purpose of this study; gifted children (n=27), children at risk of LDs (n=27), and control/average children (n=27). Participants were recruited from two private schools in the central region of Jordan. Gifted children were qualified for this group if they met all of the following criteria: (a) classroom teacher's nomination; (b) Woodcock-Johnson Arabic Tests full scale IQ (FSIQ) of 116 or above; and (c) native speakers of Arabic, no noted emotional/behavioral disorder, no noted attention disorders, and no sensory impairments. Children at risk of LDs were qualified for this group if they met all of the following criteria: (a) classroom teacher's nomination; (b) Woodcock-Johnson Arabic Tests full scale IQ (FSIQ) of 85-115; and (C) had at least five frequent symptoms of the 10 Building Blocks Questionnaire; (d) native speakers of Arabic and no sensory impairments. Average children were qualified for this group if they met all of the following criteria: (a) classroom teacher's nomination; (b) Woodcock-Johnson Arabic Tests full scale IQ (FSIQ) of 85-115; and (c) native speakers of Arabic, no noted emotional/behavioral disorder, no noted attention disorders, and no sensory impairments.

There were 48 males and 33 females in the sample. Within the gifted group there were 15 males and 12 females; for the LDs group there were 19 males and 8 females; and for the control group there were 14 males and 13 females. The three groups of this study were matched on grade, age, and father's level of education. The mean age in months for children at risk of LDs

was 63.85 ($SD = 2.46$), for the gifted children was 63.74 ($SD = 3.40$), and for the control group was 63.59 ($SD = 2.29$). The mean for the three groups is not exactly the same due to how the groups were matched. However, there were no difference in mean age in months among the three groups of this study, $F(2, 78) = .06, p = .942$. Socioeconomic status was based upon the father's highest level of education. For each group, 11 had 1–3 years of college, and 16 had a Bachelor's degree or higher.

Instruments

Inclusionary Instruments

Woodcock-Johnson Arabic Cognitive Tests (WJ IV). The Woodcock-Johnson Arabic Cognitive Tests (WJ IV) were used to assess the general intelligence of the participants (WJ IV; Abu-Hamour, Mattar, & Al-Hmouz, 2016; Schrank, McGrew & Mather, 2014). The WJ Arabic Tests are based on the Jordanian local norms that have been established in Jordan for individuals ranging in age from 4 years to 22 years. The WJ Arabic Tests are a comprehensive, norm-referenced, individually administered assessment of cognitive abilities and achievement. In general, the internal consistency reliability estimates for all WJ Arabic measures are uniformly high, most often with magnitudes in the .80s and .90s for individual tests, and in the .90s for clusters (Abu-Hamour, et al., 2015). The WJ Arabic battery is a perfect tool to identify the cognitive abilities or the general intelligence among preschool children since it relies on assessing multiple criteria of Cognitive abilities by using Cattell-Horn-Carroll theory of cognitive abilities (CHC theory). To achieve the Broad Cognitive Abilities Score/Full Scale IQ Score, the following WJ Arabic Tests were administered: Verbal Comprehension, Reasoning, Orthographic Matching, Verbal Attention, Visualization, Phonological Processing, and Long-Term Retrieval (see Abu-Hamour, et al., 2016 for detailed description of these tests).

Building Blocks Questionnaire. The Building Blocks Questionnaire (BBQ) (Mather & Goldstein, 2008) was adapted with permission from English language to Arabic language for the purpose of identifying students at risk of LDs in this study. The BBQ is designed to help educators to identify a student's with LDs and to provide an overview of school-related skills and behaviors. This questionnaire has two sections: Part 1 provides 10 questions, one question for each of the 10 building blocks, which are intended to provide a general overview of a student's strengths and weaknesses. The responses for these questions were: Rarely, Sometimes, or Frequently. Once the examiner/teacher have completed part 1, for each of the questions that they have answered frequently or sometime, they would proceed to part 2 of the questionnaire and complete the additional 10 items corresponding to that Building Block (BB). Part 2 provides an additional 10 items for each block in order to provide more in-depth information about the specifics of the behavior. The 10 BB are: attention and self-regulation (e.g., “*Does the student appear inattentive or impulsive?*”); emotions (e.g., “*Does the student appear to be sad?*”); behavior (e.g., “*Does the student have trouble following school rules?*”); self-esteem (e.g., “*Does the student appear to have a low opinion of him- or herself?*”); phonological processing (e.g., “*Does the student have difficulty hearing or applying letter sounds when speaking, reading, or spelling?*”); orthographical processing (e.g., “*Does the student have trouble reading or spelling words with irregular elements?*”); motor processing (e.g., “*Does the student have difficulty forming letters or writing legibly?*”); thinking with language (e.g., “*Does the student have trouble using or understanding oral language?*”); thinking with images (e.g., “*Does the student have difficulty creating mental pictures?*”); and thinking with strategies (e.g., “*Does the student have trouble forming or following a plan?*”). For the present study, the internal consistency of the Arabic BBQ (obtained using Cronbach's alpha) was .91. In terms of social validity, teachers reported

that the instructions for the BBQ were easy to understand and that they did not find completing the questionnaire difficult. A more detailed description of the BBQ items are provided in Abu-Hamour (2014), and Mather and Goldstein (2008).

Study Measure

The dimensional change card sort (DCCS). The dimensional change card sort (DCCS) Test is an easily administered and widely used measure of executive function that is suitable for use with children in a preschool age (see Zelazo, 2006 for more details). In the standard version pre-switch phase (6 test trials) of this test, which is usually used with healthy children between the ages of three and five years, children are shown two target cards (e.g., a blue rabbit and a red boat) and asked to sort a series of bivalent test cards (e.g., red rabbits and blue boats) according to one dimension (e.g., color). During a post-switch phase (6 test trials), they are told to sort the same types of test cards according to the other dimension (e.g., shape). Children who pass the pre-switch phase and the post-switch phase of the standard version of the DCCS may proceed immediately to the border version of the test (12 test trials). The border version consists of 12 trials. On each trial, the examiner repeat the rules (“*If there’s a border, play the color game. If there’s no border, play the shape game*”). Performance on the DCCS Test is scored as the number correct out of 24 (see Figure 1). The administration of DCCS Test was around 10 minutes per student, and the examiner respond to children in a neutral, non-evaluative, non-corrective fashion. Several studies indicated that performance on the DCCS provides an index of the development of executive function, and it is a valid and reliable screening measure of early identification of gifted students and students at risk of LDs (Floyd et al., 2010; Zelazo, 2006; see Zelazo, 2012 for video presentation of DCCS Test, <https://www.youtube.com/watch?v=Fv5DDyqGGAM>).

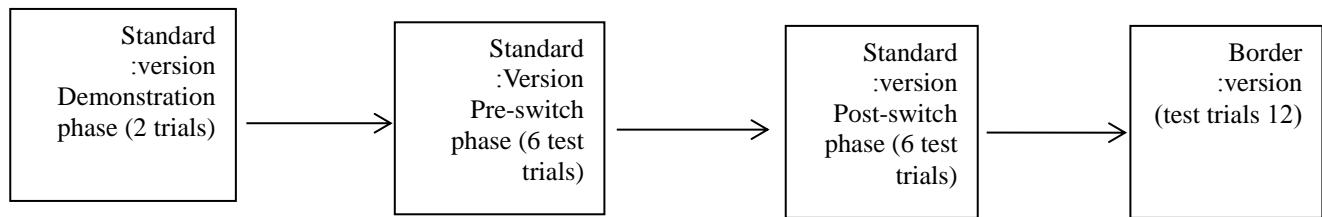


Figure 1: Summary of the phases involved in the standard and border versions of the DCCS (see text for details). Children who pass the post-switch phase may proceed to the border version.

Procedures and Data Analyses

The researchers used appropriate translation procedures (Brislin, 1986) to facilitate the use of DCCS Test in Arabic language. First, two native speakers of Arabic, who were also fluent in English, independently translated the DCCS into Arabic. Second, a back translation of the Arabic version into English was conducted by an English teacher who is fluent in both English and Arabic languages. Third, all translators reached an agreement on the forward-backward translations. Fourth, the DCCS was reviewed by five experts in the field of special education and educational psychology who made comments on clarity and content that were incorporated in the final version of the instrument. Finally, a small-scale pilot study ($n=15$) was conducted prior to the main study and only minor amendments to wording were required.

Selected schools were approached by the authors to coordinate the study work with the principals and teachers. The participants were assessed in the first semester of the 2015 academic year. The data was collected by the two authors of this study. During the data collection, the authors had daily updates and discussions to address the crucial points in the tests' administration

and provide feedback. The actual administration time of the DCCS test was around 10 minutes per student.

To ensure consistency of DCCS testing administration on the children, the researchers read from scripts and used timers. The fidelity of testing administration was tested by using a detailed checklist to ensure each DCCS test was administered as it was intended and described in the testing protocol (Zelazo, 2006). Procedural reliability was obtained during 100% of testing sessions with an average reliability of 100 percent. The researchers scored each DCCS test and entered the data into an excel sheet. The first author checked randomly 30% of the scoring sheets. The average inter-rater reliability of scoring fidelity data was 100%. In terms of data entry reliability, all of the excel data (100%) were checked against the paper scores and all discrepancies were resolved by examining the original protocols. The Statistical Package for the Social Sciences (SPSS), version 17.0, was used to analyze the data. First, data was analyzed using descriptive statistics and visual figures. Second, to explore differences among the three groups of this study, one-way independent Analysis of Variance (ANOVA) was performed. Then, Pearson moment correlations were conducted to determine the relationship among the study variables.

Results

Preliminary Data Analysis

First of all, to improve the shape of the distributions, the responses of outliers whose scores were ± 2 standard deviation or more from the group mean were replaced by a value equal to the next highest non-outlier-score plus 1 unit of measurement (Tabachnick & Fidell, 2001). Table 1 presents the descriptive analyses included calculating the means and standard deviations

among gifted children, children at risk of LDs, average children and the integrated group of children according to all study variables. This descriptive information was helpful in understanding the data and making initial inferences on the differences among all groups of this study.

Table 1. Means and standard deviations of the study variables

Measure/Variable	Gifted (n=27)	Children (n=27)	Children at risk of LDs (n=27)	Control (n=27)	Total (n=81)	
	Mean	SD	Mean	SD	Mean	SD
Age	63.74	3.40	63.85	2.46	63.59	2.29
DCCS	19.52	4.40	10.78	3.80	15.19	3.43
WJ IQ	118.63	2.18	99.81	4.27	100.15	6.03

Note. LDs = learning disabilities, DCCS = The dimensional change card sort Test, WJ IQ = Woodcock-Johnson Arabic Cognitive Tests-full scale intelligence score.

Descriptive statistics also allowed providing visual graphs that facilitated more convenient presentation of the data. Figure 2 displays the average performance of the DCCS Test among the three groups of this study. In general, the preliminary results indicate differences among all groups performances. A closer inspection of the data analyses that addressed study's questions is followed

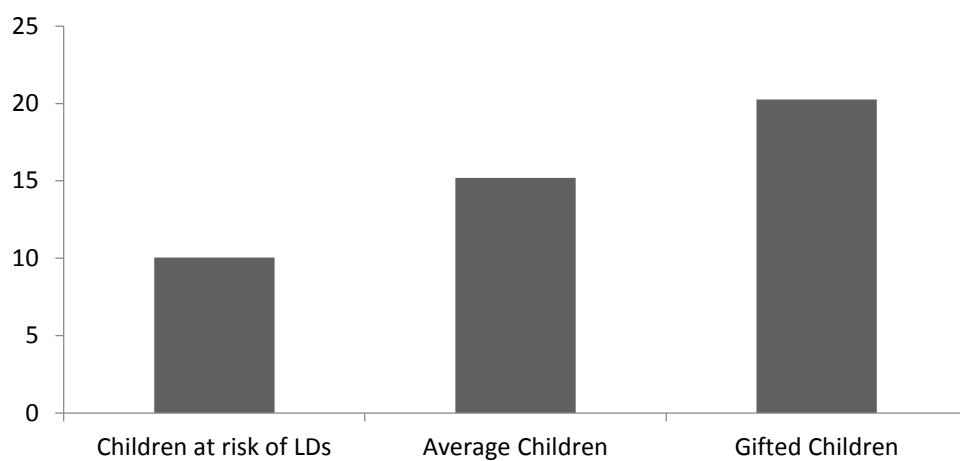


Figure 2. Graphic display of the mean performance on DCCS measure for the three groups of this study

The Average DCCS Test Differences among the Three Groups of This Study

To explore EFs differences among the three groups of this study, one-way independent Analysis of Variance (ANOVA) was performed. All assumptions of performing ANOVA were examined. No violations of normality and homogeneity of variance were detected. The variances were equal for all three groups, $F(2, 78) = .273, p = .762$. There were significant differences among the three groups of this study in terms of their performances on DCCS, $F(2, 78) = 68.07, p < .001, \omega = .79$. These differences are in favor of gifted children then average children, and the worst performances were documented for children at risk of LDs.

The Relationship between the Children's Age and their Performance on DCCS Test

To meet the assumptions of executing Pearson correlation and to increase the statistical power, the three groups of this study were integrated into one group, then age variable was correlated with EFs variable as measured by the DCCS Test. The result indicated that DCCS and age were significantly and largely correlated $r (80) = .68^{**}, p < 0.01$

The Relationship between the Children's IQ and their Performance on DCCS Test

Similar to the previous analysis, to meet the assumptions of executing Pearson correlation and to increase the statistical power, the three groups of this study were integrated into one group, then IQ variable as measured by WJ Arabic Test was correlated with EFs variable as measured by the DCCS Test. The result indicated that DCCS and IQ were significantly and moderately correlated $r (80) = .44^{**}, p < 0.01$.

Discussion

The primary purpose of this study was to broaden the knowledge base regarding the applicability of EFs Arabic assessment among preschool children. EFs Test are typically administered either before entering school or during kindergarten and are used to predict initial school success, and to identify youngsters who may not be ready to participate in a regular school experience. More specifically, the purpose of this study was to evaluate group differences on EF measure in gifted children, children at risk of LDs, and control group. In addition, this study aimed to investigate how EFs correlates to intellectual performance and age of children. The most important results of this study are discussed in the following sections.

Results indicated that there are statistically significant differences among gifted children, children, children at risk of LDs, and average children in terms of their performances on DCCS Test (the study measure of EFs). These differences are in favor of gifted children than average children, and the worst performances was documented for children at risk of LDs. The distinguished performance of gifted children in EFs measure assures the fact that EFs also play an important role in a child's cognitive functioning, behavior, facilitate his/her excellent performances on different cognitive tasks, and can be used to differentiate children according to their abilities. This finding is in line with several researchers' recommendations who suggested that EFs measure may be used with confidence for early identification of gifted children (e.g., Anderson, 2002; Brighton, et al., 2007; Porter, 2005). On the other hand, children at risk of LDs did not present adequate performance when compared with the other two groups of this study. This result is consistent with previous western countries findings that had shown that learning difficulties and behavioral problems are both associated with deficits in EFs (e.g., Mazzocco & Kover 2007; Powell & Voeller 2004). This finding may be explained by the fact that children at

risk of LDs must have at least five frequent symptoms of the 10 Building Blocks Questionnaire to be included in this study. Particularly, most children of LDs group in this study had ADHD. The high rates of co-morbidity between LDs and ADHD are well-documented in research (Hallahan, et al., 2011; Mather & Goldstein, 2008). Thus, it is expected that the condition of ADHD may cause secondary EFs deficits among children at risk of LDs because of the combined problems on several cognitive and behavioral aspects (e.g., deficits in inhibition and attention, impaired working memory). Since significant differences were found among the three groups of this study in their performances on the EFs measure, it may be suggested that DCCS Test can be used as a universal screening tool to find gifted children or children at risk of LDs as early as possible.

Significant and large correlation was found between the study measure of EF and age of participants in months. In other words, the study measure of EFs distinguished participants from different ages in months. Older participants perform better on EFs tasks than younger ones. This finding supports the hypothesis about the relationship between the DCCS Test scores and the participants' chronological age. In this aspect, researchers showed that performance on EFs tasks or demonstration of EFs behaviors develops with age (see Zelazo 2006, for review). In addition, this finding suggests that DCCS Test is a suitable measure for young children. Studies from developmental psychology and cognitive neuroscience suggest that EFs can be elicited in children as young as at the age of 5 years if suitable tasks are used (Anderson, 1998).

Significant and moderate correlation was found between the study measure of EFs and the participants' IQ as measured by WJ Arabic Test. This finding was expected since EFs are the foundation of many high level cognitive functions, which include planning, decision making, meta-cognition, and strategies (Dawson & Guare, 2004; Garner, 2009). This finding is consistent

with emerging evidence that points to the significant relationship between intelligence and EFs because high intellectual aptitude supports the demonstration of higher order cognitive skills in EFs such as reasoning and attention (e.g., Dawson et al. 2007). Furthermore, it is worth documented that DCCS Test and WJ Arabic Tests share two common cognitive factors (specifically, working memory and processing speed) that might contribute significantly along the attention to achieve this positive significant correlation. However, some of these studies documented higher correlations than this study. This may be explained by the differences between this study and other studies in terms of the participants age, number, and selection procedures.

Limitations, Future Research, and Implications

In this study, the researchers attempted to offer an effective tool that may serve as a quick and valid screening procedure to identify gifted children or children at risk of LDs. As indicated previously, the Jordanian and other Arabic educational systems are in need of valid assessment tools to identify children with special needs and provide them with an appropriate intervention. The DCCS Test proposed here should fill this gap and help teachers to identify children who might need further help to success in schools. Future research that will investigate the DCCS Test across different ages or grades is warranted. Gender differences should be investigated in future research as well. This study was intended to be preliminary, providing a framework for future research. Including a larger representative sample for the sake of building Jordanian national norms/benchmarks can be the next step in this line of research.

The promising result of this study suggests that DCCS Test may be used as a screening tool for early identification of gifted children or children at risk of LDs. Teachers in the Arab world should consider other valid and reliable assessment tools such as DCCS Test for use in

both general and special education systems. The results of the current study offer an established methodology for evaluating EFs performance that includes ease of development and administration, low cost, and short administration times.

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Function-based Interventions for Children with Autism Spectrum Disorders in Schools: A Review

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Abstract

An increasing numbers of students with autism spectrum disorder (ASD) are serviced in special and general education settings. Many students with ASD need behavioral supports in order to participate meaningfully in school settings. Function-based intervention has been shown to be effective in decreasing problem behavior and increasing appropriate behavior for students with ASD, however, there are still a number of gaps in the literature. The purpose of this study was to synthesize and examine the research on function-based intervention used in the reduction of problem behavior for students with ASD in school settings. Thirty-seven studies representing 62 participants were included in this review. Descriptive information on various characteristics of the participant, assessment, intervention, and study is provided. Limited teacher involvement and lack of evaluation of generalization and maintenance were common across the studies reviewed. Implications of the findings, study limitations, and recommendations for future research are discussed.

Keywords: function-based intervention; functional behavioral assessment; autism; school; behavior

Introduction

The field of special education for children with autism spectrum disorders (ASD) has progressed significantly since the 1970s. Educational programs based on applied behavior analysis (Lovaas, 1987), TEACCH (Mesibov, Shea, & Schopler, 2005), and pivotal response training (Koegel & Koegel, 2006) have contributed to the field of special education for children with ASD. In the United Kingdom, the prevalence rates of ASD are approximately 3.8/1000 boys and 0.8/1000 girls (Taylor, Jick, & MacLaughlin, 2013). While in Australia, the 2012 Survey of Disability, Aging and Carers (SDAC) estimated that the prevalence rates of ASD are 8/1000 and 2/1000 for males and females respectively (Australian Bureau of Statistics, 2014). However, the prevalence in the United States is increasing with the latest data showing that 14.7/1000 (one in 68) children has been diagnosed with an ASD (Centers for Disease Control and Prevention, 2014). Schools will need to be prepared to educate an increasing number of students with ASD in the years to come.

The number of research studies focused on ASD, particularly in the areas of education and treatment, has increased tremendously. Still, the education of children with ASD continues to be a challenge for school professionals. One area that causes significant challenge in the education of students with ASD is problem behavior. Teachers often indicate that problem behaviors are a significant stressor in their profession (Hastings & Brown, 2002). These problem behaviors include aggression, self-injurious behavior (SIB), stereotyping, and repetitive behavior (Horner, Carr, Strain, Todd, & Reed, 2002). The prevalence of aggression in children with ASD has been found to be around 53% (Mazurek, Kanne, & Wodka, 2013). Students with ASD who exhibit aggression or obsession with certain topics that involve violence can often be suspended from school. While these challenging behaviors very often have communicative intent, teachers have difficulty understanding and managing these behaviors in their classrooms (Starr & Foy, 2012).

In the past, interventions for problem behaviors tended to be punitive and aversive (Morrison, Redding, Fisher, & Peterson, 2006). However, researchers are emphasizing the need for positive behavior supports (PBS), involving functional behavioral assessment (FBA) and the design of interventions to match the function of the problem behavior (Snell, Voorhees, & Chen, 2005). FBA is a process of gathering information to identify the maintaining contingencies for problem behavior in the individual's environment (O'Reilly, 1997). Interventions are then based on the function of the problem behavior. The use of FBA and the principles of PBS have changed the goal of behavior support from a sole focus on removal of problem behavior to a more holistic approach of preventing problem behaviors, teaching alternative skills, and on improving the individual's quality of life (Carr, et al., 2002).

Many research syntheses have examined the effectiveness of behavioral interventions for challenging behavior either for individuals with ASD specifically (e.g., Campbell, 2003; Machalicek, O'Reilly, Beretvas, Sigafoos, & Lancioni, 2007) or for individuals with disabilities that include ASD (e.g., Carr et al., 1999). Overall, previous research syntheses have found that function-based interventions are effective in reducing problem behaviors in children with ASD. However, there are two consistent findings from these reviews that point to limitations of existing research on function-based interventions. First, an area that has been sorely neglected is the evaluation of maintenance and generalization effects (Snell et al.,

2005). Many researchers have called for further research to evaluate the maintenance and generalization effects of behavioral interventions for problem behaviors (Horner, et al., 2002; Scotti, Evans, Meyer, & Walker, 1991) as this may provide further evidence of the effectiveness of these interventions to promote lasting and meaningful outcomes. Second, many of the existing research studies on function-based interventions have been led by researchers with limited involvement of teachers (Goh & Bambara, 2012). As a key component of PBS is ensuring social validity and acceptability of interventions by typical intervention agents, researchers must ensure that teachers have an integral role in research in order to demonstrate the feasibility of applying these interventions by teachers in the classrooms. More importantly, teachers need to be adequately trained to plan and implement FBA and function-based interventions. Research has shown that teachers can be trained successfully to conduct FBA and write appropriate behavior support plans (e.g., Bethune & Wood, 2013).

Although Machalicek and colleagues (2007) conducted a review of studies addressing challenging behaviors in school settings for students with ASD, however, not all the studies in their review were FBA-based. Thus, missing from the existing literature is a review of function-based interventions specific to students with ASD in school settings. Such a review is warranted as it could provide evidence to support the use of function-based interventions in schools and would be of use to researchers in determining gaps in the research base for this specific population of students. Therefore, the purpose of this literature review is to provide a descriptive overview of function-based interventions used in school settings for students with ASD.

Method

Search Procedures and Selection Criteria

The literature search was conducted in three phases. First, an electronic search of databases (*Education Research Complete*, *ERIC*, and *PsycInfo*) was conducted for studies published between 2000 and 2012. The database of studies for the present review was established from a broad search using the following keywords: behavior problems, behavior modification, behavioral assessment, self-injurious behavior, positive behavior support, functional behavioral assessment, functional analysis, and functional assessment. In addition, the terms autism, pervasive developmental disorders, and autism spectrum disorders were included in the search. Second, a hand search of journals in which function-based interventions is frequently published was conducted: *Behavior Modification*, *Behavioral Disorders*, *Behavioral Interventions*, *Child and Family Behavior Therapy*, *Education and Training in Autism and Developmental Disabilities*, *Education and Treatment of Children*, *Focus on Autism and Other Developmental Disabilities*, *Journal of Applied Behavior Analysis*, *Journal of Autism and Developmental Disorders*, *Journal of Positive Behavior Interventions*, *Research and Practice in Severe Disabilities*, *Research in Autism Spectrum Disorders*, and *Research in Developmental Disabilities*. Third, we conducted ancestral searches of studies referenced in the included studies and in the reference lists of literature reviews on FBA-based interventions (Beavers, Iwata, & Lerman, 2013; Goh & Bambara, 2012; Machalicek, et al., 2007; Reed, Hirst, & Hyman, 2012).

Studies were included based on the following criteria: (a) school-aged participant had a diagnosis of autism, Asperger's, or pervasive developmental disorder (PDD), (b) the study

was conducted in a K-12 school setting, (c) assessment was conducted using one or more FBA methods to identify variables associated with challenging behavior (d) an individualized intervention to address problem behavior was implemented, (e) the study employed a single-subject research design that demonstrated experimental control with the exclusion of AB design and group designs, and (f) graphed data included at least two points in baseline and intervention respectively.

Coding Procedures

Four categories of independent variables were coded for each study. The four categories were (a) Participant features: gender, grade level, classroom setting, and target behavior; (b) Assessment features: FBA method, function of problem behavior, teacher involvement in FBA, and physical context of FBA; (c) Intervention features: intervention component implemented, teacher involvement in intervention, and physical context of intervention; and (d) Study features: research design, procedural fidelity, and social validity. A description of each of the independent variables is provided in the Results section.

Inter-rater Agreement

The first and second authors served as the primary coders in this study. Several graduate students in special education were trained in the coding system and independently coded a random sample of 38% ($n = 14$) of the included research studies. Inter-rater agreement was calculated separately for each item coded under participant, assessment, intervention, and study features. Inter-rater agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements, multiplied by 100. The mean inter-rater agreement for the coding of participant, assessment, intervention, and study features was 94% (range, 78%-100%). After the inter-rater agreement was conducted, any disagreement was resolved through a consensus from both the primary and secondary coders.

Results

Research Studies

Thirty-seven research studies in 12 different journals met the inclusion criteria. These studies included a total of 62 participants with ASD. The two journals that published the highest number of research studies in this review were *Journal of Applied Behavior Analysis* ($n = 8$) and *Behavior Modification* ($n = 7$). These two journals made up approximately 41% of the research studies on school-based function-based intervention for students with ASD. Table 1 presents detailed information for each study, including the independent variables that were coded (features of the participant, assessment, intervention, and study). All of the studies reported positive findings in terms of reduction in problem behaviors and/or increase in appropriate behaviors.

Table 1. Function-Based Interventions for Students with Autism Spectrum Disorders

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
Athens & Vollmer (2010)	2 male elementary student with autism; NS; Aggression; Reversal design; No; No.	Experimental FBA; (i) Attention & (ii) Tangible; Yes; Typical. Consequence intervention (DRA without extinction); No; Typical.	Aggression decreased and appropriate behavior increased for both students during intervention and 1- & 2-month follow-up.
Banda et al. (2009)	1 male middle school student with severe autism; Special education; SIB. ABAC reversal design; Yes; Yes.	Descriptive & experimental FBA; Multiple functions; Yes; Typical. Antecedent & consequence interventions (positive social attention & extinction); Yes; Typical.	SIB decreased.
Braithwaite & Richdale (2000)	1 male elementary student with autism & ID; General & special education; SIB. Multiple-baseline across behavioral outcomes design; No; No.	Descriptive FBA; Escape & tangible; Yes; Typical. Skill instruction & consequence intervention (FCT & extinction); Yes; Typical.	SIB decreased and correct use of taught phrase increased.
Buckley & Newchok (2005)	1 male elementary student with autism; Special education; Aggression. Reversal design; No; No.	Experimental FBA; Tangible; No; Atypical. Skill instruction & consequence intervention (functional communication training & extinction); No; Atypical.	Aggression lower during low effort mands condition compared to high effort mands condition.
Butler & Luiselli (2007)	1 female middle school student with autism; Special education; SIB. Reversal design; No; No.	Experimental FBA; Escape; Yes; Typical. Antecedent & consequence interventions (non-contingent escape, blocking, & instructional fading); Yes; Typical.	Problem behavior decreased and frequency of requests increased.
Cale et al. (2009)	5 male & 3 female elementary student with ASD; General & special education; Disruption, aggression, & SIB. Multiple-baseline across participants design; Yes; Yes.	Descriptive FBA; Not identified; Yes; Not applicable. Antecedent interventions (environmental modifications); Yes; Typical.	High rates of completion of routines and near total elimination of problem behaviors.
Campbell & Tincani (2011)	2 male & 1 female elementary student with ASD; General & special education; Non-engagement (noncompliance & task refusal). Multiple-baseline across participants design; Yes; Yes.	Descriptive FBA; (i) & (ii) Tangible, & (iii) Escape & tangible; Yes; Not applicable. Skill instruction (Power Card strategy); Yes; Typical.	Direction following improved for all students during intervention. Skill maintained for 2 out of 3 students during follow-up.

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
Casey & Merical (2006)	1 male middle school student with autism; General & special education; SIB. Multiple-baseline across settings design; No; No.	Descriptive & experimental FBA; Escape; Yes; Typical. Skill instruction (functional communication training); Yes; Typical.	SIB reduced and maintained at 24-month follow-up.
Chung & Canella-Malone (2010)	1 female elementary student with autism & ID; Special education; Stereotypy. Multiple-baseline across participants design; No; No.	Experimental FBA; Automatic reinforcement; No; Atypical. Antecedent intervention (presession response blocking); No; Atypical.	Stereotypy reduced and correct responding increased.
Cihak et al. (2012)	4 male middle school student with autism; General & special education; Non-engagement (off-task). BAB reversal design; Yes; Yes	Descriptive & experimental FBA; (i) & (ii) Attention, & (iii) & (iv) Escape; Yes; Typical. Skill instruction & consequence intervention (Social Stories™, video self-modeling, teacher contingent responses); Yes; Typical.	Task engagement higher during intervention for all students.
Clarke et al. (2002)	1 female middle school student with autism; Special education; SIB. Multiple-baseline across activities design; Yes; No.	Descriptive FBA; Escape; Yes; Typical. Antecedent & consequence interventions (e.g., environmental & material modifications, praise); Yes; Typical.	Problem behaviors reduced and engagement increased during intervention and 1-yr follow-up.
Conroy et al. (2005)	1 male elementary student with mild autism; General & special education; Stereotypy. Alternating treatments with an initial baseline design; No; No.	Descriptive & experimental FBA; Automatic reinforcement; Yes; Atypical. Antecedent intervention (stimulus cards); Yes; Typical.	Stereotypy decreased but engagement did not increase.
Crozier & Tincani (2005)	1 male elementary student with autism; Special education; Disruption (talking out). ABAC reversal design; Yes; Yes.	Descriptive FBA; Attention; Yes; Typical. Skill instruction & antecedent intervention (Social story & verbal prompts); No; Atypical.	Talk-outs reduced and maintained at 2-week follow-up.
Devlin et al. (2009)	1 male elementary student with autism; Special education; SIB. Alternating treatments with a final best treatment phase design; No; No.	Experimental FBA; Escape; No; Typical. Antecedent & consequence interventions (interpersonal requests, positive reinforcement, & extinction); No; Typical.	Frequency of SIB lower with behavioral intervention compared to sensory-integration therapy.
Devlin et al. (2011)	4 male elementary students with autism; Special education; SIB & stereotypy. Alternating treatments with an initial baseline & final best treatment phase design; No; No.	Descriptive/experimental FBA; Escape & Tangible or Escape; No; Atypical. Antecedent & consequence interventions (multi-component interventions); No; Typical.	Frequency of problem behavior lower with behavioral intervention compared to

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
English & Anderson (2006)	1 male elementary student with autism; NS; SIB. ABACAB reversal design; No; Yes.	Descriptive & experimental FBA; Multiple functions; Yes; Typical. Antecedent & consequence interventions (physical guidance & attention during 15-s break); Yes; Typical.	sensory-integration therapy for all students.
Franco et al. (2009)	1 male elementary student with autism; Special education; Disruption (making sounds). Multiple-baseline across settings design; No; Yes.	Experimental FBA; Escape & tangible; Yes; Typical. Skill instruction (FCT); No; Typical.	Problem behaviors reduced and engagement increased.
Friedman & Luiselli (2008)	1 male middle school student with autism; Special education; Non-engagement (sleeping). Reversal design; No; No.	Descriptive FBA; Escape & automatic reinforcement; Yes; Typical. Antecedent & consequence interventions (stimulus change, response interruption & redirection, & positive reinforcement); Yes; Typical.	Daytime sleep eliminated during intervention and 6-month follow-up.
Hoch et al. (2002)	1 male & 1 female elementary students with autism, Special education; Aggression & SIB. Reversal design; No; Yes.	Experimental FBA; Escape; Yes; Typical. Consequence intervention (negative reinforcement with preferred activities); Yes; Typical.	Problem behaviors reduced & task completion increased during intervention and follow-up. Behaviors generalized to novel instructors and tasks.
Kelley et al. (2002)	1 male elementary student with autism & severe ID; Special education; Aggression. Multiple-baseline across participants design; No; No.	Experimental FBA; Escape; No; Atypical. Skill instruction & consequence intervention (FCT with extinction); No; Atypical.	Aggression decreased and communication responses increased.
Kennedy et al. (2000)	1 male elementary student with autism; Special education; Stereotypy. Multiple-baseline across behavioral functions design; No; No.	Experimental FBA; Multiple functions; No; Atypical. Skill instruction & consequence intervention (FCT, response interruption, extinction, prompting of alternative response); No; Atypical.	Stereotypy decreased and signing increased.
Kern et al. (2006)	1 male high school student with autism & severe ID; Special education; SIB. Reversal design; No; No.	Descriptive FBA; Automatic reinforcement; Yes; Typical. Skill instruction & consequence intervention (exchange inedible	Pica decreased and exchanges for edibles increased.

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
Lang et al. (2009)	1 female elementary student with severe autism; NS; Stereotypy. Alternating treatments with a baseline design; No; No.	items for edibles & response blocking); Yes; Typical. Experimental FBA; Automatic reinforcement; NS; NS. Antecedent intervention & skill instruction (play intervention with AOC); No; Atypical.	Reduced stereotypy and problem behavior and increased functional play during play intervention with AOC.
Lang et al. (2010)	1 male & 1 female elementary students with severe autism; Special education; Stereotypy. Alternating treatments with a baseline design; No; Yes.	Descriptive & experimental FBA; Automatic reinforcement; Yes; Atypical. Antecedent & skill instruction (play intervention with AOC); Yes; Atypical.	Reduced stereotypy and challenging behavior and increased functional play during play intervention with AOC for both students.
Langdon et al. (2008)	1 male & 1 female elementary students with autism & severe ID; Special education; SIB. BAB reversal design; No; No.	Descriptive & experimental FBA; Escape; Yes; Atypical. Skill instruction (FCT using PECS); No; Atypical.	Problem behavior reduced and communication responses increased for both students.
Liu-Gitz & Banda (2010)	1 male elementary student with autism; Special education; Stereotypy. Reversal design; Yes; Yes.	Experimental FBA; Automatic reinforcement; Yes; Typical. Consequence intervention (Response Interruption & Redirection); Yes; Typical.	Vocal stereotypy reduced.
Luiselli et al. (2004)	1 male elementary student with autism; Special education; Stereotypy. Alternating treatments design; No; No.	Experimental FBA; Escape & automatic reinforcement; No; Typical. Antecedent intervention (alternative sensory consequence with a chew object); No; Typical.	Saliva play eliminated.
Mace et al. (2011)	1 male middle school student with autism; Special education; Aggression. Reversal design; No; No.	Experimental FBA; Tangible; No; Typical. Consequence intervention (offering alternative preferred activity or permitting delayed access contingent on completion of low-preference demands); No; Typical.	Problem behaviors reduced.
Machalicek et al. (2009)	2 female elementary student with autism & moderate ID; Special education; SIB.	Experimental FBA; Attention & escape; No; Atypical. Antecedent & consequence	Challenging behaviors reduced and engagement

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
	Alternating treatments design; No; No.	interventions (positive attention with academic demands interspersed among preferred activities); No; Typical.	increased for both students.
O'Reilly et al. (2005)	1 male middle school student with autism & ID; Special education; SIB. Reversal design; No; No.	Experimental FBA; Escape; No; Typical. Antecedent intervention (individualized schedule); No; Typical.	SIB reduced and engagement increased during intervention & 5-month follow-up.
Patel et al. (2000)	1 male elementary student with autism; Special education; Stereotypy. Reversal with a multi-element component design; No; Yes.	Experimental FBA; Automatic reinforcement; No; Atypical. Consequence intervention (DRO with preferred sensory stimuli); No; Atypical.	Stereotypy reduced.
Pennington et al. (2012)	1 male elementary student with autism; Special education; Non-engagement (elopement). ABA reversal design; No; No.	Descriptive FBA; Attention; Yes; Typical. Consequence intervention (DRA); Yes; Typical.	Elopement reduced during intervention but did not fully return to baseline levels when intervention was withdrawn.
Rapp et al. (2009)	2 male elementary students with autism; Special education; Stereotypy. Multiple baseline across participants with multi-element & reversal design; No; No.	Experimental FBA; Automatic reinforcement; No; Typical. Antecedent & consequence interventions (stimulus cue cards & verbal reprimands); No; Typical.	Vocal stereotypy reduced for both students.
Romaniuk et al. (2002)	1 female elementary student with autism; General & special education; Disruption. ABABAB reversal design; No; No.	Experimental FBA; Escape; No; Atypical. Antecedent intervention (provided with choices); No; Atypical.	Problem behaviors reduced.
Ross (2002)	1 male & 1 female elementary students with autism; Special education; Socio-communication skills. ABA reversal design; No; Yes.	Experimental FBA; Attention; No; Atypical. Skill instruction & consequence intervention (FCT & token reinforcement); No; Atypical.	Faulty responses decreased and conversational units increased for both students. Effects generalized to novel person for one student.
Stichter et al. (2009)	3 male elementary students with autism; General & special education; Aggression, stereotypy, & non-engagement. Multiple-baseline across educational contexts design;	Descriptive & experimental FBA; Not identified; Yes; Typical. Antecedent intervention (individualized antecedent strategies, such as, proximity, pre-correction, scheduling); Yes; Typical.	Problem behaviors reduced and engagement and social interaction increased during intervention and

Author(s)	Participant: Participant Description; Typical Setting; Target Behavior. Study: Design; Social Validity; Procedural Fidelity	Assessment: FBA Type; Function of Behavior; Teacher Involvement; Assessment Context. Intervention: Intervention Type; Teacher Involvement; Intervention Context	Results
	No; Yes.		maintenance for all students.
Waters et al. (2009)	2 male elementary student with autism; General & special education; Aggression. Multiple-baseline across participants design; No; No.	Experimental FBA; Escape & tangible; No; Typical. Antecedent & consequence interventions (Visual schedule, DRO plus extinction); No; Typical.	Transitions with problem behaviors reduced for both students.

Note: NS = not specified; FBA = functional behavioral assessment; DRA = differential reinforcement of alternative behavior; SIB = self-injurious behavior; ID = intellectual disability; FCT = functional communication training; ASD = autism spectrum disorders; AOC = abolishing operation component; SDA = structured descriptive assessment; PECS = *Picture Exchange Communication System*; DRO = differential reinforcement of other behavior.

Participant Features

Gender and grade level. Thirty-one studies involved male participants and 12 studies involved female students. In the majority of the studies, the studies were conducted with elementary students (grades K-5; $n = 28$), followed by middle school students (grades 6-8; $n = 8$). Of the 37 studies, only one study (i.e., Kern, Starosta, & Alderman, 2006) included a high school student (grades 9-12).

Classroom setting. This independent variable described the classroom placement of the participant. Twenty-six studies were conducted with participants in special education settings, eight studies for students in inclusive settings, and one study included students who were placed in general education settings. Finally, in three studies, the classroom placements of the participants were not specified in the research studies.

Target behavior. This independent variable described the problem behavior that was targeted for intervention in the research studies. Problem behaviors were grouped into the following five categories listed here by decreasing severity: Stereotypy/self-injurious behavior (e.g., hand flapping, hand biting, head hitting), aggression (e.g., hitting or throwing objects at others), disruption (e.g., talking out loud and crying), non-engagement (off-task behaviors that were not disruptive in the class setting, such as looking out the window or sleeping in class), and socio-communication skills (e.g., conversational skill or appropriate interaction). The most prevalent type of behavior was stereotypy/self-injurious behavior, targeted in 24 studies. Aggression was the next most prevalent category of behaviors reported ($n = 8$), followed by non-engagement ($n = 5$). Four studies targeted disruption and one study focused on the lack of socio-communication skills (i.e., Ross, 2002).

Assessment Features

FBA type. This variable described the specific descriptive and experimental assessment procedures that were employed to assess the environmental influences on the participant's behavior. Experimental FBA included functional analysis, hypothesis testing, or

structural analysis. Descriptive FBA included interview and questionnaire, rating scales, direct observation of behavior, and record review. Twenty-one studies utilized experimental FBA only. Seven studies used descriptive FBA only. The use of a combination of both experimental and descriptive FBA was carried out in nine studies.

Function of problem behavior. This variable referred to the function of problem behavior that was identified in the study based on the FBA results. In the research studies where a single function was identified for the problem behavior, the most common function was escape ($n = 11$), followed by automatic reinforcement ($n = 8$), attention ($n = 5$), and tangible ($n = 4$). When the FBA indicated more than one function, the function of the problem behavior was coded as having multiple functions. In 11 studies, multiple functions were identified. Finally, the function of the problem behavior was not identified in two studies (i.e., Cale, Carr, Blakeley-Smith, & Owen-DeSchryver, 2009; Stichter, Randolph, Kay, & Gage, 2009). The function of the problem behavior was typically not reported when the researchers utilized a structural analysis or hypothesis testing for the FBA without identifying the function of the problem behavior.

Teacher involvement in FBA. This variable examined whether or not teachers were involved in the FBA. Of the 37 studies, 21 studies involved teachers in the FBA. Most of the teacher involvement in FBA was in the form of providing information for the FBA through interviews or questionnaires regarding the students' behavior. However, there were some studies in which the teachers had a more active involvement in the FBA process. In these studies, teachers participated in the functional analysis (e.g., Cihak, Kildare, Smith, McMahon, & Quinn-Brown, 2012), observed and recorded behavioral data (e.g., Franco et al., 2009; Kern et al., 2006), and/or formulated the hypothesis with the researcher (e.g., Clarke, Worcester, Dunlap, Murray, & Bradley-Klug, 2002). Typically, for studies that did not involve teachers in the FBA, researchers or clinicians, were the assessment agents (e.g., Athens & Vollmer, 2010; Mace, Pratt, Prager, & Pritchard, 2011).

Physical context of FBA. This variable described the location in which the FBA was conducted. In 22 studies, the FBA was conducted in typical settings such as the participants' respective classrooms. However, participants in 12 studies were pulled out to atypical settings (e.g., behavioral observation room) for the FBA. When only teacher interviews or questionnaires were carried out, with no involvement of the participants in the FBA, the physical context of FBA was coded as not applicable ($n = 3$).

Intervention Features

Intervention component implemented. This variable described whether the study included the four key components of a comprehensive behavior support plan: (a) antecedent interventions, (b) skill instruction, (c) consequence interventions, and (d) long-term supports (Bambara, 2005). In this review, none of the studies implemented a long-term support intervention. Because a study could consist of more than one intervention component, the percentage of studies implementing each of the three intervention components (i.e., antecedent intervention, consequence intervention, skill instruction) totals to more than 100%.

The most prevalent component of behavior support utilized was consequence intervention. Consequence interventions comprise strategies that direct the provision of responses for problem behavior and/or appropriate behavior. Among the 37 studies, 23

(62%) included a consequence intervention component. The consequence strategies that behavior, response cost, and extinction.

The next most prevalent component of behavior support utilized was antecedent intervention. Antecedent interventions are strategies that focus on restructuring the environment to prevent the occurrence of problem behaviors (Kern & Clarke, 2005). Antecedent strategies were implemented in 54% of the studies ($n = 20$). A diverse variety of antecedent strategies were implemented, including curricular modifications, environmental arrangement, and choice-making.

The final component of behavior support that was examined was skill instruction. Skill instruction comprises strategies that teach the students an alternative skill to replace the problem behavior or a skill that improves their functioning in school settings (Halle, Bambara, & Reichle, 2005). Slightly more than one third of the studies ($n = 14$) included a skill instruction component. The skills that were taught included communication skills, social skills, and play skills.

Teacher involvement in intervention. This variable examined whether or not teachers were involved in designing and implementing the intervention strategies. Teachers were involved in intervention in 46% of the studies ($n = 17$). Teachers often took the role of intervention agent to implement the strategies. In a small minority of studies, teachers were involved in designing the intervention plan (e.g., Clarke, et al., 2002). Studies that did not involve teachers in intervention typically utilized therapists as the intervention agent.

Physical context of intervention. This variable described the location in which the intervention was implemented. In the majority of the studies ($n = 26$, 70%), the intervention was implemented in typical settings, such as, participants' classrooms. However, a small number of the studies were implemented in atypical settings, such as the assessment room or an empty room within the school building.

Study Features

Research design. This variable described the single-subject research design that was utilized in the study. Almost half of the included studies ($n = 18$) used a reversal design. A multiple baseline design was utilized in 12 studies, and seven studies employed an alternating treatments design.

Maintenance. Maintenance refers to the ability to continue to demonstrate behavioral reduction or gains after the intervention has been discontinued. Slightly less than a quarter of the studies ($n = 9$) measured maintenance effects. Among the studies where maintenance data were collected, the shortest maintenance duration examined was two weeks, while the longest was 24 months. In some studies, maintenance was examined but the maintenance duration was not stated in the study.

Generalization. Generalization refers to the ability to demonstrate behavioral reduction or gains in novel environments or conditions. Only two studies evaluated the generalization effects of the intervention (i.e., Hoch, McComas, Thompson, & Paone, 2002; Ross, 2002).

Procedural fidelity and social validity. This variable documented whether the study measured procedural fidelity (i.e., the extent to which the intervention was implemented as planned) and social validity (i.e., the acceptability of the intervention components to typical

intervention agents). In 13 studies, procedural fidelity was measured. However, social validity was only evaluated in seven studies (19%).

Discussion

The purpose of this study was to synthesize research on function-based interventions for students with ASD in school settings. In general, the findings for student characteristics were consistent with the research syntheses of function-based interventions for school-aged participants that included students with and without disabilities (Goh & Bambara, 2012; Snell et al., 2005). The majority of the students who were involved in the function-based interventions were male; this finding was also reported in other research syntheses on behavioral interventions that included individuals with ASD (Campbell, 2003; Carr, et al., 1999; Didden, Korzilius, Van Oorsouw, & Sturmey, 2006), and this aligns with the greater proportion of males identified with ASD (Centers for Disease Control and Prevention, 2014). Only about a fifth of the participants were middle school students and there was only one high school student out of all of the 62 participants in this research synthesis. This is a disturbing finding and suggests the need for more research using function-based interventions with this student population.

Traditionally, interventions for problem behavior have been implemented in restrictive settings (e.g., hospitals and inpatient settings). Although there were studies conducted with students with ASD in inclusive settings, the majority of the studies reviewed were conducted with students who were in special education settings. Function-based interventions have customarily been utilized with more severe problem behaviors such as self-injurious behaviors and aggression (Carr, et al., 1999). However, in this research synthesis, we found that function-based interventions were utilized across a wide range of problem behaviors, from severe SIB to common off-task behaviors in the classroom. Further, a majority of the FBA and interventions were implemented within the students' classrooms. This is a welcome finding, demonstrating the use of function-based interventions for various problem behaviors that occur in inclusive classroom settings.

With regard to the use of FBA, experimental FBA (i.e., functional analysis, structural analysis and hypothesis testing) alone or in combination with descriptive methods was the most commonly used FBA method; a finding consistent with other research syntheses (e.g., Campbell, 2003; Carr, et al., 1999; Didden, et al., 2006; Goh & Bambara, 2012). The function of the problem behaviors also varied across the studies with escape and automatic reinforcement being two of the most commonly identified functions of the problem behavior.

Although a large majority of the studies involved teachers, the extent of their involvement was not typically described in the studies reviewed. Generally, the teachers did not assume primary responsibilities for the design of assessment and intervention. In addition, few research studies reported social validity results. As teachers often prefer interventions that fit the context of their classroom and as they often choose interventions based on their own beliefs about problem behavior and its intervention (Boardman, Argüelles, Vaughn, Hughes, & Klingner, 2005), evaluating the teachers' satisfaction with the intervention would be an important measure of the sustainability of the intervention.

In terms of intervention components implemented, the use of consequence intervention and antecedent intervention were the most common, followed by skill instruction. Comprehensive lifestyle change has been advocated by many researchers as an important component in the intervention of problem behaviors that may produce meaningful and lasting change to the individual's quality of life (Carr, et al., 2002). However, research syntheses have found few or no studies that incorporated this intervention component (Goh & Bambara, 2012; Snell et al., 2005), a finding that was echoed in the present review.

As stated earlier, researchers have called for further research to evaluate the maintenance and generalization effects of behavioral interventions for problem behaviors (Horner, et al., 2002; Scotti et al., 1991) in order to provide further evidence of the effectiveness of these interventions to promote long term and meaningful outcomes. However, as reported by other researchers (Snell, et al., 2005), we also found that very few studies measured maintenance and generalization effects. Since many interventions were implemented in the student's classroom, perhaps generalization may not be as critical as compared to an intervention that is being implemented in a segregated setting. Even so, generalization of intervention effects could be demonstrated across novel settings or people within the school or in the home and community.

Limitations

The results on this review should be interpreted in accordance with several limitations. First, as with any review, the results are dependent on what can be ascertained from published research. Intervention studies that are published in scholarly journals are likely to report positive findings, and this leads to the possibility that the results of the present review may be positively skewed. Second, this review examined the components of published research studies and did not take into consideration the quality of the research that has been published. Although there is a great deal of overlap between the components that were examined in this studies and accepted quality indicators for special education research (e.g., Horner et al., 2005), beginning with a selection of only those research studies deemed to be high quality may have yielded different results.

Conclusion and Future Research

This research synthesis of function-based interventions with students with ASD in school settings resulted in several encouraging findings. Function-based interventions were found to be effective across various target problem behaviors in both inclusive and special education settings. An important future research agenda should target the collateral gains, such as social relationships and lifestyle change, that Horner, et al. (2002) and Scotti, et al. (1991) advocated as important outcome measures as indicators of the effectiveness of behavioral interventions for problem behaviors. Aside from this, future research is needed to evaluate the effectiveness of function-based interventions for high school students with ASD. Other important characteristics that warrant examination in future research include maintenance and generalization effects, the involvement of teachers in designing and decision-making process during assessment and intervention, and assessment of the social validity of the function-based intervention.

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Relationships between Reading Motivation, Reading Activity, Oral Language, and Reading Achievement in Children with Attention-Deficit/Hyperactivity Disorder

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Abstract

Fifteen third and fourth graders with attention-deficit/hyperactivity disorder were asked to complete reading self-efficacy and reading activity scales and standardized tests of oral and written language to examine the relationships between reading self-efficacy, reading activity, oral language, and reading achievement, with gender and age controlled. Students with higher self-efficacy for personally relevant reading activities displayed higher reading achievement, whereas those who held higher self-efficacy for fundamental reading skills displayed lower reading achievement, suggesting inflated perceived competence possibly due to meta-cognitive deficits. Students' reading performance decreased with age, suggesting the presence of Matthew effects. Fourth graders displayed higher task self-efficacy than third graders. Reading activity, oral language, and gender did not contribute significantly to predicting reading achievement in this sample of children.

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neuro-behavioral developmental disorders in childhood, affecting about 5% of the children in the United States, as reported by Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Prior research has documented that, compared to typically developing peers, children with ADHD tend to demonstrate lower performance on both word recognition (Åsberg, Kopp, Berg-Kelly, & Gillberg, 2010; Mayes and Calhoun 2006) and reading comprehension tasks (Brock & Knapp, 1996; Zentall, Tom-Wright, & Lee, 2013) (e.g., recalling central ideas; Miller, et al., 2013), possibly associated with underlying deficits in executive functioning (Miranda, Soriano, & Garcia, 2005). Ghelani, Sidhu, Jain, and Tannock (2004) found that students with ADHD obtained lower scores on reading rate and accuracy and reading comprehension tasks compared to their typically developing peers. Frazier, Youngstrom, Glutting, and Watkins (2007) also found a large discrepancy in reading achievement between children with ADHD and those without disabilities. They suggested that this might either indicate the negative impact of ADHD symptoms on these students' reading performance or the fact that students with learning disabilities, a frequently co-morbid condition with ADHD that is typically associated with reading difficulties, were not excluded in their study.

When it comes to the amount and breadth of reading activities (we refer to this as reading activity in this study), Lee and Zentall (2012) found that children with ADHD tended to be equally engaged in school reading and personal reading activities (e.g., reading for self-enjoyment) as their typically developing peers. In contrast, students with reading disabilities (RD) with and without ADHD were found to engage in significantly fewer personal reading activities for enjoyment. They argued that this result might indicate that "*reading could be viewed as disability-free for students with*

ADHD without RD" (p. 784). More research is needed to explore the reading activity in the ADHD population.

Deficits in oral language have been observed in children with ADHD (Kim & Kaiser, 2000; McInnes, Humphries, Hogg-Johnson, & Tannock, 2003; Oram, Fine, Okamoto, & Tannock, 1999). For example, Oram, et al., (1999) found that students with ADHD experienced difficulties on standardized tests targeting receptive and expressive language skills, even when potential co-morbid language impairment (LI), a condition typically associated with oral language difficulties, was excluded. Kim and Kaiser (2000) examined the comprehensive language profiles of children with ADHD and found that children with ADHD demonstrated lower oral language abilities compared to their typically developing peers, and these children tended to experience more difficulties in expressive than receptive language.

Children with ADHD also have been found to demonstrate lower general motivation to learn new things and use strategies consistently (Carlson, Booth, Shin, & Canu, 2002; Zentall & Beike, 2012). In Tabassam and Grainger's (2002) study, both children with LD alone and those with co-morbid LD and ADHD showed significantly lower academic self-efficacy than their typically developing peers. However, their study didn't examine academic self-efficacy for children with ADHD alone. A more recent study conducted by Lee and Zentall (2012) found that children with ADHD displayed equivalent self-efficacy for reading compared to their typically developing peers. More studies are needed to examine self-efficacy, a critical component of motivation, in the domain of reading for children with ADHD.

Evidence suggests that reading motivation, reading activity, oral language, and reading achievement are closely related in typically developing children (Guthrie, Wigfield, Metsala, & Cox, 1999; Kendeou, Van den Broek, White, & Lynch, 2009; Shell, Murphy, & Bruning, 1989). However, to date few studies have directly

investigated these critical relationships among children with ADHD. The current study aims to address this research gap and determine whether reading motivation, reading activity, and oral language are strong predictors of reading achievement in children with ADHD. The results from the study are expected to contribute to the field by adding to the very limited body of research literature on reading in children with ADHD, deepening understanding of the underlying causes of their lower reading achievement, and providing some support for future research studies that investigate how to improve reading achievement for these children.

Review of Literature

Reading motivation, reading activity, and oral language have been documented to be critical constructs that play important roles in students' reading development. The body of literature on relationships between these constructs for typically developing children provides theoretical and empirical support for examining these relationships in children with ADHD.

Reading Motivation

Motivation has been documented to be highly correlated with learning in general and reading comprehension in particular (Brophy, 2004; Duke, Pearson, Strachan, & Billman, 2011; Guthrie, 2004; Guthrie, Schafer, & Huang, 2001; Guthrie, et al., 2006; Proctor, Daley, Louick, Leider, & Gardner, 2014). As a critical component of reading motivation, self-efficacy for reading refers to individuals' assessments of their own capabilities to perform reading tasks or activities to achieve desired goals (Eccles & Wigfield, 2002; Wigfield, Guthrie, Tonks, & Perencevich, 2004). Self-efficacy is believed to be very influential for individuals' functioning (Bandura, 1986), and can impact students' choice of the reading activities or tasks with which they engage, how much effort they expend on these, to what extent they persist when faced with reading difficulties, how they feel towards reading, and their overall reading

achievement (Linnenbrink & Pintrich, 2003; Mills, Pajares, & Herron, 2006; Pajares & Schunk, 2002; Solheim, 2011; Wolters, Denton, York, & Francis, 2014). For instance, Solheim (2011) found that reading self-efficacy was a strong positive predictor of fifth graders' reading comprehension on both multiple-choice and constructed-response comprehension measures even with word reading, listening comprehension, and nonverbal cognitive ability held constant. Lee and Zentall (2012) found that the children with ADHD didn't differ from their typically developing peers in intrinsic and extrinsic motivation, a finding that differed from prior studies in which motivational deficits were found in this population across academic areas (e.g., Zentall & Beike, 2012). They argued that this result might indicate that children with ADHD experience deficits in general motivation but not reading motivation. However, their study didn't examine the relationships between reading self-efficacy specifically and reading achievement for the children with ADHD.

Reading Activity

Reading activity, defined as the amount and breadth of reading, is critical to students' reading development and engagement (Guthrie, Schafer, & Huang, 2001; Wigfield & Guthrie, 1997). Reading activity has been found to exert a significant positive impact on students' reading achievement (McQuillan & Au, 2001; El-Khechen, Ferdinand, Steinmayr, & McElvany, 2016). In Cipielewski and Stanovich's (1992) study, the Title Recognition Test (TRT) and the Author Recognition Test (ART) were used to measure fourth and fifth graders' reading exposure. The volume of reading tested by both measures was found to predict fifth-grade reading performance, with third-grade reading ability controlled. Guthrie, Wigfield, Metsala, and Cox (1999) found that the amount of reading predicted text comprehension for third and fifth graders, even when prior knowledge, reading self-efficacy, and previous reading achievement were controlled. El- Khechen and colleagues (2016) also reported similar

findings for bilingual students with Turkish or Turkish/German as family language, whose reading amount in German was found to positively predict their German reading comprehension. In addition to being a predictor of reading achievement, reading activity also has been found to be correlated with reading motivation (Becker, McElvany, & Kortenbruck, 2010; Cox & Guthrie, 2001; Wigfield & Guthrie, 1997; Stutz, Schaffner, & Schiefele, 2016). For example, Wigfield and Guthrie (1997) assessed reading volume and breadth of 105 fourth and fifth graders using the Reading Activities Inventory (RAI; Guthrie, McGough, & Wigfield, 1994). This measure asked students to provide titles of different kinds of print materials they read during the past week in and out of school (e.g., comics, magazines, newspapers) achievement were controlled. El- Khechen and colleagues (2016) also reported similar findings for bilingual students with Turkish or Turkish/German as family language, whose reading amount in German was found to positively predict their German reading comprehension.

and to rate how often they read these materials on a 4-point scale, with 1 representing “*almost never*” and 4 “*almost every day*”. The results showed that the students’ reading motivation predicted their reading activity. The authors claimed that children who held high self-efficacy beliefs for reading and were intrinsically motivated reported more frequent reading than their less motivated peers. In Cox and Guthrie’s (2001) study, 251 third and fifth graders completed three surveys: the Motivation for Reading Questionnaire (MRQ; Wigfield & Guthrie, 1997) to measure a wide array of studies, newspapers) and to rate how often they read these materials on a 4-point scale, with 1 representing “*almost never*” and 4 “*almost every day*”. The results showed that the students’ reading motivation predicted their reading activity. The authors claimed that children who held high self-efficacy beliefs for reading and were intrinsically motivated reported more frequent reading than their less motivated peers. In Cox and

Guthrie's (2001) study, 251 third and fifth graders completed three surveys: the Motivation for Reading Questionnaire (MRQ; Wigfield & Guthrie, 1997) to measure a wide array of students' reading motivations; the Strategy Self-Report Measure to assess students' use of reading strategies; and the RAI to measure the amount of reading for both enjoyment and school. Reading motivation was found to be a strong predictor of reading for enjoyment for both third and fifth graders when prior achievement and strategy use were controlled. However, reading motivation didn't contribute to variance in self-reported activity in school-oriented reading for these students. More recently, Stutz, Schaffner, & Schiefele (2016) found positive correlations between intrinsic reading motivation and the amount of reading for a large group of second- and third-grade elementary students.

Lee and Zentall (2012) assessed the reading motivation and reading activity of 133 second to fifth graders who were divided into four groups (students with ADHD, students with RD, ADHD + RD, and non-disabled) and found that students with RD and those with ADHD + RD engaged in fewer personal reading activities (as assessed by the RAI) compared to the non-disabled group. Those with ADHD alone didn't differ from their typically developing peers in their school-oriented or personal reading activities. However, the relationships between reading activity, reading motivation, and reading achievement for children with ADHD were not investigated in their study. A more recent longitudinal study conducted by Lee and Zentall (2015) found that reading achievement, amount of reading for personal interest and for school, and intrinsic motivation at the elementary level were positive predictors of reading achievement in middle school for students with ADHD. Self-efficacy for reading, however, didn't seem to contribute to predicting later achievement for these children. We have not located any study that has directly examined the concurrent relationships between reading self-efficacy and reading achievement in the ADHD population.

Oral Language

Oral language has long been associated with students' later reading achievement. Scarborough (2001) conceptualized three different aspects of oral language: phonology (sounds), syntax (word order), and semantic structures (vocabulary for labeling objects and concepts). The relationship between oral language and reading achievement has been well documented in previous research studies (Catts, Fey, Zhang, & Tomblin, 1999; Kendeou, Van den Broek, White, & Lynch, 2009; Nation & Snowling, 2004; Vellutino, Tunmer, Jaccard, & Chen, 2007). For example, Kendeou and colleagues (2009) measured oral language abilities (i.e., listening comprehension, audiovisual story comprehension, and vocabulary) and decoding skills (i.e., letter and word identification and phonological awareness) of four- and six-year-old students and retested them two years later. The results showed that oral language abilities and decoding skills each independently predicted reading comprehension in second grade. In Nation and Snowling's (2004) study, measures tapping vocabulary, listening comprehension, and semantic skills were used to assess students' oral language abilities from the age of 8.5 to 13 years. Regular word reading, exception word reading, nonsense word decoding, and reading comprehension were measured to examine the students' reading skills. The results showed that oral language abilities were both concurrent and longitudinal predictors of reading comprehension. In Vellutino, Tunmer, Jaccard, and Chen's (2007) study, 468 children divided into younger (grades 2 and 3 combined) and older (grades 6 and 7 combined) groups were given a large battery of tests to assess their reading skills (e.g., reading comprehension, word identification) and reading-related cognitive abilities (e.g., phonological and visual coding). Both semantic (vocabulary and verbal concept) knowledge and listening comprehension were found to directly contribute to reading comprehension. In a large-scale study conducted by Catts, Fey, Zhang, and Tomblin (1999), 604 second-graders were grouped

as good readers (who scored at least 1 SD above the mean) versus poor readers (who scored at least 1 SD below the mean) based on their performance on reading comprehension tests. Poor readers were found to have had experienced difficulties with not only phonological processing, but also broader oral language skills in kindergarten. The results from regression analysis showed that oral language contributed significantly to later reading achievement. In this study, standardized measures of oral language abilities included receptive vocabulary, sentence comprehension, expressive vocabulary, and oral narrative skills. Given the oral language difficulties typically experienced by children with LD and with ADHD, it is assumed that oral language skills might be an important contributor to lower reading achievement in these children.

Gender and Age/Grade as Potential Moderators

Gender differences favoring girls in reading motivation have been explored and reported in previous research studies. In general, girls tend to demonstrate more positive reading motivation compared to boys (Lau, 2009; Logan & Johnston, 2009; Marinak & Gambrell, 2010; Wigfield & Guthrie, 1997). For example, Wigfield and Guthrie (1997) found significant gender differences favoring girls on different reading motivation scales for fourth and fifth graders. Similar findings were obtained in a national survey conducted by McKenna, Kear, and Ellsworth (1995), which showed that girls held more positive attitudes toward both academic and recreational reading than boys at all grade levels in elementary school. Marinak and Gambrell (2010) also examined gender differences in the reading motivation of 288 third graders. The Motivation to Read Profile (MRP; Gambrell, et al., 1996) that tapped two constructs of reading motivation (i.e., self-concept as a reader, and value of reading) was used. Boys were found to hold equivalent self-concept beliefs compared to their female counterparts, but valued reading less. These results, as suggested by the researchers, indicated that low reading motivation in boys might be strongly related to the limited

value they place on reading. It is worth noting that Marinak and Gambrell's study measured self-concept and not self-efficacy beliefs. Reading self-concept refers to more general beliefs about one's abilities within the domain of reading (e.g., "I am a good reader"), while reading self-efficacy refers to beliefs that are more task- or skill-specific (e.g., "I am confident I can read and understand a magazine article").

Girls also have been found to perform better on reading achievement outcomes (Mullis, Martin, Gonzalez & Kennedy, 2003; Mullis, Martin, Kennedy & Foy, 2007) and engage in more reading activities than boys (Coles & Hall, 2002; Logan & Johnston, 2009). In Logan and Johnston's (2009) study, 232 10-year-old children were given different measures of reading (including word reading, comprehension, and vocabulary) and were asked to complete a questionnaire that reflected their reading frequency, attitudes, perceived competence, and academic support. Girls were found to hold more positive attitudes toward reading than boys and performed better on reading comprehension tasks and read more frequently than boys. In contrast, no gender differences in reading performance were found for 136 first to fourth graders with ADHD in Dupaul, et al.,'s (2006) study, in which both boys and girls with ADHD were found to demonstrate reading performance in the low average range, as assessed by Woodcock-Johnson III Tests of Achievement (WJ-III) and report card grades. Although girls were found to perform slightly better than boys in the area of reading, the differences were not statistically significant. They also reported higher ratings for academic motivation in girls than boys.

In terms of age/grade differences in reading motivation, Eccles, Wigfield, Harold, and Blumenfeld (1993) assessed 865 first, second, and fourth graders for their perceived competency and valuing in different domains, in which reading was included as a specific domain. Results showed that younger children (particularly first graders) exhibited more positive self-efficacy than older children. McKenna, Kear, and

Ellsworth (1995) found that students in grades 1 through 6 exhibited decreasing motivation towards both reading for pleasure and academic reading. Wigfield and Guthrie (1997) found that fourth graders held a more positive motivational stance regarding reading than fifth graders, though the differences were only significant in the fall and not in the spring administration of their measures. In Lau's (2009) study, fourth to eleventh graders in Hong Kong were divided into three grade levels (primary, junior secondary, and senior secondary) and were given a Chinese version of the Motivation for Reading Questionnaire (CMRQ; Wigfield & Guthrie, 1997) to assess their reading motivation, including self-efficacy, intrinsic motivation, extrinsic motivation, and social motivation. Students in higher grade levels were found to be less motivated than those in lower grade levels. These grade differences were consistently shown across all types of reading motivation.

Cox and Guthrie (2001) found grade differences for third and fifth graders in both reading for enjoyment and reading for school. With respect to reading for enjoyment, reading motivation predicted reading activity for fifth graders (with other variables controlled) whereas reading motivation together with prior reading achievement predicted reading activity for the third graders. With respect to reading for school, reading motivation contributed to reading activity for third grades but not fifth graders. In Lee and Zentall's (2012) study that sampled second to fifth graders with ADHD, RD, co-morbid ADHD and RD, and typically developing students, grade effects in reading motivation were found, in that fifth graders showed lower reading self-efficacy than third and fourth graders. They also found grade differences for school-oriented reading activities, with fifth graders reporting more frequent activity than second graders. Lee and Zentall (2015) also found that the intrinsic, extrinsic, and social motivation were higher in elementary than middle school for children with ADHD.

The Current Study

Given the well-documented poor reading achievement of children with ADHD as well as the fact that few studies have directly examined the relationships between oral language, reading motivation, reading activity, and reading achievement in this population, the current study aims to address the following three questions: a) What are the reading self-efficacy beliefs and frequency of engaging in different reading activities for third and fourth graders with ADHD compared to their typically developing peers? b) To what degree do reading self-efficacy, reading activity, and oral language abilities predict reading achievement in third and fourth graders with ADHD? c) To what degree do reading self-efficacy and oral language predict reading activity in third and fourth graders with ADHD? This study targeted third and fourth graders for the following two reasons. First, the shift from learning to read to reading to learn takes place at around third/fourth grade (Chall & Jacobs, 2003). When entering these grades, students are pressed to use reading as a tool to learn complex words, concepts, and facts to expand their knowledge about the world. Therefore, reading achievement in the intermediate grades is a particularly important academic outcome to investigate because of its close ties with students' ability to learn and explore. Second, this period also witnesses the trend of decrements in reading motivation for many elementary students (e.g., Lee & Zentall, 2012; McKenna, Kear, & Ellsworth, 1995).

Method

Participants

Fifteen students (5 boys and 10 girls) with ADHD from 3rd (n=8) and 4th (n=7) grade in 9 schools in the Midwest were included in this study. Of the 15 participants, 60% were White, 20% were African American, 6.7% were Asian American, and 13.3% were Hispanic. None of the participants had documented intellectual, emotional, or

hearing difficulties, or spoke English as a second language. Student assent and signed parental consent forms were obtained before the study measures were administered.

Prior to participating in the current study, twelve students were clinically diagnosed as having ADHD, eleven of whom took medication on a daily basis. Those students were required not to take any medication on testing days for the study. Further, screening assessments for ADHD were administered and the results indicated that all 15 participants met our criteria of having ADHD, defined in this study as (a) obtaining a T-score over 60 on either the Conners' Continuous Performance Test-Second Edition (CPT-2) omission or commission portions, (b) obtaining a T-score above 60 on the parent version of the Conners' Rating Scale-Revised long form (CRS-R), and/or (c) obtaining a T-score above 60 on the teacher version of the CRS-R. Based on regression analysis, the criterion used to define ADHD did not serve as a significant predictor of any outcome measure in this study.

Among all 15 participants with ADHD, ten also demonstrated oral language difficulties, either receptive (listening comprehension) or expressive (oral expression), or both, defined as scoring below the 25th percentile on Wechsler Individual Achievement Test-II (WIAT-II; Wechsler, 2005) Listening Comprehension and/or Oral Expression sub-tests. In addition, 14 of the participants scored below the 25th percentile on the WIAT-II Written Language sub-test, indicating written language deficits for most of these children. Sixty-two typically developing students (37 boys and 25 girls) randomly selected from one 3rd (n= 19), 4th (n= 20) and 5th (n= 23) grade class from 3 schools in the same geographic area also were included as an instrument validation sample. All these students were nominated by their general education teachers as not having any known disabilities and making typical progress in academics. This group was asked to complete the reading motivation and reading activityLower Measures, and their scores served to validate these instruments. For third graders, 52.6%

were White, 5.3% were African American, 5.3% were Asian American, 15.8% were Hispanic, and 21.5% identified as two or more races. For fourth graders, 35% were White, 5% were African American, 10% were Asian American, 25% were Hispanic, and 25% identified as two or more races. See Table 1 for the demographic information of the participants with ADHD and the typically developing validation sample.

Table 1. Participant characteristics.

Variables	ADHD Group (n=15)	NA Group (n=62)	Total Sample (n=77)
Grade			
Third	8	19	27
Fourth	7	20	27
Fifth	---	23	23
Age in months	116.27 (10.40)	120.89 (11.06)	119.99 (11.02)
Gender			
Male	5	37	42
Female	10	25	35
CRS-Parent-Inattentive	68.00 (11.93)	---	---
Minimum	51		
Maximum	90		
CRS-Parent-Hyperactive	66.57 (16.24)	---	---
Minimum	43		
Maximum	90		
CRS-Teacher-Inattentive	64.73 (7.96)	---	---
Minimum	54		
Maximum	81		
CRS-Teacher-Hyperactive	52.55 (7.50)	---	---
Minimum	37		
Maximum	63		
CPT-Omission	55.83 (16.97)	---	---

Minimum	42.95		
Maximum	103.64		
CPT-Commission	54.60 (8.28)	---	---
Minimum	36.83		
Maximum	62.09		
WIAT-Listening Comp	93.73 (15.72)	---	---
Minimum	62		
Maximum	129		
WIAT-Oral Expression	93.60 (13.63)	---	---
Minimum	68		
Maximum	112		
WIAT-Written Language	76.87 (14.88)	---	---
Minimum	49		
Maximum	105		
WIAT-Word Reading	95.67 (12.64)	---	---
Minimum	72		
Maximum	117		
WIAT-Reading Comp	90.87 (15.39)	---	---
Minimum	62		
Maximum	122		
Reading SE-Personal Tasks	3.69 (0.97)	4.42 (0.63)	4.28 (0.76)
Minimum	1.80	2.60	1.80
Maximum	5.00	5.00	5.00
Reading SE-Fundamental Skills	3.40 (0.90)	3.64 (0.88)	3.59 (0.89)
Minimum	1.63	1.63	1.63
Maximum	5.00	5.00	5.00
Frequency Reading Activities	2.60 (0.55)	3.36 (1.12)	3.21 (1.07)
Minimum	1.75	1.00	1.00
Maximum	3.75	5.00	5.00

Measures

The data were collected using tests that targeted the participants' oral language, written expression, reading motivation, reading activity, and reading achievement.

Oral Language. To examine the participant's oral language abilities, the Listening Comprehension and Oral Expression sub-tests from the WIAT-II were administered. During the Listening Comprehension sub-test, students were asked to point to one of four pictures that matched the word (e.g., "Point to the picture of an empty box") or sentence (e.g., "Which picture matches the sentence? Grandma is walking upstairs to get her hat") spoken by the examiner, or tell the word associated with the picture and description provided by the examiner (e.g., "Look at this picture. Tell me the word that means a small place where clothes are stored"). During the Oral Expression sub-test, only third graders were asked to repeat sentences after the examiner. All the participants completed the word fluency (e.g., name as many different animals as possible within 60 seconds), visual passage retell (e.g., tell a story to describe the pictures), and giving directions (e.g., explain how to make a peanut butter and jelly sandwich) tasks. Internal consistency reliability estimates for these sub-tests are high for age 8-11: Listening Comprehension (.78 < α < .82) and Oral Expression (.83 < α < .89).

Written Expression. To examine the participants' written language performance, the Written Expression subtest from the WIAT-II was administered. The students responded to the prompt targeting word fluency (i.e., write things that are round within 60 seconds), sentence combination (e.g., combine the two sentences "Mark has a sister named Ann" and "Ann is six years old" without altering the meaning), and paragraph completion (e.g., "My favorite game is..."). The internal consistency reliability estimates for the Written Language sub-test was .81 < α < .87 for the sample ages.

Reading Self-efficacy. The Reading Self-Efficacy Scale (RSES) was adapted from the instrument used in Shell, Colvin, and Bruning's (1995) study that originally included five items in the reading tasks sub-scale and four items in the reading skills sub-scale. In the present study, more items were added to each of the two sub-scales so as to examine students' perceived competence across a larger set of reading tasks and skills typically experienced by third to fifth graders.

Eight tasks were provided in the reading tasks sub-scale: (a) "*read a letter from a friend,*" (b) "*read a chapter from one of your textbooks,*" (c) "*read the daily newspaper,*" (d) "*read a book or story from the library,*" (e) "*read a magazine article,*" (f) "*read web pages, blogs, etc.,*" (g) "*read poems,*" and (h) "*read instructions for putting together a model (like a model car or dollhouse).*" Eleven skills were provided in the reading skill sub-scale: (a) "*know how to say all the words on a page in one of your school books,*" (b) "*know the meaning of all the words on a page in one of your school books,*" (c) "*know the meaning of small parts of words like prefixes (for example: un-, dis-) and suffixes (for example: -ly, -ment),*" (d) "*know how to say all the parts of a word,*" (e) "*understand the plot of a story,*" (f) "*understand the main idea of an article,*" (g) "*read a page sounding like your teacher,*" (h) "*know how stories should be organized,*" (i) "*know how informational papers should be organized,*" (j) "*know how argument or opinion essays should be organized,*" and (k) "*know what to do to fix it when you don't understand what you are reading.*" The students were asked to rate how sure they thought they could perform the task or demonstrate the skill on a 5-point Likert-type scale (*1 = I'm sure I cannot, 2 = I'm pretty sure I cannot, 3 = Maybe I can, 4 = I'm pretty sure I can, and 5 = I'm sure I can*). In the present study, internal consistency reliability estimates (Cronbach's α) of the reading tasks sub-scale and reading skills sub-scale were .79 and .87, respectively. Each item on the two sub-scales was read aloud to the participants during administration.

Reading Frequency. Students were asked to rate how frequently they performed each task listed on the self-efficacy for reading tasks sub-scale on a 5-point scale (1 = Never, 2 = Seldom, 3 = Often, 4 = Very Often, and 5 = Always) to examine their reading volume for different reading tasks for the Reading Activity Scale (RAS). Internal consistency of this scale in this study was .85. Each item was read aloud to the participants during administration.

Reading Achievement. The Word Reading and Reading Comprehension sub-tests of WIAT-II were administered to assess the participants' reading performance. During the Word Reading sub-test, the students were asked to read a word list beginning at the grade-appropriate start point without being timed. During the Reading Comprehension sub-test, the participants read sentences and passages and were asked different types of questions regarding the content, such as to identify the main idea, to recall details, to define vocabulary, and to make inferences. The internal consistency reliability estimates of the two sub tests were as follows for the samples ages: Word Reading (.97 < α < .98) and Reading Comprehension (.94 < α < .96).

Study Design and Procedures

The present study is a correlational research study. The participants with ADHD were given the assessments that examined their oral language, reading motivation, reading activity, and reading achievement during the spring semester. The student instrument validation sample completed only the reading motivation and activity scales. The assessments were administered in two sessions: during the first session the oral and written expression sub-tests were administered and during the second session the reading achievement sub-tests, RSES, and RAS were administered. Each session lasted about 40 minutes. All the tasks were administrated individually by the first author in a quiet room either at a school or the community location preferred by the parents.

Results

Instrument Analysis

Means and standard deviations for all the items on the oral language sub-tests, reading achievement sub-tests, RSES, and RAS are reported in Table 1. Factor analysis was used to explore the loading of each item on the apriori factors for the RSES (tasks and skills) and RAS. Items were expected to exhibit factor structure loading of .50 or greater.

A principal components analysis extraction with varimax rotation using a forced three-factor solution was conducted for responses on the RSES and RAS from all of the students in this study (the validation sample plus the ADHD sample). Low communalities (below .4) were found for items 2, 3, and 4 on the RSES-Tasks sub-scale, items 1, 6, and 11 on the RSES-Skills sub-scale, and items 2, 4, 6, and 7 on the RAS. After removing these items, the remaining items were re-analyzed and the three forced factors explained 62.6% of the total variance and the rotated factor loadings aligned well with all loadings above .5 on the three factors. For the RSES-Tasks sub-scale, item 1 “*read a letter from a friend,*” 5 “*read a magazine article,*” 6 “*read web pages, blogs, etc.,*” 7 “*read poems,*” and 8 “*read instructions for putting together a model,*” loaded on the factor labeled *Self-Efficacy for Personally Relevant Reading Tasks* (Cronbach’s $\alpha = .79$). For the RSES-Skills sub-scale, item 2 “*know the meaning of all the words on a page in one of your school books,*” 3 “*know the meaning of small parts of words like prefixes and suffixes,*” 4 “*know how to say all the parts in a word,*” 5 “*understand the plot of a story,*” 7 “*read a page sounding like your teacher,*” 8 “*know how stories should be organized,*” 9 “*know how informational papers should be organized,*” and 10 “*know how argument or opinion essays should be organized,*” loaded on the factor labeled *Self-Efficacy for Fundamental Reading Skills* (Cronbach’s $\alpha = .87$). For the RAS, item 1 “*How often do you read a letter from a friend,*” 3 “*How*

often do you read the daily newspaper," 5 "How often do you read a magazine article," and 8 "How often do you read instructions for putting together a model," loaded on the factor labeled Frequency of Personally Relevant Reading Activities (Cronbach's $\alpha = .85$).

Comparisons for Self-Efficacy Beliefs and Reading Frequency

A series of independent t -tests was conducted to compare the children with ADHD to their typically developing peers on Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, and Frequency of Personally Relevant Reading Activities (see Table 2). The results showed that children with ADHD obtained significantly lower scores than their typically developing peers on Self-Efficacy for Personally Relevant Reading Tasks ($t = -3.566, p = .001$) and Frequency of Personally Relevant Reading Activities ($t = -2.544, p = .013$). However, the two groups rated themselves similarly on Self-Efficacy for Fundamental Reading Skills ($t = -.943, p = .349$).

Table 2. Comparison of reading self-efficacy beliefs and reading activity of students with ADHD and typically developing peers.

	ADHD	TD	t	p
Reading SE-Personal Tasks	3.69 (.97)	4.41 (.63)	-3.566***	.001
Reading SE-Fundamental Skills	3.40 (.90)	3.64 (.88)	-.943	.349
Frequency Activities	2.60 (.55)	3.36 (1.12)	-2.544*	.013

Correlation and Regression Analysis

Correlation analysis (using all available data) then was conducted to determine whether composites needed to be created prior to linear regression analysis. See Table 3 for the zero-order correlation matrix for the measures for the ADHD group. Noting that reading comprehension and word reading were highly correlated ($r = .80$), a composite variable for reading achievement (READ) was created by averaging scores on the two measures. Listening comprehension and oral expression were also highly correlated ($r = .57$), so a composite variable for oral language (ORAL) was created by averaging scores on the two measures. The results showed that reading achievement was negatively correlated with age ($r = -.67$) and Self-Efficacy for Fundamental Reading Skills ($r = -.54$) but positively correlated with oral language abilities ($r = .79$). Age was positively correlated with Self-Efficacy for Fundamental Reading Skills ($r = .54$) and was negatively correlated with oral language ($r = -.64$). Self-Efficacy for Personally Relevant Reading Activities was positively correlated with Self-Efficacy for Fundamental Reading Skills ($r = .57$), but not Frequency of Personally Relevant Reading Activities. Self-Efficacy for Fundamental Reading Skills was not correlated with Frequency of Personally Relevant Reading Activities either.

Table 3. Zero-order correlation matrix for measures for ADHD group.

Variable	READ	Age	Gender	Ethnicity	WIAT-ORAL	SETasks	SESkills
READ							
Age		-.67**					
Gender	.08	--					
Ethnicity	.24	--	--				
WIAT-	.79**	-.64*	.10	.21			
ORAL							
SETasks	.09	.45	.44	.14	-.01		
SESkills	-.54*	.54*	.47	.21	-.42	.57*	
Frequency	.38	-.38	.27	.28	.36	.21	-.07

Note. READ is the reading achievement composite score based on WIAT- Word Reading and WIAT-Reading Comprehension scores; WIAT-ORAL is the oral language composite score based on WIAT-Listening Comprehension and WIAT-Oral Expression scores; Zero-order correlation between READ, chronological age, WIAT-ORAL, task-oriented reading self-efficacy, skill-oriented reading self-efficacy, and reading activity was reported using the Pearson correlation coefficient, r ; The correlation between gender and ethnicity with READ, WIAT-ORAL, task-oriented reading self-efficacy, skill-oriented reading self-efficacy, and reading activity, respectively, was reported using the eta index for measures of association.

* $p < .05$, ** $p < .01$

To examine whether reading motivation, reading activity, oral language, and other possible factors may contribute to reading achievement in students with ADHD, a two-step regression analysis was conducted (see Table 4) in which the reading composite was entered as the dependent variable, and age, gender, ethnicity (coded as 0 for white and 1 for non-white), and oral language were entered (as a block) first as background variables. All assumptions for running regression analysis were met, including linear relationships between the dependent and independent variables based on scatter plots, no significant outliers, independence of observations based on Durbin-Watson statistic, homoscedasticity (i.e., equal variance of residuals), and normal distribution of residuals. The result from the regression analysis showed that the student background variables accounted for a significant proportion of variance in the reading composite score ($R^2 = .684$; $F = 5.411$, $p = .014$). Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, and Frequency of Personally Relevant Reading Activities were then entered as a second block. The results showed that self-efficacy beliefs made a unique contribution to the regression model, with all the variables entered accounting for an additional 20% of variance in the reading composite score ($R^2 = .883$; $F = 7.577$, $p = .008$). In particular, Self-Efficacy for Personally Relevant Reading Tasks was found to be a strong positive predictor of reading achievement ($\beta = .640$, $p = .016$), and Self-Efficacy for Fundamental Reading Skills was a strong negative predictor of reading achievement ($\beta = -.562$, $p = .031$). Age contributed to predicting reading achievement in a negative

manner ($\Delta = -.550$, $p = .049$). Oral language, frequency of reading activity, and gender did not make a significant contribution in predicting reading achievement.

Table 4. Predicting reading achievement from reading self-efficacy beliefs and activity.

Predictor	Model 1		Model 2
	β	β	
Chronological Age	-.301		-.550*
Gender	-.028		-.112
Ethnicity	-.104		.036
WIAT-ORAL	.580*		.271
SE-Personal Tasks			.640*
SE-Fundamental Skills			-.562*
Frequency Reading Activity			-.123
R ²	.684		.883
Adj. R ²	.558		.766
Δ R ²	.684		.199
F	5.411*		7.557**

* $p < .05$, ** $p < .01$

To examine whether reading motivation and other background variables might contribute to predicting reading activity in students with ADHD, another two-step regression analysis was conducted (see Table 5). Reading activity was entered as the dependent variable, and age, gender, ethnicity, and oral language were entered (as a block) first as background variables. The results showed that student background variables didn't explain a significant portion of the variance in reading activity ($R^2 = .314$; $F = 1.146$, $p = .390$). Self-Efficacy for Personally Relevant Reading Tasks and Self-Efficacy for Fundamental Reading Skills were then entered as a second block. The results showed that self-efficacy beliefs didn't make a significant unique contribution to

reading frequency, accounting for only an additional 8% of variance in reading activity ($R^2 = .397$; $F = .876$, $p = .551$).

Table 5. Predicting reading activity from reading self-efficacy beliefs.

Predictor	Model 1	Model 2
	β	β
Chronological Age	-.383	-.618
Gender	-.329	-.229
Ethnicity	-.151	-.139
WIAT-ORAL	.112	.076
SE-Personal Tasks		.407
SE-Fundamental Skills		-.077
R^2	.314	.397
Adj. R^2	.040	-.056
ΔR^2	.314	.082
F	1.146	.876

* $p < .05$, ** $p < .01$

A post-hoc analysis was conducted to examine whether reading achievement predicted reading self-efficacy beliefs in the children with ADHD (see Tables 6 and 7). Self-Efficacy for Personally Relevant Reading Tasks was entered as the dependent variable, and age, gender, ethnicity, and oral language were entered (as a block) first. The background variables didn't account for a significant portion of variance in task self-efficacy ($R^2 = .430$; $F = 1.883$, $p = .190$). The reading composite score was then entered into the regression model, but it did not make a significant independent contribution to task self-efficacy ($\beta = .643$, $p = .136$). Age was found to positively predict Self-Efficacy for Personally Relevant Reading Tasks ($\beta = .843$, $p = .027$), suggesting that 4th graders showed higher task self-efficacy than 3rd graders with ADHD. The same analysis with Self-Efficacy for Fundamental Reading Skills as the dependent variable showed that student background variables didn't account for a

significant portion of variance ($R^2 = .513$; $F = 2.633$, $p = .098$) and that reading achievement was not a strong predictor of skill self-efficacy ($\beta = -.402$, $p = .332$).

Table 6. Predicting self-efficacy for personal reading tasks from reading achievement.

Predictor	Model 1	Model 2
	β	β
Chronological Age	.650	.843*
Gender	-.333	-.315
Ethnicity	.031	.097
WIAT-ORAL	.449	.076
Reading Achievement		.643
R^2	.430	.560
Adj. R^2	.201	.316
ΔR^2	.430	.131
F	1.883	2.295

⑩ $p < .05$, ** $p < .01$

⑩

Table 7. Predicting self-efficacy for fundamental reading skills from reading achievement.

Predictor	Model 1	Model 2
	β	β
Chronological Age	.379	.258
Gender	-.457	-.468
Ethnicity	.317	.275
WIAT-ORAL	-.064	.169
Reading Achievement		-.402
R^2	.513	.564
Adj. R^2	.318	.322

ΔR^2	.513	.051
F	2.633	2.328

Discussion

This study aimed to investigate the relationships between reading motivation (in particular, reading self-efficacy), reading activity, oral language, and reading achievement for children with ADHD. The potential role of age and gender as moderators was also taken into consideration. The major findings of the study are: 1) children with ADHD showed lower Self-Efficacy for Personally Relevant Reading Tasks and engaged in less frequent reading of personally relevant materials compared to their typically developing peers; 2) reading self-efficacy and age were found to be strong predictors of reading achievement for children with ADHD; and 3) fourth graders with ADHD demonstrated higher Self-Efficacy for Personally Relevant Reading Tasks than third graders with ADHD.

Children with ADHD were found to display lower Self-Efficacy for Personally Relevant Reading Tasks compared to their peers without disabilities. This result was different from Lee and Zentall's (2012) study in which students with ADHD showed equivalent reading self-efficacy with their typically developing peers. One possible explanation is that potential co-morbid conditions such as learning disabilities, reading disabilities, or language impairment that are frequently associated with motivational deficits were not excluded in our study. As a matter of fact, the screening results showed that most of this group of children with ADHD experienced significant difficulties with writing. Therefore, it's possible that lower reading self-efficacy in our sample might actually be associated with potential co-morbid language and/or literacy learning problems instead of the negative impact of ADHD symptoms. On the other hand, children with ADHD didn't differ from their typically developing peers in Self-

Efficacy for Fundamental Reading Skills. Although no prior study has investigated skill-oriented reading self-efficacy, the current finding is expected given that children with ADHD might tend to overestimate their competence in mastering reading skills due to their meta-cognitive deficits (Alvarado, Puente, Jiménez, & Arrebillaga, 2011). In addition, children with ADHD were also found to display lower Frequency of Personally Relevant Reading Activities than their peers without disabilities. This result is different from Lee and Zentall's (2012) study, in which students with ADHD were found to engage in equivalent amounts and frequencies of personal reading activities. One possible explanation might be that the RAS used in our study targeted some different personal reading activities than the RAI used in Lee and Zentall's (2012) study (e.g., "*how often do you read instructions for putting together a model*" from RAS vs. "*how often do you read fiction books*" from RAI). Another possible explanation might be due to the fact that RD as a frequently occurring condition with ADHD was excluded in Lee and Zentall's (2012) study.

Reading self-efficacy was found to be a strong predictor of reading achievement for children with ADHD. According to the results from the self-efficacy instrument analysis, five items loaded on one factor labeled Self-Efficacy for Personally Relevant Reading Tasks from the RSES-Tasks subscale, and eight items loaded on Self-Efficacy for Fundamental Reading Skills from the RSES-Skills subscale. The results from regression analysis showed that Self-efficacy for Personally Relevant Reading Tasks contributed to predicting these children's reading achievement in a positive manner. For every standard deviation increase in task self-efficacy, reading achievement increased by .640 standard deviations when all the other predictors were controlled. This result confirms previous findings not only supporting reading self-efficacy as a strong predictor of reading achievement (Proctor, et al., 2014; Shell, Murphy, & Bruning, 1989; Shell, Colvin, & Bruning, 1995), but also the fact that personally meaningful

reading materials contribute to better reading achievement (Fink, 2007; Guthrie & Wigfield, 2000; Quirk & Schwanenflugel, 2004). In other words, children with ADHD who held greater perceived competence for reading tasks that were relevant to their lives (e.g., read a letter, daily newspaper, magazine) tended to exhibit better reading performance.

Self-efficacy for Fundamental Reading Skills contributed to predicting reading achievement in a negative manner. For every standard deviation increase in skill self-efficacy, reading achievement decreased by .562 standard deviations when controlling for all the other predictors. It is possible that children with ADHD who experience deficits in reading achievement may tend to have inflated perceived competence for reading skills. This possibility is supported by our finding that children with ADHD showed similar ratings for Self-Efficacy for Fundamental Reading Skills, but obtained significantly lower scores on Self-Efficacy for Personally Relevant Activities and Frequency of Personally Relevant Reading Activities compared to typically developing students, suggesting inflated perceived competence in fundamental reading skills. Nelson and Manset-Williamson (2006) also examined reading self-efficacy in students with reading disabilities who were entering fourth to eighth grade and found that these students' estimated competence in reading was much higher than their actual reading comprehension performance. Although no studies have investigated reading self-efficacy specifically for reading skills in children with ADHD, the research in the domain of writing has reported inflated competency beliefs for writing skills in children with learning disabilities (e.g., Graham, MacArthur, Schwartz, & Page-Voth, 1992). More broadly, Kruger and Dunning (1999) found that students who were less skilled in a domain not only performed more poorly but also tended to exhibit inflated competency beliefs for skills within that domain. They also found that the students exhibited significant deficits in meta-cognition, which (as argued by the researchers)

led to inflated perceived competence for these low achievers. Their findings are consistent with Klassen's (2002) argument that unrealistically high self-efficacy beliefs may lead to poor academic performance due to the fact that students who hold such unrealistic beliefs tend to put forward less effort and discount or fail to employ effective strategies and self-regulation processes. Our sample of 3rd and 4th graders with ADHD may be within the developmental period when there is great press for using reading as a tool to accomplish varied reading tasks and expand one's understanding of the world. Therefore, the students may hold task-related self-efficacy beliefs that are aligned well with the reading task demands they face both in and out of school. On the other hand, the typical meta-cognitive deficits in children with ADHD (Alvarado, Puente, Jiménez, & Arrebillaga, 2011; Westby & Cutler, 1994) may hinder these children from realistically estimating how well they could execute different reading skills across tasks, leading to inflated self-efficacy for fundamental reading skills.

Age was found to contribute to variance in reading achievement negatively. In other words, older children with ADHD were found to demonstrate decreased reading performance compared to relatively younger children in this study. Results from some prior studies showed that students exhibited higher levels of reading proficiency as they aged due to acquisition of text structure knowledge (Englert & Hiebert, 1984) and improved sensitivity to important elements in texts (Brown & Smiley, 1977). For children with ADHD, however, decrements in reading achievement over time might reflect the long-term negative impact of language and motivation deficits on their reading outcomes. Other factors such as lack of strategic reading skills, limited print exposure, and lack of appropriate reading instruction also might lead to a widening reading achievement gap over the course of schooling. This is commonly referred to as the Matthew effect in reading (Stanovich, 1986; Walberg & Tsai, 1983): students who have initially better reading ability obtain positive reading gains whereas those who are

disadvantaged early in reading lose ground over time in comparison to their peers (Pfost, Dörfler, & Artelt, 2012).

Age was found to be a positive predictor of Self-efficacy for Personally Relevant Reading Tasks, suggesting that 4th graders displayed higher self-perceptions for reading than 3rd graders in this sample of children with ADHD. This result was consistent with Lee and Zentall's (2012) study reporting lower reading self-efficacy for 5th graders than 3rd and 4th graders, with the 4th graders displaying the highest self-efficacy. Given the developmental nature of reading, the shift from emphasizing learning to read to reading to learn typically happens around 3rd or 4th grade. When entering 4th grade, students have already developed knowledge about alphabetic principle, word decoding, fluent reading, and comprehending texts with familiar vocabulary and language that are also well connected to their experience (Chall & Jacobs, 2003). Therefore, 4th graders tend to hold higher reading self-efficacy compared to 3rd graders in our study. Another possible explanation as suggested by Lee and Zentall's (2012) was a spurt in reading motivation in the fourth grade. As a matter of fact, 4th grade typically developing students also have been reported to demonstrate the highest reading self-efficacy (Becker, McElvany, & Kortenbruck, 2010; Wigfield & Guthrie, 1997).

Oral language did not contribute to reading achievement in this study. Previous findings have emphasized the critical role of oral language in reading development, especially in the area of reading comprehension (Dickinson, McCabe, Anastopoulos, Peisner-Feinberg, & Poe, 2003). Catts et al. (1999) found that oral language and phonological processing made unique significant contributions to reading achievement in second graders. They also found that poor readers tended to experience expressive and/or receptive language difficulties four to five times greater than good readers when they were in kindergarten. In addition, the body of oral language intervention literature

suggests that instruction in different aspects of oral language contributes to improved literacy skills (e.g., Bowyer-Crane, et al., 2008; Hatcher et al., 2006). For this study, however, oral language didn't contribute to predicting reading achievement. One possible explanation might be related to the instruments used to assess reading achievement and/or oral language. Cutting and Scarborough (2006) suggested that different measures of reading achievement might pose differentiated demands on vocabulary and sentence processing abilities. In our study, oral language was measured by the Listening Comprehension and Oral Expression sub-tests from WIAT-II and reading achievement (a composite score) was measured by the Word Reading and Reading Comprehension sub-tests on the WIAT-II. It is possible that the specific instruments used for this study led to the non-significant contribution of oral language to reading achievement for children with ADHD. Another possible explanation for our non-significant finding is our limited sample size, which does constrain the generalizability of the results from this study to the larger population of children with ADHD.

Four items from the RAS loaded on one factor, labeled Frequency of Personally Relevant Reading Activities. The results from regression analysis showed that this factor did not predict variance in reading achievement. This finding is contrary to the results reported by other researchers (e.g., Guthrie, et al., 1999), where reading activity was a strong predictor of reading performance. It is assumed that frequent reading across different types of texts contributes to overall reading achievement. However, in the case of children with ADHD, even frequent reading activities might not be able to adequately compensate for the negative impact of attention and language deficits on their reading performance. This speaks to the influence of the Matthew effect on poor readers' achievement gains—frequent unsuccessful or error ridden reading attempts may be unlikely to have much of an influence on reading achievement. Of course,

limited sample size remains another possible explanation for this null finding. On the other hand, self-efficacy beliefs were not significantly correlated with reading activity. Neither Self-efficacy for Personally Relevant Reading Activities or Self-Efficacy for Fundamental Reading Skills was found to be a strong predictor of reading activity for children with ADHD. This finding is inconsistent with prior research studies that have found reading self-efficacy to be correlated with reading activity (e.g., Wigfield & Guthrie, 1997). Our limited sample size might be a possible explanation of this non-significant correlation finding between reading self-efficacy beliefs and reading activity. However, another possible explanation rests with how prior research has defined motivational constructs used to predict reading activity. For example, Wigfield and Guthrie (1997) created an intrinsic motivation composite that included reading self-efficacy, curiosity, and involvement based on an exploratory factor analysis and found that the intrinsic motivation composite strongly predicted the amount and breadth of reading. However, in Guthrie et al.'s (1999) study, reading self-efficacy was considered a theoretically independent construct from the intrinsic motivation composite used in Wigfield and Guthrie's (1997) investigation. Later studies (e.g., Cox & Guthrie, 2001; Wang & Guthrie, 2004) reported consistent findings of intrinsic motivation as a strong predictor of reading activity, but self-efficacy for reading was not included as part of the motivational construct. Therefore, future studies need to examine directly to what extent the correlation and/or predictive relationships might exist between reading self-efficacy beliefs and reading activity. It may be that reading self-efficacy beliefs alone are not adequate to explain variance in reading activity.

Gender was not correlated with Self-Efficacy for Personally Relevant Reading Tasks, Self-Efficacy for Fundamental Reading Skills, or Frequency of Personally Relevant Reading Activities, according to the correlation analysis. The regression analysis showed that gender did not contribute unique variance in reading achievement.

This is contrary to previous findings in the typically developing population suggesting that girls outperform boys on reading comprehension and word reading tasks (Logan & Johnston, 2009; Mullis, Martin, Gonzalez, & Kennedy, 2003; Mullis, Martin, Kennedy, & Foy, 2007). For instance, Logan and Johnston (2009) found significant, though relatively small, gender differences favoring girls in reading abilities (as measured through word reading, comprehension, and vocabulary). They argued that this difference might be due to the fact that girls hold more positive attitudes toward reading than boys. The lack of a gender effect on reading performance in this study is likely due to the limited sample size.

Limitations and Future Directions

As with all studies, there are limitations in this study. First and foremost, our limited sample size reduces the potential generalizability of the results to a larger group of children with ADHD. As explained above, failure to detect relationships between reading achievement and gender, oral language, and reading activity might partly be due to the limited number of students who participated in our study. Therefore, studies with far more children with ADHD will be needed to further explore these issues in the future. Additionally, exploration of group differences in self-efficacy for reading and reading activity between children with ADHD and their typically developing peers should be further explored by excluding potential co-morbid conditions such as LD, RD, or LI that could possibly pose negative impact on the students' motivation to read and engagement in frequent and various reading activities.

This study only investigated self-efficacy for reading as a critical construct of reading motivation. Wigfield and Guthrie (1997) proposed many sub-components of reading motivation such as self-efficacy for reading, intrinsic motivation (e.g., curiosity, preference for challenge), extrinsic motivation (e.g., desire for reading recognition, obtaining good grades), and social reasons for reading (these latter three

could be construed as achievement goal orientations). Future studies should consider examining the role of each motivational construct on the reading performance of children with ADHD so as to identify potent motivational precursors to reading achievement in these special populations. For example, what is the relationship between intrinsic versus extrinsic reading motivation and reading achievement? Do children with ADHD exhibit gender and/or age differences in intrinsic, extrinsic, or social aspects of their reading motivation?

Lastly, even with a small sample, the results from this correlational study suggested that reading self-efficacy and age are strong predictors of reading achievement for children with ADHD. Future studies may use data from this study for designing appropriate early interventions to improve these children's reading self-efficacy beliefs, which ultimately contribute to improved reading achievement. As suggested by Walker (2010), instructional activities that incorporate (a) teaching strategy use (e.g., different reading and coping strategies), (b) giving students choice (e.g., selecting books and topics of personal interest), and (c) providing self-evaluation opportunities (e.g., student tracking reading progress using teacher-developed checklists) all help cultivate reading self-efficacy beliefs and positive reading outcomes. Margolis and McCabe (2006) also suggested adopting peer modeling of targeted strategies and reinforcing student efforts to emulate these strategies.

International scholars may consider further exploring this area of inquiry with students with ADHD in their own countries by replicating and adapting the current study, as suggested above, via correlational and/or experimental research studies, which will ultimately contribute to enhanced understanding of relationships between reading motivation and achievement across cultures.

Implications for Practice

The findings from the study are informative for classroom practice in several ways. First, Self-efficacy for Personally Relevant Reading Tasks is a strong positive predictor of reading achievement for children with ADHD, suggesting that teachers should engage students in reading activities that have authentic purposes and pertain to their personal lives. Second, Self-efficacy for Fundamental Reading Skills was found to be a strong negative predictor of reading achievement, which indicates that fundamental reading skills such as decoding accuracy, reading fluency, text structure knowledge, and strategic meaning-making should be taught to students with ADHD to (a) improve these skills to promote reading success which in turn can enhance self-efficacy beliefs and (b) help students with challenges in these fundamental skills better calibrate their competency beliefs with their actual performance. Considering that many students with ADHD experience meta-cognitive weaknesses, teachers may consider incorporating self-regulation skills into the systematic teaching of reading strategies (Mason, Meadan-Kaplansky, Hedin, & Taft, 2013; Pressley, 1986). Lastly, it is critical to provide appropriate early interventions for children with ADHD to mitigate the Matthew effect. We encourage the use of evidence-based practices that enable mastery of fundamental reading skills to be adopted in classrooms to help reduce the achievement gap between these struggling learners and their typically developing peers. It's worth noting that the findings from the study are also relevant for international audiences given that students with ADHD in many countries (ADHD is a worldwide phenomenon affecting students in many educational systems; Polanczyk, Silva de Lima, Horta, Biederman, & Rohde, 2007) would likely benefit from engaging in personally relevant reading activities, learning fundamental reading skills, and receiving early intervention targeting effective reading strategies together with self-regulation skills.

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Practices of Primary School Teachers in Supporting Students with Asthma in Jordan

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Abstract

This study investigated the level of practices and training regarding asthma and its management among public primary school teachers in Jordan. A total sample of 57 teachers were selected to complete the survey and for the follow-up interviews. The results indicated that all teachers have positive attitudes toward including students with asthma in public school, although there are very few of them who were trained to manage asthma. Most importantly, findings in general suggested that the health and educational needs for students with asthma were not met in public schools settings. Recommendations and implications for future research are discussed in the context of the educational system in Jordan.

Introduction:

Asthma is the most common chronic disease and health impairments of children; estimates of its prevalence range from 6% to as high as 20% of school-age children (Mendenhall & Tsien 2000; Sexson & Dingle, 2001), and in many urban cities and school districts, rates range from 20% to 25%, according to the federal Centers for Disease Control and Prevention (U.S. Department of Health and Human Services, 2013). Currently, chronic disease, such as asthma, among school-aged children is a major international public health concern. In Australia, one in six children has asthma with higher prevalence in the school aged group (Asthma Foundation of Australia, 2007). A similar rate has been reported in other developing countries (Jordanian Ministry of Health, 2016). The prevalence of asthma among Jordanian children has been reported to range from 10% to 13%.

Asthma is described as a lung disease with reversible airway obstruction and airway inflammation. An increased responsiveness (or hyperactivity) or a variety of stimuli is also present. Each student will vary as to what trigger an asthma attack. Some students have extrinsic asthma in which the asthma attack is triggered by allergies, such as those to pollen, dust mites, or cats. Children with asthma can also be exposed to secondhand tobacco smoke at home and come to school wearing clothing exposed to tobacco smoke that can trigger symptoms in other students. Some students have intrinsic asthma in which there is no identifiable allergen, but asthma attacks may be triggered by viral respiratory infections and environmental stimuli such as air pollution. Some students will have a combination of extrinsic and intrinsic types and be considered to have mixed asthma. Still other students' asthma will be triggered by exercise

(exercise-induced asthma) or aspirin (aspirin-induced asthma) (Heller, Alberto, Forney, & Schwartzman, 2009). In addition, it is well-documented that the severity of asthma varies greatly (U.S. Department of Health and Human Services, 2013). The child may experience only a period of mild coughing or extreme difficulty in breathing that requires emergency treatment. However, many asthmatic children experience normal lung functioning between episodes.

Students with asthma or respiratory conditions typically need medication to increase respiratory functioning, including bronchodilators (that open up the air passages) or anti-inflammatory agents (that reduce airway inflammation) (Asthma Foundation of Australia, 2007). These medications are often delivered through an inhaler or nebulizer, so school personnel will need to know how to use them properly. In addition, students with asthma can be taught to take their medication with assistance. Some students are taught the times that they take their medications and which pill or type they take at which time. Some students may learn this schedule through a picture or object schedule. Learning the purposes of the medications is also important. Some students may be able to learn what each medication is for or have information documented on their notebook (e.g., "this pill helps me to breathe"). Having students able to identify their medications can help decrease errors and promote independence. Fortunately, asthma can be controlled effectively in most children with a combination of medications and limiting exposure to known allergens. The majority of children with asthma who receives medical and psychological support successfully complete school and lead normal lives. By working cooperatively with parents and medical personnel to minimize the child's contact with provoking factors and constructing a plan to assist the child during attacks, the classroom teacher can play an important role in reducing the impact of asthma (Getch & Neuharth-Pritchett, 1999).

The Educational Aspect of Asthma

“Other Health Impairment” is one of the 14 categories of disability listed in USA special education law, the Individuals with Disabilities Education Act (IDEA) (Yell, Shriner, & Katsiyannis, 2006). To be classified as a student with disability under IDEA, a child with asthma must fall under the other health impairment. Under IDEA, a child who has an “other health impairment” is very likely to be eligible for special services to help the child address his or her educational, developmental, and functional needs resulting from the disability. Other health impairment means having limited strength, vitality, or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment, that: (i) Is due to chronic or acute health problems such as asthma ..; and (ii) Adversely affects a child’s educational performance (Heller et al., 2009). In the USA, the landmark 1975 *Education for All Handicapped Act* (Civil Rights Division, 1990) mandated free and appropriate public education for all students with disabilities in the least restrictive and most integrative environment possible. This policy gives children with disabilities, including children with asthma, the right to be educated and supported in public schools. In Jordan, we have the ‘*Law on the Rights for Persons with Disabilities*’ for the year of 2007. This law stated in the Article four, Section (B) that ‘The Ministries of Education and Higher Education are adopting inclusive education programs between students with disabilities and non-disabled counterparts and implementing these programs within the framework of educational institutions’ (The Higher Council for the Affairs of Persons with Disabilities 2007, 4). However, placing students with asthma in public schools or constituting a law is not good enough to assume that they receive appropriate support. Some research revealed gaps between policy and practice and showed that

significant barriers remain to the participation of students with health impairment in education (Abu-Hamour & Al-Hmouz, 2014).

Schools should have a system for finding and supporting students with asthma. This system should offer a spectrum of services, including identifying students with asthma, supervising medication, providing case management, and educating students and school personnel on appropriate management skills. The classroom can be a useful place to discuss disabilities and encourage understanding and acceptance of a child with a health impairment. Some teachers find that simulation or role-playing activities are helpful. Factual information can also help build a general understanding of impairment. Classmates should learn to use accurate terminology and offer the correct kind of assistance when needed. This in turn can play a vital role in ensuring that students with asthma have the same educational opportunities as other students and lead to improved academic performance. On the other hand, some previous studies suggested that care for children with asthma in schools was often disorganized, poorly delivered, or not delivered at all (McLaughlin, Maljanian, Kornblum, Clark, Simpson, & McCormack, 2006; Snow, Larkin, Kimball, Iheagwara, & Ozuah, 2005). Poor organizational structure around asthma may result in inadequate asthma management due to the lack of appropriate treatment and medications. Furthermore, according to Dockett (2004), children with asthma are often viewed as being different and physically challenged, and they experience lowered expectations from their teachers. In addition, many children with health impairments suffer from excessive pity, sympathy, and overprotection; others are cruelly rejected, stared at, teased, and excluded from participation in activities with nondisabled children. However, if students with asthma are to succeed within the general education classrooms, well-preparation and school modifications are essential for many of them. In other words, the success of an inclusive placement is

dependent on general education teachers' ability and willingness to make modifications to accommodate individual differences (Salend, 2005).

Several previous research has indicated that teachers recommend and use accommodations they perceive to maintain academic integrity, are effective, are easy to use, and are feasibly implemented (e.g., Gajria, Salend, & Hemrick, 1994; Gilbertson-Schulte, Elliott, & Kratochwill, 2000). If certain accommodations are not acceptable to teachers or hard to be implemented by them, it is very likely teachers will not use them (e.g., Ainscow, 2007; Ketterlin-Geller, Alonzo, Braun-Monegan, & Tindal, 2007; Miner & Finn, 2003). In terms of students with asthma, accommodations are frequently necessary to enable them to participate more fully and independently in school. These accommodations may include adaptations to provide increased access to a task or an activity, changing the way in which instruction is delivered, and changing the manner in which the task is done (Heller, Dangel, & Sweatman, 1995). More specifically, Some students with asthma will need assignments and tests modified because of fatigue and endurance issues-either because of a health problem or because of the physical effort involved in slowly completing an assignment or test. Assignments may need to be abbreviated or broken up into shorter segments, or students may need extra time to complete assignments and tests. A student may be offered alternate ways to complete an assignment or test, such as using a computer or telling the answer instead of writing them. Although the current educational policy in Jordan states that schools must make available reasonable accommodations that assist students with asthma to learn, communicate, receive training, and enjoy mobility; there is not a clear national policy regarding the reasonable accommodations for these students. Additionally, recent research indicated that teachers have little knowledge and training about which accommodations

are appropriate for students with health impairments such as asthma (Abu-Hamour & Al-Hmouz, 2014).

What are Zimbabwean

Teachers Training

With improved knowledge, teachers should be able to manage the school children with asthma and deal with emergency medical situations appropriately. Students who require health care procedures are often found in the school environment, and their procedures often need to be performed during school hours. Teachers not only need to be familiar with these procedures but they also need to consider if a student can or should be taught to assist with the performance of his or her own procedures (Heller et al., 2009). Schools should have policies in place regarding who can administer medications. If non-nursing personnel (e.g., teacher, paraprofessional) are allowed to administer such medications, it is important that they be given proper training.

Health is not merely the absence of disease or infirmity but also a state of optimal mental, social, and physical well-being (Dorland's Illustrated Medical Dictionary, 2011). Given this broader definition, not only do teachers need to monitor students for common health problems and problems involving health care procedures but they also need to have a broader understanding of the student's disability and its impact on health and school performance. Students who have asthma may be at risk of not performing optimally. Some students may not feel well because of health problems or they may experience discomfort. In these instances, the student's attention will be drawn away from the task. Teachers need to monitor for health problems and make appropriate accommodations (e.g., alleviate discomfort as indicated, provide breaks). Also, teachers need to remember that classroom performance may be erratic when the student is feeling poorly. Most students will need more repetition of the classroom material when

feeling ill or having discomfort than they would require when feeling healthy. In addition, students with asthma often have increased absenteeism due to illness or asthma attack or allergy. Some students may miss classroom time because they need to leave classes early due to slower mobility or to have health care procedures performed. Teachers will need to be prepared to accommodate students absences, whether they are for a few days or a few minutes. They may need to re-teach skills because of prolonged absences, modify the length of a student's lesson, or build in more repetition when more time is available, for example (Heller et al., 2009).

For teachers to provide appropriate care, it is important that they have a sound knowledge of asthma and have the confidence to manage any problems that may arise. However, It has been reported that although teachers are known to be concerned about students with asthma, and are often called upon to manage asthma at school, they may have little knowledge and understanding of the condition (French & Carroll, 1997). Recent studies suggested asthma knowledge deficit among elementary school teachers (Lucas, Anderson, & Hill, 2012). The results indicated that most of these teachers felt that they did not know enough about asthma, but they have positive attitudes toward children with asthma. Furthermore, many of the studies emerged in the '90s suggested a lack of teachers' awareness on asthma and its management (Eiscnberg, Moe, & Stillger, 1993; Hussey, Cahill, Henry, King, & Gormley, 1999; Madsen, Storm, & Johansen, 1992). Based on, teachers' training on asthma and its management was then recommended in most of the research that addressed asthma in schools.

Context of the Study

Considering that integration is a new practice, Jordan has recently made progress in teaching students with special education needs in public schools (Al Khateeb & Al Khateeb, 2008). The Jordanian National Education Strategy calls for the commitment of the Ministry of

Education to offer appropriate educational programs in regular schools for students with special educational and health needs. Nevertheless, the movement towards integration in Jordan has not been supported by serious efforts to restructure the public and private schools system. For instance, pre-service training and in-service training programs for teachers were not addressing the needs of students with asthma. As integrating efforts continued, resource room teachers have been assigned the sole responsibility of supporting students with special needs in general. Regular classroom teachers, on the other hand, have not been involved in addressing the needs of the included students. The integration of students with disabilities into schools is currently one of the foremost educational policy in Jordan and has generated much debate. Thus, it is a necessity to conduct more research for the purpose of exploring integration and inclusion of students with asthma in the Jordanian context.

Students with health impairments such as asthma have not received much attention from schools and the community in general in Jordan. It seems that these students are considered to be the sole responsibility of their families who should seek help from physician and practitioner in the private sector (eg., hospital and medical clinic). Furthermore, most of the teachers in Jordan are not fully aware of the characteristics of students with other health impairments, such as asthma, and the recommended practices for working with them. In Jordan, practitioners indicated that integration efforts have been mostly directed toward students with learning disabilities. Students with other special needs (e.g., other health impairment) have not received similar attention yet.

Significance of the Study

Students with health impairment have a wide range of medical problems that teachers need to understand so that they can monitor students effectively and intervene should a problem

occur. Properly trained teachers are important resources for addressing asthma among children. They can identify students with asthma, respond appropriately to asthma emergencies, and reduce student's exposure to classroom asthma triggers. Additionally, knowledge and practices about asthma held by teacher is likely to have a major impact on how well a child is able to manage at emergency situation. Child spends most of the day at school. It is therefore important that these children are given proper asthmatic management either in the form of preventive measures or in case they develop symptoms at school.

Most schools in Jordan do not have nurses, thus placing the responsibility for daily asthma management of students with asthma by teachers. Proper education and knowledge of school teachers about asthma is essential, which will help in management and control of this chronic disease in school settings. Thus, the major purpose of this study was to investigate the teachers' practices and training about asthma in Jordan. This in turn, will help the policy makers in Jordan to have better understanding for the needs of students with asthma which should be addressed in the school's system. In addition, the results of this study can be used to help teachers to provide better classroom practices for students with asthma. To our knowledge no study exists that has investigated Jordanian teachers' practices and training of asthma in primary school level.

Purposes of the Study

The main purpose of this study was to investigate the level of practices and training regarding asthma and its management among primary school teachers in Jordan.

This study addressed the following questions:

Study question 1: To what extent do regular classroom teachers favor inclusion of students with asthma in public schools?

Study question 2: To what extent do regular classroom teachers have training about asthma that is reflected in providing appropriate accommodations in public schools?

Study question 3: What are the most challenges that are faced by regular classroom teachers which limit their ability to provide appropriate services for students with asthma?

Method

Participants

A total number of 68 regular classroom teachers who worked in eight public schools that provided teaching for students in primary grades in the southern region of Jordan were asked to be the participants of the study. The schools were selected purposively for feasibility reasons. All these schools have resource rooms to provide special education services. Of this total population, 57 teachers responded and returned the survey material. The second author met the teachers individually in their school and encouraged them to be part of the study which increased the response rate. All of the teachers were females and have students with asthma in their classes. The ages ranged from 24 to 35 years of age with the majority being 29 years old with seven years of teaching experiences. All of them were qualified teachers and have a university degree in the field of child education.

Procedures

The Ministry of Education provided the researchers with all descriptive information and contact numbers for schools in Jordan and authorization was obtained from the appropriate education bodies. Permission was sought from the principals of eight public primary schools then regular classroom teachers were approached. The teachers were approached individually and the aim of the survey was explained to them. Teachers were assured that the study was for scientific

purposes only and that their responses were confidential and anonymous. They were urged to respond to all items to the best of their knowledge. A cover letter explaining the purpose of the survey, the term of inclusion, and the estimated time for filling out the survey (25 minutes) was presented in the beginning of the study. Inclusive education was defined as "students with special needs (e.g., asthma) who are supported in chronologically age appropriate general education classes in their home schools and receive the reasonable accommodations (e.g., alleviate discomfort as indicated, provide breaks, re-teach skills because of prolonged absences) within the context of the core curriculum and general class activities" (Halvorsen & Neary, 2001, p.18). The informed consent was requested from the teachers in order for them to participate in the study. The teachers completed a hard copy of the survey and returned it to the researchers within four days after receiving it. Then the second author interview each teacher individually for around 20 minutes to discuss their responses and clarify any vague point for them. All data was collected during the month of April of 2015.

Instrument

The survey instrument had three main sections. The first section requested descriptive information about the participants' gender, age, education levels, years of teaching experience, the existence of students with asthma in their classroom, and the inclusion preference. The second section requested information about the teachers' training and practices of the general health and legal information that pertaining to asthma; and the teachers' practices in terms of accommodating students with asthma in their schools. The third section is an open-ended question that asked participants to list the major challenges and obstacles in including students with asthma in public schools.

The survey included 21 items that were distributed randomly to mitigate order effects and selection bias. The 21 items of the instrument were formulated based on a modified version of the Classroom Adaptations for Students with Health Disabilities Questionnaire (Heller et al., 2009), and the review of relevant literature (Ainscow, 2007; Asthma Foundation of Australia, 2007; Ketterlin-Geller et al., 2007; Lucas et al., 2012; McLaughlin et al., 2006; Snow et al., 2005; U.S. Department of Health and Human Services, 2013; Yell et al., 2006). Areas covered in the survey included: general health and legal information, physical and health monitoring, environmental arrangement, instruction and curricular adaptations, and assignments and tests. The responses on the items were in Likert-type forms designated as follows: (a) yes always, yes sometimes, and no; and (b) yes or no.

Validity and Analyses

To establish the face and content validity of the instrument, an initial version of the survey was given to 10 university instructors. These referees were asked to judge the content of the survey and provide feedback. They made comments on a few items and suggested merging some items due to similarity of their meanings, and re-phrasing some for more clarity; these suggested changes were taken into consideration when making the final version of the survey. Language validity was established by translation in Arabic and re-translation to English done by the first author and two language experts. In addition, internal consistency was calculated using Cronbach's alpha (Field, 2009). The instrument had a high coefficient (.94) of reliability.

In order to respond to the research questions, the information from the closed-ended items in the questionnaire was entered into the statistical package for the Social Sciences (SPSS Inc., Chicago IL, 2008). An exploratory analysis approach was applied to all data, providing frequency distributions as well as graphical displays of data. In addition, to generate categories

and themes for the last section of the survey, the researchers were immersed with the data by reading the teachers' responses and analyzing the interviews scripts to this question many times. Then generate the category through the prolonged engagement with the data (the teachers' answers). These categories then become buckets into which segments of text are placed. These categories are internally consistent but distinct from one another (Marshall & Rossman, 2006, p.159).

Results

Although just 4% ($n=2$) of the total number of participants ($N=57$) are trained to correctly dispense medication and look for signs of asthma, all teachers (100%) have positive attitudes toward including students with asthma in public school, and all teachers (100%) have students with asthma in their classrooms. A closer inspection of the data is introduced in the form the percentages and frequencies (see Table 1) according to the covered domain, and themes for an open ended question of the survey are presented in the next section.

The general trend of the descriptive data are: (a) all of the teachers are in favor of including students with asthma in public schools; (b) teachers are not trained to support students with asthma in regular classroom; (c) teachers are not familiar with Law on the Rights for Persons with Disabilities for the year of 2007; (d) teachers are not monitoring for asthma signs and its medication; (e) teachers are positive and flexible in terms of providing environmental arrangement for students with asthma but not in terms of providing instructional and curricular adaptations; (f) teachers are not providing consistent practice to support students with asthma in their assignments and tests; and (g) students with asthma are not considered eligible for special education services in public schools in Jordan.

Table 1. *Percentages and Frequencies of the study's items*

Domain/Item	Item's Response	Percentages (%)	Frequencies
General Health and Legal Information			
1- Are you trained to correctly dispense medication and look for signs of asthma (e.g., steps to use the inhaler, asthma attack indicators)?	Yes	4	2
	No	96	55
2- Do you have an emergency plan for students with asthma (e.g., specific contact numbers listed and a strategy in place in the event of asthma attacks or other potential medical problems)?			
	Yes	7	4
	No	93	53
3- Do you lecture your students about asthma to make them aware of this illness needs?			
	Yes	4	2
	No	96	55
4- Are you familiar with the Jordanian Law (31) on the Rights of Persons with Disabilities? (Specifically the section that addresses the needs of students with health impairments).			
	Yes	2	1
	No	98	56
Physical and Health Monitoring			
1- Do you monitor the health problems (e.g., breathing problems, asthma attack) for your students?			
	Yes Always	3	2
	Yes Sometimes	18	10
	No	79	45
2- Do you monitor pain and discomfort for students with asthma?			
	Yes Always	77	44
	Yes Sometimes	16	9
	No	7	4
3- Do you monitor fatigue and low endurance for students with asthma?			
	Yes Always	16	9
	Yes Sometimes	56	32
	No	28	16

4- Do you monitor medication and treatment effects for students with asthma?	Yes Always	4	2
	Yes Sometimes	8	5
	No	88	50

Table 1—(Continued).

Domain/Item	Item's Response	Percentages (%)	Frequencies
Environmental Arrangement: Across school environments and within classrooms			
1- Do you consider special arrival and departure times for students with asthma when needed?	Yes Always	62	35
	Yes Sometimes	26	15
	No	12	7
2- Do you consider providing students with asthma with appropriate seats?	Yes Always	65	37
	Yes Sometimes	25	14
	No	10	6
3- Do you schedule rest breaks or rest breaks as needed for students with asthma?	Yes Always	21	12
	Yes Sometimes	56	32
	No	23	13
Instruction and Curricular Adaptations			
1- Do your school provide special education services for students with asthma?	Yes Always	5	3
	Yes Sometimes	11	6
	No	84	48
2- Do you have a documented accommodation plan for student with asthma?	Yes Always	0	0
	Yes Sometimes	5	3
	No	95	54
3- Do you provide modify activities (e.g., more time, shorter segments, different response, different outcome) for students with asthma?	Yes Always	9	5
	Yes Sometimes	37	21
	No	54	31
4- Do you provide textbook on CD for students with asthma?	Yes Always	0	0
	Yes Sometimes	0	0
	No	100	57
5- Do you communicate with parents to let them	Yes Always	4	2

know about the missed school work when student with asthma is absent?	Yes Sometimes	10	6
	No	86	49

Table 1—(Continued).

Domain/Item	Item's Response	Percentages (%)	Frequencies
Assignments and Tests			
1- Do you break up assignments and tests into shorter segments for students with asthma?	Yes Always	23	13
	Yes Sometimes	67	38
	No	10	6
2- Do you provide extended time for students with asthma as needed?	Yes Always		10
	Yes Sometimes	70	40
	No	12	7
3- Do you use peer helper to help students with asthma for assignments?	Yes Always	9	5
	Yes Sometimes	23	13
	No	68	39
4- Do you use alternate grading for students with asthma as needed?	Yes Always	0	0
	Yes Sometimes	11	6
	No	89	51
5- Do you monitor the academic progress of students with asthma to make sure that they are not falling behind?	Yes Always	5	3
	Yes Sometimes	55	31
	No	40	23

Major Challenges and Obstacles in Including Students with Asthma in Public Schools

Responses to the open-ended question that asked teachers about the major challenges and obstacles in including students with asthma in public schools were coded. These were then read and re-read and themes were developed to reflect the nature of the responses. The main themes that represented the challenges and obstacles that faced by teachers in providing appropriate services for students with asthma were: (a) teachers are too busy to make time for students with asthma, (b) teachers fear working with students with special health care needs in general, (c) teachers have concerns about liability in supporting the needs of students with asthma, (d) teachers lack of training and experiences in supporting the needs of students with asthma, (e) schools lack the proper resources to manage student's asthma effectively.

Discussion

All teachers must maintain safe, healthy environments for all of their students to promote health and learning. Teachers who have students with asthma often need specialized knowledge and skills to address specific health issues. In some instances teachers will need to know how their students' health can affect educational performance, whereas in other situations teachers will need to know what to do if a health problem should occur. Understanding these students' special health care needs make a significant difference in providing proper health management and appropriate educational adaptations to address the health issues (Heller et al., 2009). The primary purpose of this study was to investigate the level of training and practices regarding asthma and its management among primary school teachers in Jordan. The major findings of this study are discussed in details in the following sections.

All of the teachers are in favor of including students with asthma in public schools. Similar findings were reported by other researches (e.g., French & Carroll, 1997; Lucas et al., 2012). This result may be explained by the fact that teachers want to look good or have sympathy

for students with asthma more than it is a general policy or practice in Jordan. This finding is expected since previous research in Jordan suggested greater willingness amongst teacher to include students with certain types of mild disabilities, such as asthma, rather than students with other severe disabilities that affect basic academic skills (Al-Zyoudi, 2006). However, school teachers have a duty of care for all children while attending school or participating in school related activities. This duty of care applies particularly to children with a health condition such as asthma.

Teachers are not trained to support students with asthma in regular classroom. Although teachers generally embrace the practice of inclusion, the results of this study suggested that these teachers are largely untrained and unprepared to truly integrate students with asthma in public schools. As indicated previously, several studies suggested a lack of teachers' awareness on asthma and its management (Eisenberg et al., 1998; Hussey et al., 1999; Madsen et al., 1992). Improved pre-service preparation and professional development for primary school teachers to help students with asthma is needed.

Teachers are not familiar with Law on the Rights for Persons with Disabilities for the year of 2007. Unfortunately, even though the Law on the Rights for Persons with Disabilities has passed since 2007, it is not practiced in the real world with students with special needs in Jordan. It would be easy to think that legislation in itself has created an environment that can accommodate the educational needs of students with disabilities in Jordan, but this is not true. The law of education for students with asthma needs to be enforced in Jordan. This finding confirms that fact that most of the students with asthma infiltrate the regular education system in Jordan without being provided with adequate educational support (Abu-Hamour & Al-Hmouz, 2014). Legislation has been implemented slowly or has not been implemented at all in Jordan.

The policies and legal protections need to be better understood, accepted and implemented at both the central governmental and wider community levels.

Teachers are not monitoring for asthma signs and its medication. This finding is expected since most of these teachers are not trained to provide help for students with asthma. Previous studies suggested that care for children with asthma in schools was often disorganized and lack of appropriate treatment and accessibility to asthma medications (McLaughlin et al., 2006; Snow et al., 2005). However, School teachers' ability to correctly identify the signs and symptoms of a severe acute asthma attack are critical if they are to handle this type of emergency in the school environment.

Teachers are positive and flexible in terms of providing environmental arrangement for students with asthma but not in terms of providing instructional and curricular adaptations. For example teachers' interviews in this study indicated that they had acceptance to students absenteeism due to illness or asthma attack but very few of them would consider providing certain accommodations to compensate these students. This result is in line with previous research that has indicated that teachers were selecting the accommodations according to the easiness of implementation and not according to the needs of students with asthma (e.g., Ainscow, 2007; Ketterlin-Geller et al., 2007; Miner & Finn, 2003) .

Teachers are not providing consistent practice to support students with asthma in their assignments and tests. This result is a reflection of not using standardized accredited procedures in Jordanian schools to support students with asthma. If students with asthma are to succeed within general education classrooms, testing and assignments accommodations are essential. In a very important sense, several investigators indicated that testing accommodations have a positive effect on students' academic achievement (e.g., Goh, 2004; Lang et al., 2005). Therefore, the

Ministry of Education in Jordan may need a clear written policy on testing accommodations use to assure that students with asthma have equal opportunities to participate in testing situations. Indeed, assessment is the cornerstone of effective teaching and learning environments. It plays a central role in determining the quality of education. Effective assessment for students with disabilities requires adequate resources and teachers well-grounded in assessment accommodations technique (Elhoweris & Alsheikh, 2010).

Students with asthma are not considered eligible for special education services in public schools in Jordan. This may be explained by the fact that philosophies and practices of inclusion, as an advanced phase of integration, have not been clearly understood and implemented within the public schools in Jordan (Abu-Hamour & Al-Hmouz, 2014). In Jordan, it is notably observed that integration efforts have been directed toward students with learning disabilities in particular. It seems that classroom teachers and special education teachers are not aware that they have common responsibilities toward students with asthma.

Teachers are facing several challenges that limit their abilities to support students with asthma. Teachers faced many obstacles and challenges while teaching and implementing the reasonable accommodations that allowed students with asthma to participate effectively in the classroom. These findings are consistent with findings reported by Bartholomew and colleagues (2006) who indicated that lack of resources (e.g. equipment) and time constraints among school staff were barriers to asthma care. In this study, many teachers understandably express anxiety about accepting liability for what they perceive to be a medical rather than an educational issue and one for which they have received little or no training.

Recommendations, Limitations, and Future Research

Based on the results of this study, the researchers recommended the following: (a) develop and implement necessary training programs for teachers and other staff who will be responsible for asthma care task at school and school-related activities, (b) meet with parents and health care providers to address issues of concern about the provision of care to students with asthma by teachers, (c) identify students with asthma, and review their health records as submitted by families and health care providers, (d) arrange a meeting to discuss health accommodations and educational aids and services that the student with asthma may need, and to develop an Individualized Educational Program (IEP), (e) find appropriate interventions for students with asthma to reduce their loss of instructional time as well as gaps in sequential learning events created by their absences, and (f) ensure that the student with asthma receive prescribed medications in a safe, reliable, and effective manner and has access to needed medication at all times during the school day.

There are a few limitations in this study that should be considered when interpreting the findings. First, all information was based on teacher self-report and interviews. The study would be more reliable if there were observations sessions to conduct better understanding of teachers' perspectives and practices. Second, the study sample was small and was conveniently selected from public schools. As a result, generalization of these findings must be treated with caution. For example, crucial differences between private and public schools in Jordan may be existed. Private schools in Jordan provide better services for students with health impairments than public schools, and most of these private schools hire a full time nurse to satisfy the needs of the students with asthma. In general, students in private schools presented a better learning, health, and behavioral profile than students in public schools in Jordan. Thus, the conditions of students with asthma in private schools should be explored in future research. Finally, although the ability

for students with asthma to attend school is more of a reality than it has ever been in the past, the rising prevalence rates combined with the absence of school nursing staff in public schools creates a burden on unprepared school systems. Thus, it is critical that further research focus on the identification of evidenced-based practices that lead to safe and successful educational outcomes for this vulnerable population of students.

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Regular Teacher Preparation for Inclusion

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Abstract

The role of regular teachers is asserted as an integral component in the fruition or otherwise of inclusion in Early Childhood Education (ECE). Consequently, their preparation for inclusion is a cause for concern. An examination of regular teachers' preparation for inclusion in ECE in Zimbabwe revealed that they had tuition in characteristics, health, attitudes, education, inclusion, assistance, diversity and behavior management of children with disabilities. Regular teachers had also tutelage of social, physical and behavior management environment. They had further grounding in collaboration with peer regular teachers, teacher assistance teams, multi-disciplinary teams and parents. Inversely, regular teachers lacked training in instructional environment management, adaptive equipment, environmental adaptations, flexible working with individual children, collaboration with specialist teachers and content, process and assessment

modification. Attention to these issues as they relate to child diversity, curriculum differentiation, classroom and behavior management and collaboration would optimize regular teachers' preparation for inclusion in ECE.

Keywords: *Children with disabilities, early childhood education, inclusion, regular teachers, specialist teachers, Zimbabwe*

Introduction

In compliance with various international Human Rights Declarations, Conventions and Charters including the Universal Declaration of Human Rights (United Nations, 1948) and the Salamanca statement and framework for action on special needs education (UNESCO, 1994), Zimbabwe adopted inclusion in Early Childhood Education (ECE) in 1994 (Chireshe, 2013; Mugweni & Dakwa, 2013; Musengi & Chireshe, 2012). As the paradigm shift from exclusion to inclusion in ECE picks up steam in the country, most children with disabilities who have been previously educated in special settings are now educated in regular classrooms (Majoko, 2005; Mandina, 2012; Mushoriwa, 2001), affecting all aspects of schooling.

In Zimbabwe, children with disabilities are learners with hearing impairments (including deafness), speech or language impairments, mental retardation, visual impairments (including blindness), emotional disturbance, orthopedic impairments, autism, traumatic brain injuries, other health impairments or specific learning disabilities and therefore require special needs education services (Mpofu, Kasayira, Mhaka, Chireshe & Maunganidze, 2007; Musengi & Chireshe, 2012). These learners have developmental challenges as measured by diagnostic

instruments and procedures, in one or more of the following areas: physical development, communication development, cognitive development and adaptive development and social or emotional development (Chireshe, 2011; Mutepfa, Mpofu & Chataika, 2007; Mushoriwa, 2002). Inclusive education can be viewed as teaching and learning of children in classrooms they would otherwise attend if not identified as having unique needs (Chambers & Forlin, 2010; Hodkinson, 2005; Lambe, 2007). It constitutes several features including acceptance and participation of children with disabilities in the school and social community as well as provision of necessary human, material, financial, time and technological resources that afford these children least restrictive environments to succeed (Chambers & Forlin, 2010; Garman, 2005; Winch-Dimmitt, 2006). Inclusive education also embodies consultation and collaboration between regular and specialist teachers, provision of materials and curriculum adaptations and support personnel in regular education classrooms as well as social and academic interactions of both children with and without unique needs (Hodkinson, 2005; Jung, 2007; Voltz, 2003).

In pursuit of inclusion in ECE, the Government of Zimbabwe manages the Basic Education Assistance Module (BEAM), a nationwide scheme which caters for the costs of core education such as levies, school and examination fees of children with disabilities in order to prevent families from resorting to coping mechanisms including withdrawing these children from schools in response to poverty (Mugweni & Dakwa, 2013). The government also passed and enforces pro-inclusion policies and legislation including the Constitution of Zimbabwe Amendment Number 20 of 2013 section 75, Education Act of 1996, the Disabled Persons Act of 1996, the Secretary's Circular number 2 of 2000 and the Director's Circular number 7 of 2005. Among other rights, these policies and legislation mandates the rights of children with disabilities to care, health and education (Chireshe, 2013; Mandina, 2012; Mugweni & Dakwa,

2013). Consequently, a significantly increased number of children with disabilities are served in mainstream ECE settings the country over, pressurizing regular teachers to meet more diverse needs as mainstream classrooms now constitutes more heterogeneous mix of children with different backgrounds and with different levels of abilities and disabilities (Mpofu , et al., 2007; Musengi & Chireshe, 2012). Inclusive education requires regular teachers to acquire new competencies and skills as well as develop them continuously (Chireshe, 2011; Majoko, 2005; Mushoriwa & Gasva, 2008).

Since meeting the needs of diverse abilities and disabilities requires teacher professional competence that optimizes holistic development of children (Bassette, 2008; Pearson, 2007; Romano & Chambliss, 2000), the Zimbabwean teacher is thus, integral in the success or otherwise of inclusion in ECE (Chireshe, 2013; Majoko, 2005). Through having confidence in their teaching efficacy, being willing to shift in paradigm, having favorable attitudes toward children with disabilities and exhibiting attitudes, beliefs, knowledge, understandings, competencies and skills needed to meet the needs of all children, teachers can impact inclusion in education (Berry, 2010; El-Ashry, 2009; Ferreira & Graca, 2006). Educators who proactively accept responsibility to teach in inclusive settings are more likely to display receptivity toward inclusion as well as improve their quality of instruction, differentiated teaching practices and engagement in collaboration (Alghazo, Dodeen & Algaryouti, 2003; Elhowerise & Alsheikh, 2006). Professional competence of teachers to meet the diverse needs of children in inclusive classrooms constitutes expertise in the content areas from regular education and the ability to collaborate, develop, plan, manage and implement individualized lessons for children receiving special needs education services (Friend & Bursuck, 2012; Garman, 2005; Lambe, 2007), thus enhancing learning opportunities for all children. Resultantly, teacher education programs are the

foundation in preparing teachers to work in diverse pedagogical settings (Idol, 2006; Pearson, 2007; Sherill, 2006).

Teacher preparation programs for inclusion inculcate in future teachers competencies and skills to meet the full range of needs among children (Cooper, Kurtts, Baber & Vallecorsa, 2008; Hsien, 2007; Tait & Purdie, 2000). These programs equip teachers with knowledge of the characteristics of children with disabilities and a comprehension of their role and responsibility in special needs education (Harvey, Yssel, Bauserman & Merbler, 2010; Reinke & Moseley, 2002). According to Forlin (2010); and Mintz (2007), identification of disabilities including learning, mild intellectual and behavioral disabilities often occurs during school life. Since teachers serve children at risk of disabilities and provide inclusive practices to children with disabilities, they need expertise in special needs education process including pre-referral procedures such as assessments and individualized planning to differentiate between an educational disability and a child needing intensive or different instruction (Arndt & Liles, 2010; Avramidis, Bayliss & Burden, 2000). Student teachers require instruction on basic characteristics of each disability category so as to gain a general understanding of the disability as well as the inclusive practices to use in classrooms (Bassette, 2008; Brownell, Ross, Colon & McCallum, 2005; Campbell, Gilmore & Cuskelly, 2003). Because inclusive pedagogy entails teaching and learning of children with disabilities in regular education settings, it is imperative for teacher preparation programs to develop in student teachers an understanding of characteristics of various disabilities, their role in the processes by which to support children who may have a disability and a positive attitude in working with children with disabilities and their families and other stakeholders (Burstein, Sears, Wilcoxon, Cabello & Spagna, 2004; Carroll, Forlin, Jobling, 2003; Chong, Forlin & Au, 2007).

It is also fundamental for teacher preparation programs to develop in student teachers the professional competence to differentiate instruction for inclusion of children with disabilities in regular education classrooms (Al-Zyoudi, 2006; Ferreira & Graca, 2006; Romi & Leyser, 2006). As inclusive education exposes all children to regular education curriculum, the success of all children hinges on modifications and adaptations to the teaching and learning content and processes (Sharma, Forlin, Loreman & Earle, 2006; Sherill, 2006; Tubeles, 2008). Teacher preparation programs therefore need to foster in student teachers professional competence in differentiation of instruction and universal design of learning for adaptation of instruction to the unique needs of children. Inclusive teachers differentiate teaching and learning so that all children have access to the curriculum (Arthaud, Arama, Breck, Doelling & Bushrow, 2007; Al-Zyoudi, 2006; Hodkinson, 2005). Because differentiation of instruction is not easily mastered and requires practice, teacher preparation programs need to provide student teachers with opportunities to learn and master how to differentiate their lessons in order to meet the needs of a variety of disabilities (Campbell et al., 2003; Kalyva, Gojkovic & Tsakiris, 2007). Courses on differentiation of instruction can embody theoretical and practical application of the strategies and techniques for modification and adaptation of the content for children with disabilities (Chong & Forlin, 2007; Shade & Stewart, 2001; Voltz, 2003).

Teachers further require expertise in classroom and behavior management in order to realize inclusion in education (Allday, Neilsen-Gatti, Hinkson-Lee, Hudson, Russel & Kleinke, 2012; Sharma, Moore & Sonawane, 2009; Woloshyn, Bennett & Berrill, 2003). Issues related to challenging child behavior are the most stressful part of teachers' professional lives (Clunies-Ross, Little & Kienhus, 2008; Richards & Clough, 2004). Most teachers frequently request assistance related to behavior management because they feel ill-prepared to manage misbehavior

effectively (Elhowerise & Alsheikh, 2006; Idol, 2006; Shade & Stewart, 2001). Inclusion of children with emotional and behavioral disorders who often present multiple behavioral challenges exacerbates teachers' feeling of ill-preparedness (Allday, et al., 2012; Winch-Dimmitt, 2006). Children at risk of disabilities or who have other disabilities also engage in a wide range of challenging behaviours (Alghazo ,et al., 2003; Berry, 2010; Carroll et al., 2003).

Teachers' understanding of effective behaviour management techniques and multi-sensory systems of support is foundational in successful inclusion (Clunies-Ross, et al., 2008; Ferreira & Graca, 2006). Owing to the significant need to meet the requirements of inclusive practices for children with behavioral difficulties, adequate pre-service instruction in classroom management practices is critical (Friend & Bursuck, 2012; Harvey, et al., 2010; Mintz, 2007). Teacher preparation programs can develop in student teachers practical principles for teaching and strategies for addressing challenging child behavior to minimize disruptions (Renke & Moseley, 2002; Tabele, 2008).

The pursuit of increased achievement among all children has transformed educational practice, shifting teaching and learning from a solitary enterprise to one in which regular and special educators are mutually involved and collaboration is at the cutting edge (Burstein, et al., 2004; Chambers & Forlin, 2010; Voltz, 2003). Collaboration between regular and specialist teachers requires that they all work together to meet the diverse needs of children with and at risk of disabilities (Forlin, Loreman, Sharma & Earle, 2009; Jung, 2007; Richards & Clough, 2004). Collaboration constitutes a complex set of interpersonal and professional skills and competencies ranging from regular communication to co-teaching partnerships (El-Ashry, 2009; Van Laarhoven, Munk, Lynch, Bosma & Rouse, 2007). In co-teaching, a regular teacher and a special teacher share roles and responsibilities for planning, delivering and evaluating instruction for a

wide range of children, including those with disabilities (Romi & Leyser, 2006; Van Reusen, Shoho & Barker, 2001; Winch-Dimmitt, 2006). Co-teaching optimizes instructional equity for children with disabilities in heterogeneous classrooms (Arndt & Liles, 2010; Bassette, 2008). Owing to the currency of co-teaching, teacher education programs need to prepare student teachers to collaborate, write and implement lesson plans, manage and administer interventions and carry out differentiated instruction (Arndt & Liles, 2010; Conderman & Johnstone-Rodriguez, 2009; Voltz, 2003).

Rationale for the Study

A number of factors prompted the execution of the current study. Literature on regular teacher preparation for inclusion published since 1994 reveals researchers' worldwide concern (Allday et al., 2012; Forlin, 2010; Pearson, 2007; Sharma et al., 2009). Prior to the global adoption of inclusion in education, teacher preparation programs have been non-responsive to the philosophy (Hsien, 2007; Kilanowski-Press, Foote & Rinaldo, 2010; Mintz, 2007). There is also a dearth of studies on regular teacher preparation for inclusion (Chambers & Forlin, 2010; Elhowerise & Alsheikh, 2006). Regular teachers further reveal that their preparation is devoid of information and knowledge related to working with children with disabilities (Idol, 2006; Richards & Clough, 2004). Similarly, most regular teacher preparation programs related to children with disabilities include content on disability characteristics but little on methodologies for inclusive practices (Arndt & Liles, 2010; Tubebele, 2008). Most regular teachers are also inadequately professionally prepared to implement inclusive education (Bassette, 2008; Chong, et al., 2007). Teaching in inclusive settings further demands a wide range of skills and dispositions to meet child diversity (Al-Zyoudi, 2006; Berry, 2010; Hodkinson, 2005). In consequence, teacher

preparation programs are obliged to equip student teachers with diverse range of skills and competencies before they enter the teaching profession.

Regular teachers need to have professional grounding in basic characteristics of disabilities, differentiation of instruction, classroom and behavior management and collaboration in order to realize successful inclusion (Allday, et al., 2012; Bassette, 2008; Harvey et al., 2010; Tubele, 2008). Currently, teacher education literature in Zimbabwe does not address the extent to which regular ECE teachers receive preparation in these critical special needs education areas. If the field of ECE is to continue to embrace inclusion, it is fundamental to examine the effectiveness of preparation of regular teachers. It is also critical to investigate practices and ascertain if teacher education programs are meeting the needs of teachers and providing safe learning environment for all children (Forlin, et al., 2009; Lambe, 2007). In view of the foregoing, the current study examined the present state of pre-service regular ECE teacher preparation for inclusion after two decades of adoption of the philosophy in the country. The present study attempted to ascertain whether changes have taken place regarding pre-service regular ECE teacher preparation for inclusion in the country. Specifically, the current study addressed the following research questions:

1. What are Zimbabwean regular teachers' perceptions regarding their preparation for inclusion of diverse children in ECE?
2. What are the perceptions of regular teachers in Zimbabwe about their preparation for curriculum differentiation in inclusion in ECE?
3. What are Zimbabwean regular teachers' perceptions regarding their preparation for classroom and behavior management in inclusion in ECE?

4. What are the perceptions of regular teachers in Zimbabwe concerning their preparation for collaboration in inclusion in ECE?

Methodology

In order to determine regular teachers' preparation for inclusion in ECE in Zimbabwe, a survey on their coursework instruction on basic skills and competencies needed for successful inclusion was conducted. The current descriptive survey involved a random sample of three hundred and eighty ($n = 380$) 2014 graduate regular ECE pre-service teachers, 211 females and 169 males, aged between 27 and 42 years. The sample was drawn from five randomly selected Zimbabwean public primary school teachers' colleges (76 from each college) using simple random sampling. Random sampling selects a sample in such a way that each member of the population has an equal chance of being selected into the sample (Cohen, Manion & Morrison, 2007; Creswell, 2009). Random sampling guarantees selection of a sample that is truly representative of the population in order to use the results obtained from the sample to make generalizations about the population (McMillan & Schumacher, 2006; Wiersma & Jurs, 2009). The respondents were given self-administered questionnaires in order to ascertain their preparation for inclusion in ECE. Data was analyzed using descriptive statistics in the form of percentages based on the three categories: Agree, Uncertain and Disagree. Three hundred and eighty out of four hundred and fifty-two self-administered questionnaires were returned which constituted 84% return rate. The findings were synthesized according to basic skills and knowledge needed for successful inclusion particularly knowledge on characteristics of various disabilities, differentiation of instruction, behavior management and collaboration.

Results

Table 1: Regular teachers' preparation for child diversity in inclusion in ECE (n = 380)

ITEM	Agree %	Uncertain %	Disagree %
1. In my college coursework, I have received instruction on basic characteristics of various disabilities	50.8	33.4	15.8
2. In my college coursework, I have received instruction on health related needs of children with different disabilities	66.3	10.5	23.2
3. In my college coursework, I have received instruction on the educational needs of children with different disabilities	69.5	7.9	22.6
4. In my college coursework, I have received instruction on adaptive equipment for children with different disabilities	29.7	23.4	46.8
5. In my college coursework, I have received instruction on environmental adaptations for children with different disabilities	26.8	31.8	41.3
6. In my college coursework, I have received instruction on inclusion of children with different disabilities	71.3	18.9	9.7
7. In my college coursework, I have received instruction on the importance of attitudes in inclusive education	69.7	13.7	16.6
8. In my college coursework, I have received instruction on process by which to assist children with disabilities	59.7	13.7	26.6

Table 1 depicts regular teachers' preparation for child diversity in inclusion in ECE. Overall, the majority of regular teachers had received instruction on child diversity in inclusive education. For item 1, 50.8% of the regular teachers agreed that they had received instruction on basic characteristics of various disabilities while the rest (33.4%) were uncertain and (15.8%) disagreed. Nevertheless, 69% of the respondents received instruction on health related needs, educational needs and inclusion of children with different disabilities (Items 2, 3 and 6). Items 4 and 5 reveal mixed feelings of regular teachers regarding instruction on adaptive equipment and environmental adaptations for children with different disabilities. In item 4, 29.7% of the respondents had instruction on adaptive equipment for children with different disabilities while the rest (23.4%) were uncertain and (46.9%) disagreed. A similar pattern emerged in Item 5 where 41.3% of the regular teachers disagreed that they had instruction on environmental adaptations for children with different disabilities while 26.8% of the regular teachers agreed and 31.8% were uncertain. Regarding Item 7, 69.7% of respondents agreed that they had instruction

on the importance of attitudes in inclusive education while the rest (13.7%) were uncertain and (16.6%) disagreed. In Item 8, 59.7% of the regular teachers agreed that they had instruction on the process by which to assist children with disabilities while 26.6% of the regular teachers disagreed and 13.7% were uncertain.

Table 2: Regular teachers' preparation for curriculum differentiation in inclusion in ECE (n = 380)

ITEM	Agree	Uncertain	Disagree
	%	%	%
1. In my college coursework, I have received instruction on attending to child diversity in inclusive education	78.4	9.5	12.1
2. In my college coursework, I have received instruction on content modification in inclusive education	22.4	6.6	71.1
3. In my college coursework, I have received instruction on process modification in inclusive education	27.1	17.4	55.5
4. In my college coursework, I have received instruction on modification of assessment in inclusive education	22.9	15.5	61.6
5. In my college coursework, I have received instruction on flexible working with individual children in inclusive education	25.8	9.7	64.5

Table 2 illustrates regular teachers' preparation for curriculum differentiation in inclusion in ECE. Data for Item 1 shows that most of the respondents (78.4%) agreed that they had received instruction on attending to child diversity in inclusive education while the rest (9.5%) were uncertain and (12.1%) disagreed. However, approximately 71.1% of the regular teachers disagreed that they had received instruction on content modification in inclusive education while 22.4% of the regular teachers agreed and 6.6% were uncertain (Item 2). A similar pattern was seen in Item 3 where 55.5% of the regular teachers disagreed that they had received instruction on process modification in inclusive education while 27.1% of the regular teachers agreed and 17.4% were uncertain. With regard to item 4, 22.9% of the regular teachers agreed that they had received instruction on modification of process in inclusive education while 61.6% of the regular

teachers disagreed and 15.5% were uncertain. A similar pattern emerged in Item 5 where 64.6% of the respondents disagreed that they had received instruction on modification of assessment in inclusive education while the rest (25.8%) agreed and (9.7%) were uncertain.

Table 3: Regular teachers' preparation for classroom and behavior management in inclusion in ECE (n = 380)

ITEM	Agree %	Uncertain %	Disagree %
1. In my college coursework, I have received instruction on management of the social environment in inclusive education	83.4	5.8	10.8
2. In my college coursework, I have received instruction on management of the physical environment in inclusive education	57.1	28.4	14.5
3. In my college coursework, I have received instruction on management of instructional environment in inclusive education	8.4	22.4	69.2
4. In my college coursework, I have received instruction on behavior management environment in inclusive education	76.1	6.8	17.1
5. In my college coursework, I have received instruction on management of behavior of children with diverse disabilities in inclusive education	61.1	10.8	28.2

Table 3 illustrates regular teachers' preparation for classroom and behavior management in inclusion in ECE. For item 1, 83.4% of the respondents agreed that they had received instruction on management of the social environment in inclusive education while 5.8% of the respondents were uncertain and 10.8% disagreed. In Item 2, 57.1% of the regular teachers agreed that they had received instruction on management of the physical environment in inclusive education while 28.4% of the regular teachers were uncertain and 14.5% disagreed. Nevertheless, in Item 3, 69.2 % of the respondents disagreed that they had received instruction on management of instructional environment in inclusive education while the rest (22.4%) were uncertain and 8.4%

agreed. Regarding Item 4, 76.1% of the regular teachers agreed that they had received instruction on behavior management environment in inclusive education while 6.8% of the regular teachers were uncertain and 17.1% disagreed. A similar pattern was observed in Item 5 where 61.1% of the respondents agreed that they had received instruction on management of behavior of children with diverse disabilities in inclusive education while 10.8% of the respondents were uncertain and 28.2% disagreed.

Table 4: Regular teachers' preparation for collaboration in inclusion in ECE (n = 380)

ITEM	Agree	Uncertain	Disagree
	%	%	%
1. In my college coursework, I have received instruction on collaboration with specialist teachers in inclusive education	28.4	13.4	58.2
2. In my college coursework, I have received instruction on collaboration with peer regular teachers in inclusive education	77.9	13.7	8.4
3. In my college coursework, I have received instruction on collaboration with teacher assistance teams in inclusive education	51.2	12.9	35.8
4. In my coursework, I received instruction on collaboration with multi-disciplinary teams in inclusive education	75.8	3.4	20.8
5. In my coursework, I have received instruction on collaboration with parents in inclusive education	69.5	16.3	14.2

Table 4 depicts regular teachers' preparation for collaboration in inclusion in ECE. For Item 1, 28.4% of the respondents agreed that they had received instruction on collaboration with specialist teachers in inclusive education while the rest (13.4%) were uncertain and 58.1% disagreed. Nevertheless, in Item 2, 77.9% of the regular teachers agreed that they had received instruction on collaboration with peer regular teachers in inclusive education while 13.7% of the regular teachers were uncertain and 8.4% disagreed. A similar pattern was seen in Item 3 where 51.2% of the respondents agreed that they had received instruction on collaboration with teacher assistance teams in inclusive education while 12.9% of the respondents were uncertain and

35.9% disagreed. For Item 4, 75.8% of the regular teachers agreed that they had received instruction on collaboration with multi-disciplinary teams in inclusive education while 3.42% of the regular teachers were uncertain and 20.8% disagreed. A similar pattern was observed in Item 5 where 69.5% of the respondents agreed that they had received instruction on collaboration with parents in inclusive education while 16.4% of the respondents were uncertain and 14.2% disagreed.

Discussion

Consistent with the international fraternity, inclusion in ECE is a philosophy of inspiration, passion and contention in Zimbabwe. Consequently, the country places children with disabilities in ECE classrooms with regular education teachers at high rates (Chireshe & Ndlovu, 2002; Mushoriwa, 2002; Mutepfa, et al., 2007). The present study examined regular teachers' preparation for inclusion in ECE. Consistent with previous studies which have found that instruction on special needs education issues significantly improves teachers' attitudes and instructional competencies and skills in inclusive education (Alghazo, et al. 2003; Campbell et al., 2003; El-Ashry, 2009), regular teachers had instruction on characteristics of various categories of disabilities. Although, instruction on characteristics of various disabilities may not be adequate to address all of the attitudes, beliefs, knowledge, understandings, skills and competencies needed to teach children with disabilities in inclusive ECE settings, it may enhance regular teachers' preparation for inclusion. When regular teachers understand and accept children with disabilities, they feel more supportive in their role as a specialist educator (Reinke & Moseley, 2002; Romano & Chambliss, 2000; Tait & Purdie, 2000).

Regular teachers had instruction on health related needs of children with different disabilities. This finding concurs with previous research which has established that teachers need instruction on diverse needs of children with different disabilities as some conditions result in children requiring specialized attention from teachers (Chambers & Forlin, 2010; Shade & Steward, 2001; Woloshyn, et al., 2003). Consonant with previous studies which have found that regular teachers need professional competence in special needs education process in order differentiate between an educational disability and a child needing intensive or different instruction since they serve children at risk of disabilities and provide inclusive practices to children with disabilities (Arndt & Liles, 2010; Avramidis, et al., 2010), regular teachers had instruction on the educational needs of children with different disabilities. Such instruction can develop regular teachers' competencies and skills in designing and managing pedagogical content and processes that are responsive to child diversity. In order to realize inclusion, teacher preparation programs need to develop in student teachers an understanding of basic characteristics of various disabilities and their role in the processes by which to assist and support children who may have a disability (Harvey et al., 2010; Mintz, 2007; Renke & Moseley, 2010).

Regular teachers lacked instruction on adaptive equipment for children with different disabilities. This finding is inconsistent with previous studies which have found that inclusive education avails children with disabilities technological resources that afford them the opportunity to succeed in least restrictive environments (Chambers & Forlin, 2010; Garman, 2005; Winch-Dimmit, 2006). Adaptive equipment helps bypass, works around or compensates for individual children's learning deficits in inclusive settings (Majoko, 2005; Musengi & Chireshe, 2012). Thus, regular teachers' lack of instruction on adaptive equipment may interfere with inclusive education. Regular teachers also lacked instruction on environmental adaptations for children

with disabilities. This finding contradicts with previous studies which have found that teacher preparation for inclusion equips student teachers with competencies and skills in nurturing least pedagogical environments (Berry, 2010; Burstein et al., 2004; Hodkinson, 2005). In alignment with previous studies which have established that teachers' confidence levels are increased when they are taught techniques that address inclusion in the classroom (El-Ashry, 2009; Ferreira & Graca, 2006), regular teachers had instruction on inclusion of children with different disabilities. Instruction on inclusion of children with different disabilities can inculcate in regular teachers the expertise to accommodate child diversity in teaching and learning.

Consistent with previous research which has established that inclusive education demands a wide range of teacher skills and dispositions to meet a diverse child population (Friend & Bursuck, 2012; Garman, 2005; Lambe, 2007), regular teachers had instruction on the importance of attitudes in inclusive education. Similarly, Idol (2006); Pearson (2007); and Sherill (2006) assert that teachers require professional competence and the attitudes to collaborate, develop, plan, manage and implement individualized lessons for children receiving special needs education services so as to meet the diverse needs of children in inclusive classrooms. Regular teachers had instruction on process by which to assist children with disabilities. This finding is consonant with previous research which has established that teacher competencies and skills in special needs education process and content are integral in successful inclusion (Bassette, 2008; Brownell et al., 2005; Campbell, et al., 2003). In alignment with previous studies which have found that teacher competence in meeting the diverse needs of children is pivotal in successful inclusion (Cooper et al., 2008; Hsien, 2007; Tait & Purdie, 2000), regular teachers had instruction on attending to child diversity in inclusive education. Such instruction can assist teachers to be responsive to child individuality.

Regular teachers lacked instruction on content modification in inclusive education. This finding contradicts with previous studies which have found that inclusive teaching and learning content responds to the unique needs of children (Forlin, 2010; Mintz, 2007). Owing to lack of instruction on content modification in inclusive education, teachers may manage teaching and learning content that is non-responsive to the unique needs of children. Inconsistent with previous research which has established that process modification informs teaching and learning in inclusive education (Carroll, et al., 2003; Chong, et al., 2007; Voltz, 2003), regular teachers lacked instruction on process modification in inclusive education. Without instruction on process modification in inclusive education, teaching and learning strategies may be non-responsive to the individuality of children. Regular teachers lacked instruction on modification of assessment in inclusive education. This finding contradicts with previous studies which have established that since inclusive education assesses all children on a regular curriculum, teachers need to have expertise in assessment (Allday, et al., 2012; Idol, 2006; Tubebele, 2008). Lacking instruction on modification of assessment in inclusive education, teachers may be incompetent in adapting assessment to the individual needs of children.

Inconsistent with previous studies which have established that inclusive education responds to children's individuality (Arthaud, et al., 2007; Sharma et al., 2006; Sherill, 2006), regular teachers lacked instruction on flexible working with individual children in inclusive education. By virtue of lack of instruction on flexible working with individual children in inclusive education, teachers may not tailor their pedagogical approaches and content to the unique needs of individual children. Inclusive teachers nurture social interactions between children with and without disabilities (Campbell et al., 2003; Kalyva, et al., 2007; Tubebele, 2008). Regular teachers had instruction on management of the social environment in inclusive education. As a result of

such instruction, teachers can support the social acceptance of children with disabilities by their typically developing peers. Consistent with previous studies which have established that inclusive teaching and learning environments optimizes the unfolding of the unique potentialities of children (Chong & Forlin, 2007; Shade & Stewart, 2001; Winch-Dimmitt, 2006), regular teachers had instruction on management of the physical environment in inclusive education.

Regular teachers lacked instruction on management of instructional environment in inclusive education. This finding contradicts with previous studies which have established that the instructional environment of inclusive settings responds to child diversity (Berry, 2010; Carroll et al., 2003; Ferreira & Graca, 2006). Without instruction on management of instructional environment in inclusive education, regular teachers may not nurture pedagogical environments that optimize the unfolding of the unique endowments of both children with and without disabilities. Nevertheless, regular teachers had instruction on management of behavior of children with diverse disabilities. This finding is inconsistent with previous studies which have established that issues related to challenging child behavior are the most stressful part of teachers' professional lives and many teachers feel ill-prepared to manage misbehavior effectively and ultimately frequently request assistance related to behavior management (Clunies-Ross et al., 2008; Richards & Clough, 2004). With instruction on management of instructional environment in inclusive education, regular teachers may be competent in managing disruptive and challenging behavior. Inconsistent with previous studies which have found that collaboration of regular teachers and specialist teachers facilitate best practices in inclusive education (Burstein, et al., 2004; Chambers & Forlin, 2010; Voltz, 2003), regular teachers lacked instruction on collaboration with specialist teachers in inclusive education.

Central to successful inclusion is collaboration of regular teachers (Alghazo, et al., 2003; Elhowerise & Alsheikh, 2006; Chong, et al., 2007). Regular teachers had instruction on collaboration with peer regular teachers. Regular teachers had also instruction on collaboration with teacher assistance teams. This finding aligns with previous studies which have found that collaboration of teachers and their assistance teams is basic in successful inclusion (Forlin, et al., 2009; Jung, 2007; Richards & Clough, 2004). Collaboration of regular teachers with assistance teams can pool expertise for best practices in inclusive education. Consistent with previous studies which have established that multi-disciplinary approaches are pivotal in requisition of resources that are foundational in holistic development of children with disabilities in inclusive settings (Arndt & Liles, 2010; Bassette, 2008), regular teachers had instruction on collaboration with multidisciplinary teams. Teacher-parent collaboration is indispensable in successful inclusion (El-Ashry, 2009; Van Laarhoven, et al., 2007). Regular teachers had instruction on collaboration with parents in inclusive education. Collaboration of teachers with parents in inclusive education can facilitate the provision of comprehensive services for both children with and without disabilities.

Implications

The present study revealed that teacher preparation programs inadequately prepared regular teachers for inclusion in ECE. However, the researcher is presently unaware of the quantity of courses that would be definitive to adequately prepare regular teachers for inclusion in ECE. Nevertheless, the results of the current study revealed that the lack of some basic skills and competencies in teacher preparation programmes for inclusion contribute to practising teachers' feeling of ill-preparedness to meet the full range of needs among children in inclusion in ECE. In order identify specific topics that all regular teachers need to be taught for successful inclusion in

ECE, further study is needed. Fieldwork in inclusive settings with children with disabilities during teacher training can also enhance teacher preparation for inclusion in ECE. Guided field experiences optimize pre-service teachers' confidence in teaching children with disabilities (Chambers & Forlin, 2010; El-Ashry, 2010). Verification of the impact of fieldwork with children with disabilities would assist teachers' colleges to optimize regular teachers' preparation for inclusion in ECE.

The current study used self-administered questionnaires to collect data, future researchers can engage in document analysis particularly examining regular teacher preparation for inclusion in ECE in relation to course title, scope and description. These courses may be embodying basic skills and competencies for inclusion which regular teachers could not identify. Reviewing teacher preparation programmes for inclusion in ECE would augment the findings from regular teachers.

Limitations

The study sample inadequately represented the population of regular ECE teachers in Zimbabwe as it excluded graduates from private primary school teachers' colleges in the country. Regular ECE teacher preparation programmes were also not examined. There is a possibility that these programmes embodied some of the skills and knowledge bases addressed in the current study that the participants overlooked. Although the researcher acknowledges that regular teachers may have some instruction on the aforementioned skills and knowledge bases, exposure to such complex topics in broader teacher preparation programmes simply cannot provide practice to mastery.

Conclusion

Consistent with the international fraternity, inclusion in ECE is a primary service delivery option in Zimbabwe. The present study examined the possible dissonance between teacher preparation and regular teachers' pragmatic realities regarding inclusion in ECE. Teacher preparation needs to be responsive to the needs of both children with and without disabilities and their teachers in order to realize best practices in inclusion in ECE. To this end, the provision of on-going needs responsive support to both children with and without disabilities and their teachers is foundational in successful inclusion. Teacher preparation content and processes can influence teacher competence in inclusion in ECE. Developing regular teachers' professional competence in characteristics of children with disabilities and their role and responsibility in the special needs education process, differentiation of instruction, classroom and behaviour management and collaboration can optimize best practices in inclusion in ECE.

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