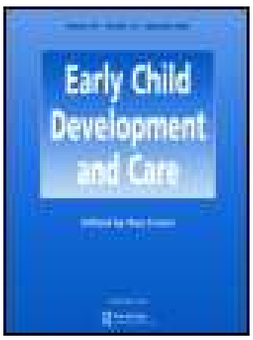

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Exploring multisensory experiences in infants' learning and development in the child care classrooms

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ABSTRACT

Infants come to know about the world and develop an understanding about themselves through multisenses. This qualitative case study aimed to explore how three infant head teachers engaged in and facilitated various multisensory play activities in their classrooms. Natural, in-class, non-participatory observations were conducted at a child care centre in the U.S. The findings of this study illustrated how the infant teachers in this study provided, promoted, and scaffolded multisensory experiences in their daily practices. The findings also highlighted that the infant teachers adapted sensory experiences to meet individual preferences, needs, interests, and changing developmental status of their infants.

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Infant play; sensory play; infant caregiving; infant teacher; day care

Introduction

Infants have long been considered helpless, incapable, and dependent upon adults for care, nurturance, and support (Cannella, 1997; Gascoyne, 2012). However, the dissemination of the knowledge on brain research is challenging this perception, portraying infants as sophisticated and highly competent beings (Lally, 2013). From birth, infants are driven to learn by seeking and making meaning from their environments (Gopnik, 2010) and to socialize and make an emotional connection with those around them (Lally, 2013). Research findings highlighted that early experiences can build the architecture of the developing brain, influence infants' development and learning, and provide a foundation for future lives (National Scientific Council on the Developing Child, 2007).

It should be noted that infants have distinct ways to develop and learn. Infants experience rapid growth and the most dramatic developmental changes from birth to age 3 (Goldschmied & Jackson, 1994). Early learning begins with the whole body through multisenses (Honing, 2007; Kovach & DaRos-Voseles, 2008). The human brain develops optimally with multisensory stimulation (Parks, 2014; Shams & Seitz, 2008, p. 411). Through multisenses, such as sight, touch, hearing, taste, smell, mouthing, and muscle sense, infants receive sensory input, actively explore their surroundings, gather knowledge about the world they encounter, and understand the world around them (Forbes, 2004; Kovach & DaRos-Voseles, 2008; Lockhart, 2011). Multisensory experiences, therefore, could be the most natural and familiar way for infants to develop and enhance their cognitive, social-emotional, and physical development as well as a sense of self (Bergen, Reid, Torelli, & Caldwell, 2001; Honig, 2007; Lockhart, 2011; Schwarz & Luckenbell, 2012). As infants come to know about the world using their senses and movement (Piaget, 1953), sensory-rich play is fundamental to infants' learning and development (Gascoyne, 2012; Goldschmied & Jackson, 1994).

The importance of sensory-rich experiences has been recognized by many theorists and practitioners, such as Piaget, Montessori, Steiner, Reggio Emilia approach, and so on. One of the

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contemporary pioneers of the twentieth century in infant play would be Elinor Goldschmied (Hughes & Cousins, 2017). Goldschmied demonstrated that infants learn through all their senses and develop physical skills to learn about the objects they encounter (Forbes, 2004; Page, Clare, & Nutbrown, 2013). She believed that even before a baby could move about, we should provide the opportunity for the baby to have items to explore and experiment with (Hughes & Cousins, 2017). She introduced the ideas of the 'Treasure Basket' and 'heuristic play,' highlighting the benefits resulting from engaging in sensory exploratory play (Goldschmied & Jackson, 1994; Page et al., 2013). The Treasure Basket was specifically designed for infants aged 7–12 months and it was filled with natural objects that were picked with sensory interest in mind for babies to explore (Gascoyne, 2012; Hughes & Cousins, 2017). Once infants became mobile (aged around 12–20 months), they would engage with heuristic play, discovery play, using a large number of different natural materials and receptacles (Gascoyne, 2012). Sensory objects in Treasure Basket and heuristic play can be used in numerous ways and have the potential for creativity, imagination, and open-ended play (Hughes & Cousins, 2017). There is no 'right' or 'wrong' way to use sensory materials. Sensory play will enable infants to follow their own interests, support their curiosity, and sustain their own level of involvement (Page et al., 2013).

The importance of sensory play has also been recognized by The National Association for the Education of Young Children (NAEYC), one of the foremost ECE organizations in the U.S. It has been argued that early childhood classrooms should include various sensory materials: sand, water, playdough, paint, crayons, markers, glue, and blocks (NAEYC, 2005). Sensory materials provide opportunities for infants to explore materials freely and directly with their hands and thus foster young children's motor and cognitive skills, social development, and eye-hand coordination (Koster, 1997).

While very few studies have explored teachers' role in infant play (Aras, 2015; Edwards, Cutter-Mackenzie, & Hunt, 2010; Jung & Recchia, 2013), a dearth of empirical research has looked directly at how infant teachers provide and facilitate sensory experiences in their classroom. Goldschmied and Jackson (1994, p. 101) stated that the role of the adult is 'not to intervene, but to stay quiet and attentive.' Teachers should carefully observe infants' particular needs as they go through rapid growth and development and provide 'emotional anchorage' (Goldschmied & Jackson, 1994; Page et al., 2013). Most of the available resources on the topic of sensory play or sensory experiences among infants seemed to be practitioner focus, listing guidelines and/or suggested activities. Empirically based knowledge of sensory experiences among infants is clearly limited. It should be noted that infants show individual preferences about and responses to sensory stimuli. Not only do all individuals have preferences for receipt of sensory information, but some may also be sensory sensitive or sensation seeking (Bagdi, Vacca, & Waninger, 2007; Thompson & Raiser, 2013). It is important to explore how infant teachers use and capitalize on multisensory experiences in their daily practice and thus create a stimulating, yet not overwhelming, environment where all activities and materials are appropriate, meaningful, and individualized (Lee, Shin, & Recchia, 2016; Page et al., 2013; Recchia & Shin, 2010; Shin & Partyka, 2017).

Research on the topic of sensory play or sensory experiences in infancy is clearly narrow in scope. This qualitative study aimed to portray how three infant head teachers engaged in various multisensory play activities in their classroom. The specific research questions were as follows:

(1) In what ways do infant head teachers provide sensory experiences to a group of infants in their classroom?
(2) What adaptations, if any, do infant head teachers make in order to meet the various needs, interests, and changing developmental status of a group of infants?

Methods

A qualitative case study method was chosen because this study was exploratory and interpretive and the case study method could be useful in presenting information about areas in which little research has been done (Merriam, 1998). Based on natural, non-participatory, in-class observation data, this

site-specific study was focused on how three infant head teachers create and adapt multisensory experiences in their infant classroom.

Settings and participants

This study was conducted at a university-affiliated child care centre in the U.S. The centre was committed to implementing inclusive early care and education of young children and providing observation and fieldwork opportunities for university students. There were 11 classrooms serving young children aged from 12 weeks through 5 years: four preschool classrooms, four toddler classrooms, and three infant classrooms. There were also special providers on board, such as an occupational therapist, physical therapist, speech therapist, and interventionist. This study invited three infant head teachers in three different infant classrooms. The term 'infant classroom' referred to a classroom where children under 2 years old are cared for as this study was conducted in an infant classroom of a university-affiliated child care setting where children under 2 years old were enrolled.

There were three infant head teachers who participated in this study. In each classroom, there were two full-time head teachers and they had a staggered schedule (one head teacher in the morning and another head teacher in the afternoon). Head teachers were supervising several student caregivers who were completing their fieldwork hours in this particular centre or working part-time in the classroom. Therefore, usually there was one full-time head teacher and one or two student caregivers at one time. Head teachers were responsible for creating a safe and stimulating classroom environment, promoting development of the 'whole' child, assessing the infants' learning and development, and supervising student caregivers.

Sarah majored in Early Childhood Education. She has been working with infants and toddlers for 11 years. She has worked as a head teacher at this specific centre for 6 years. There were eight infants aged from 4 to 16 months in Sarah's classroom. Four were boys: Adam (4 months), Liam (5 months), Thomas (15 months), and Eric (16 months). There were also four girls: Jennifer (10 months), Grace (10 months), Rosie (10 months), and Leah (14 months).

Lindsay holds a Master's degree and was previously a special education teaching assistant. She has been a head teacher in this specific centre for approximately 10 years. At the time of data collection, there were eight infants aged from 5 to 21 months in Lindsay's classroom. There were five girls and three boys in her classroom. The girls were named Riley (21 months), Selena (17 months), Mary (17 months), Briana (13 months), and Ava (7 months). The three boys were Chris (9 months), Bennett (8 months), and Jerome (5 months).

Melissa has worked in the child care field, specifically with children aged six weeks to about five years old, for 20 years. Melissa has worked in this specific child care centre for 10 years. There were 10 infants who ranged in age from 10 months to 21 months at the beginning of the data collection period. Four were girls and six were boys. The girls were Alana (19 months), Ariel (17 months), Ella (11 months), and Lilliana (10 months). There were six boys: Chris (21 months), Derek (21 months), Aaron (17 months), Kyle (17 months), Egan (16 months), and Brody (13 months). Out of the three infant classrooms, there were more older infants in Melissa's classroom.

Data collection and data analysis

As the study involved young infants, it was important to minimize any discomfort and ensure confidentiality. Considering that the centre is open to university students to complete observation hours and fieldwork, it is possible for participants to get used to having visitors in the classroom. However, it is also possible that some participants may still feel uncomfortable having the researcher in the classroom. As the participants were minors, informed consent was sought from the legal guardians/parents of all three infant classrooms (Kellet, 2010). It was stressed that participation in this study was completely voluntary, and participants may withdraw their consent at any time and for any reason (Kellet, 2010). I had provided ample time to read the consent forms and sign them.

It was also important to capture the teachers' interest and gain their permission for me to be in their classroom. I met with the teachers to discuss the study in detail and sought permission from them. I emphasized that the participation should be voluntary and their participation or non-participation should have no effect on their employment. All the participants identified with pseudonyms to ensure confidentiality. Once all the parents and teachers signed and returned the forms, the data collection process began.

Natural observation was the main and fundamental source in this study recognizing that the observation is a great tool to explore the sensory experiences in a natural setting (Marshall & Rossman, 1999). As a data collecting researcher, it was important for me to figure out when to step into the classroom and start collecting the data in order to maximize the quality of the collected data and to minimize intrusiveness to the participants in each classroom. I found that it was easier to observe infants during the morning as afternoon time was often cut short due to their extended nap times. During the observation period, I sat in the corner of the classroom and tried not to be intrusive or disruptive. Even though I did not initiate any interaction with the infants in the classroom, I interacted only when infants were interested in me. I responded to their initiation naturally; they could come and sit with me and even write on my field notes. My interactions with the infants were minimal as my goal was to not disrupt the flow of the classroom.

During the first week of the data collection period, I sat in the corner of the room and I tried to provide time for infants to get used to my presence in the room. Again, the centre is open to university students to complete observation hours and fieldwork, and therefore infants might be used to having different people in their classroom. Yet, I wanted to provide some time for infants to feel comfortable having me in the classroom. During the second week of the data collection period, I stepped into the room when everyone settled in, sat in the corner of the room, and started to take field notes. Natural in-class, non-participatory observations were conducted for approximately 10 h per week for 10–12 weeks in each classroom. Observations were conducted in the morning as the infants were more active in the morning and afternoon time was often cut short due to their extended nap times. Observation days were selected and adjusted carefully since there was one infant whose parents did not provide consent in one of the infant classrooms. That particular infant was enrolled in the centre on a part-time basis. Therefore, the data collection process was conducted only on the days that infant was not present.

I took field notes in a running record format without any predetermined categories. Specific background information, including date, time, a brief description of the setting, and number of infants and teachers present, was recorded. The focus of the observation was how infant teachers interacted with infants and provide sensory play activities/experiences. Detailed descriptions included any activities, interactions, and actual words and comments of the teacher and infants. Field notes were expanded and typed into the computer after each observation period.

All collected data were organized by each classroom in chronological order. Data then were analysed through inductive, emergent, and interpretive analysis (Marshall & Rossman, 1999). All field notes were read carefully multiple times to find recurring themes in line with the research questions. Margin notes were utilized to record any comments and/or questions that came to my mind. These comments and points were then synthesized to answer the research questions. All three cases were analysed separately. In order to ensure trustworthiness, a brief summary of the findings was shared with infant teachers as member checking (Janesick, 1994). Then, using within and cross-case analysis, any commonalities across all three cases were explored (Merriam, 1998). Specific anecdotes that best supported the research questions were selected as illustrative examples (Wolcott, 1994). Pseudonyms were assigned to ensure confidentiality.

Results

The data analysis revealed that the three infant teachers were providing various sensory materials to a group of infants and promoting multisensory experiences in their classrooms. The commonalities

across the three cases were that each teacher provided multisensory experiences throughout the day, such as sensory table play, music and dance, drawing and painting, playdough, and so on. While there were commonalities observed, some distinct differences were noticed due to their classroom dynamics and age differences. What follows is a presentation of how each infant teacher in this study was providing and adapting multisensory experiences to meet the changing needs of the infants in their own classroom.

Sarah's classroom

Of the three classrooms, many younger infants were enrolled in Sarah's classroom. Five infants out of eight were under 10 months old. Sarah seemed to be very cognizant of infants' developmental status when creating sensory experiences for infants in her classroom. It was observed that she offered two different sensory play opportunities for infants to manipulate and make their own discoveries: a sensory table and a sensory bin. A sensory table is a table high enough for young children to stand around and explore an area filled with various objects and materials (Hunter, 2008). As illustrated in an anecdote below, this sensory table experience provided Eric an opportunity to engage with sensory material (water) and to have a conversation about soapy water with the teacher. Eric was engaging with Sarah positively, gaining feedback.

> Bubble wrap[1] is taped on the floor. Eric (17 months) touches the bubble wrap with his foot and then goes to the sensory (water) table. Eric splashes water with his right hand. Eric comes back to Sarah [Infant teacher], squeezing his hands together and lets Sarah touch his hand. Sarah says, 'Ah—. Wet. It's soapy too'. Eric smiles and goes back to the water table.

As portrayed in the above anecdote, there were two different sensory experiences being offered at the same time. While sensory water table was utilized and enjoyed by an older infant with his acquired mobility and more coordinated eye-hand-arm movement, Sarah made a sensory material on the floor available for all infants to touch, explore, manipulate, and feel the different sensation on their hands and feet, as demonstrated in the following anecdote:

> Rosie (11 months) sits on the bubble wrap and plays with it. She tries to pop the bubble and pushes a car on it.

Sarah provided sensory materials in a bin on the floor rather than in a sensory table for younger infants, who were not mobile yet. Those sensory bin materials were all natural items, such as cornmeal, rice, and ice, that were safe for infants to explore and manipulate, as seen in the below two anecdotes:

> Liam (7 months) and Adam (5 months) are playing with cornmeal and rice in a bucket. The bin is placed on the floor. Liam and Adam are putting their hands in and feeling it. Jennifer (11 months) walks over to the cornmeal.

> Adam (5 months) is on his tummy. Sarah [Infant teacher] puts a mirror in front of him. Adam whines and complains. Sarah is also down on her belly and says, 'Are you mad? It's okay. Are you done?' Sarah lifts Adam up and holds him. There is a big bin with ice in on the floor. Adam touches the ice. Sarah says, 'Brr—brrr—cold? It's cold.' Sarah is rubbing his back.

Sarah used a sensory bin to enable Adam to have an access to the sensory material. Sarah also stayed next to Adam and supported Adam by rubbing his back during his sensory exploration and making comments.

One distinctive sensory activity that Sarah was offering to her infants was cooking/baking activity. As shown in the anecdote below, a group of infants sat at a table together and made muffins for their afternoon snack. A group of four infants were fully engaged in the process, naming the ingredients, pouring them into a bowl, mixing them, and smelling and tasting them.

> Sarah [infant teacher] is making muffins with kids. There are four infants at the table: Eric (17 months), Jennifer (11 months), Liam (6 months), and Leah (15 months). Sarah says, 'Eric, what's this? You have to tell them. They don't know'. Eric says, 'Salt, baking soda, sugar.' Sarah gives some salt to each kid to feel it. The kids are exploring the ingredients and Jennifer is excited. Sarah says, 'We need to add a teaspoon of baking soda. Can you put that in?'

> Sarah asks Leah to do so. When Leah puts the ingredient into a mixing bowl, Sarah says, 'Thank you, Leah.' She then adds, 'Jennifer, you want to do salt?' Jennifer adds salt into a bowl. Sarah says, 'We need a cup of sugar. Look at all the sugar, Whee–[pouring sugar into a measuring cup] cup of sugar. Eric, you would like to add sugar?' When Eric adds the sugar, Sarah says, 'Good job, Eric.' Sarah says, 'Cinnamon. Smell the cinnamon. Hmmm … ' Sarah smells it and passes the cinnamon to infants. 'Smells so good. Good smells. Ready? Put the cinnamon in. Whee … we need a cup and ¾ flour. You wanna put flour in, Liam?' Then, she says, 'Alright. Ready. Would you like to put the last cup of flour? Eric?' Eric did so. Sarah says, 'Dump. Dump, yeah. Mix, mix, Liam. Mix that up. Keep mixing. You're having fun. Jennifer's having a good time.' [Infants take a turn holding a spatula and mixing the ingredients.] Leah sticks her hand into a bowl and taste the mix. Sarah smiles and says, 'You have done this before. Are you baking at home? Future baker here. One more step.' Sarah is putting the mix into a pan. 'Yummy. Yummy. Yummy. All right, friends. We'll wait for the oven.'

Through this cooking/baking activity, Sarah was providing multisensory experiences and promoting physical, social, and cognitive experiences. For instance, infants explored different baking ingredients by touching, seeing, and smelling them. Additionally, when Leah wanted to taste the batter, Sarah mentioned the possibility that Leah might be used to baking things at home. As they were taking turns and working together, a warm, social atmosphere was created.

Melissa's classroom

Of the three classrooms, Melissa had more infants who were older and close in age. There were few infants who were ready to make a transition to a toddler room by the end of the data collection period. Recognizing those older infants' growing developmental competencies and emerging interests in pretend play, Melissa seemed to provide more group play activities, as seen in the following anecdote:

> Melissa [Infant Teacher] lays down towels on the floor and puts the water and soap into the water table. Melissa also puts toy animals and wash cloths into the water table. Ariel (19 months) is cleaning animal toys with her washcloth. Brody (15 months) is walking around the room with a wet washcloth, and Melissa redirects him. Brody splashes water with his wash cloth. Chris (23 months) is looking at Brody. Brody smacks his hand on his soaked cloth, splashing the soapy water everywhere. Melissa rolls up Brody's sleeves and says that he is going to need a new dry shirt. Chris smiles at Brody and imitates gently. Aaron (19 months) picks up a toy and shows it to Melissa. Melissa says, 'It is a cow,' Aaron says, 'Moo.' Kyle (19 months) is focused on covering and uncovering a toy with a cloth. Chris watches what Kyle is doing. Arial babbles to Melissa while holding a pig toy on her hand. Melissa asks if pig is wet. Egan (18 months) and Ariel (19 months) are talking to each other. Melissa asks if Egan can find Ariel another pig … Ariel wraps her pig toy up, and Melissa says 'Good night.' Ariel then moves side to side while holding the pig toy.

When Melissa brought the sensory water table into the classroom, her intention was to offer the 'washing the animal' play. Yet, infants seemed to have different ideas in their minds. They started manipulating and exploring sensory materials based on their' own choices and interests. Brody, for example, was using his whole body to explore water, splash water everywhere, and get wet. Chris was more observant, watching what Brody and Kyle were doing at the table. Kyle was interested in covering and uncovering a toy with a washcloth. Ariel was focused on cleaning a toy pig, wrapping it with a washcloth, and pretending to put the toy pig to sleep. Infants were fully engaged in this sensory play while Melissa stayed close to them. She offered positive comments and encouragement, and let infants enjoy the play without imposing a fixed schedule or her own agenda.

Here is another example how Melissa supported the emergent play while following the infants' lead and ideas. There were eight infants in the classroom and she prepared a pile of white shredded papers on a small triangle table, placing animal toys under the pile of shredded papers, as shown in the following anecdote:

> There are Lilliana (10 months), Ella (11 months), Brody (13 months), Ariel (17 months), Kyle (17 months), Alana (19 months), Chris (21 months), and Derek (21 months). Melissa [Infant teacher] asks, 'Can you find the dog? Can you find the cow?' She picks up one toy out of the pile. Melissa asks if they can find any of the animal buried under the paper. Infants do not respond. Infants pick up some papers and drops them on the table several times. Melissa picks up some papers as well. She then begins to lift papers high in the air and slowly drops over infants' heads,

> saying 'It's snowing!' Infants smile. Alana, Derek, and Kyle start to put papers over their heads and throwing them high up towards the ceiling. Kyle holds papers against his face, covering his face with the papers. Ariel pulls the paper away out of his hands one piece at a time …

Infants were not interested in finding the animals hidden under the pile of papers. Melissa fully realized that and did not impose her idea. Instead, she let infants explore the papers as they wish, observing them carefully. She then imitated the infants' action, picking up and dropping papers. When she commented about the repeated action that infants were engaged in, infants seemed to be happy with the 'snowing' play idea, smiling and starting playing with 'snowing' papers.

In this classroom, there were multiple art materials introduced to infants, such as crayons, markers, paint, dot paint, and playdough. As shown in the following anecdote, infants engaged in an open-ended drawing/scribbling activity on their own using available materials. This particular activity could also encourage social encounters, sharing the space to draw together.

> There is a big piece of paper taped to the wall. Alana (19 months), Chris (21 months), and Kyle (17 months) stand side by side and draw and scribble together using markers. Ariel (17 months) chooses one marker and goes over to the paper and draws. Chris goes into a corner and Derek (21 months) joins him. Brody (13 months) stops wheeling a baby in the stroller and watches them. He joins others and starts to draw, standing next to Alana and Ariel.

In addition, Melissa offered a painting activity specifically adapted for an infant with a sensory sensitivity. Melissa noticed that a specific infant was reluctant to explore paint even using a paintbrush. Based on her careful observation and her discussion with the early intervention team, Melissa has been experimenting various ways to involve the specific infant in painting activities. When Melissa learned that the specific infant was interested in a car, she created this 'paint with a toy car' activity in order to assist that specific infant to explore and enjoy painting with a minimum amount of direct contact with the paint, as indicated in the following anecdote:

> There were six individual size papers that have already taped to the table. Five infants join the table, Ariel (17 months), Chris (21 months), Derek (21 months), Aaron (17 months), and Brody (13 months). Melissa [Infant teacher] and two student caregivers put smocks on them. Melissa picks up the blue paint bottle and squirts out some paints on each paper … Melissa distributes a toy car to infants and shows them how to roll their car through the paint puddles. ..Brody moves his car side by side (with big motions) and up and down. He touches the paint with his hands. He smears the paint on the paper … His both hands and the car are all covered with paint. Brody looks at his hands. Derek is looking at Brody carefully and moves his car slowly from left and right on the paper … Derek moves his arm slowly and little bit to side. He then looks at his fingers covered with paint. Melissa says that she has paint on her hands as well just like him. Aaron moves a car slowly, making small marks only on the middle of his paper. Melissa tells Aaron she loves how into it he is, and then pays attention to Derek, Chris, and Ariel, offering encouragement. Ariel wants a smaller car and rolls her car on the table rather than on her paper. Melissa puts more paint on Ariel's and Aaron's paper. Aaron, Ariel, and Derek move their cars around their papers.

It was interesting to notice different individual temperament in this anecdote. While Brody was into touching the paint and exploring it freely using hands without any hesitation, there were infants who were careful about moving their car on the paper and getting paint on his hand.

Lindsay's classroom

Classroom dynamics in Lindsay's classroom might be slightly different. There was a group of older infants aged from 17 months to 21 months and a group of younger infants who were aged from 5 months to 9 months. It was found that various music activities, singing, and movement were embedded in daily activities and routines. For example, Lindsay was being playful during mealtime as well as clean-up time after the meal by incorporating a song, making their mealtime fun and playful.

> Riley (22 months), Mary (18 months), Briana (14 months), Ava (7 months), and Jerome (6 months) are at the eating table. Riley is eating rice and bean. Briana holds yogurt cup and eats yogurt with a spoon. Riley sings Alphabet song, swinging side by side. Jerome vocalizes, 'Ah.' Ava is done with her lunch and is wing for a wash cloth to get

> cleaned up. Lindsay [Infant teacher] gets washcloth. When Ava makes uncomfortable noise, Lindsay says, 'I know a girl whose name is Ava, Ava, Ava.' Ava gets attentive and bangs a table with both hands along with the rhythm of the name song. Lindsay then starts singing a 'clean up song.' Mary looks at Lindsay and rocks her body side to side when Lindsay sings the 'clean up song.[2]'

It seemed that infants enjoyed singing and listening to music. Ava, especially, was interested when Lindsay made a song about her and mentioned her name in the song. Throughout the day, Lindsay put music on for a group of infants to enjoy listening music and dancing along the music, as shown in the following anecdote:

> Music is on. Selena (18 months) and Mary (18 months) hold hands and dance. Ava (7 months) crawls between them. Bennett (8 months) kicks his feet happily in his seat as he eats. Mary sits down and reads a book while rocking her shoulders to the music. Selena dances and watches herself dance in the mirror. Student Teacher dances with Briana (13 months). Mary picks up a toy bear and dances with it. Mary says and makes a sign for more [baby sign language[3]] when the music stops.

Music can be definitely enjoyable sensory experiences. For instance, Mary was rocking her shoulders to the music and Selena was watching herself dancing in the mirror. Also, Selena and Mary dance together, implying the music can be a social encounter for young children. Bennett also showed his excitement by kicking his feet along with the music.

While it was recognized that a group of infants could enjoy the music activity together, it seemed that a separate low-key space for younger infants might be helpful for them to explore musical instruments, beats, and movements on their own pace. As illustrated in the below anecdote, older infants got quite excited and moved to the music around the room, and Lindsay tried to provide a different space for them to enjoy music and dance.

> Mary (18 months) and Selena (18 months) roll on the floor. Teacher puts the music on, *Old McDonald*, and they being to dance around the room. Bennett (8 months) claps. Mary makes noise while putting her head in a bucket. Selena pulls the bucket away from her. Mary takes the stuffed animal dog and plays with it. Selena joins her and carries it around. When Mary tries to wrap the dog with a blanket, Chris (9 months) crawls onto the blanket. Mary hits his head. Lindsay [Infant teacher] asks Mary, Selena, and Briana to go to the gym. After they leave, Bennett and Chris sit beside each other. They watch each other, occasionally reaching for one another and touching. Bennett plays with shakers and rattles. Chris grabs a rattle and shakes it with a smile. Bennett claps his hands.

When older infants went to a gym space, only two young infants stayed behind in the classroom. A quite space seemed to provide a unique opportunity for Bennett and Chris. They seemed to explore the sensory materials freely and on their own, make music by playing different musical instruments; this gives great pleasure to infants.

Discussion

This study explored various multisensory play activities that infant head teachers engage in and promote in their classroom. Each classroom had a multitude of sensory materials, including sand, water, playdough, paint, crayons, markers, scissors, glue, play dough, and various papers, in line with NAEYC guideline (2006). Also, all three infant teachers in this study provided, promoted, and scaffolded sensory play and experiences in their daily practices (Goldschmied & Jackson, 1994; Page et al., 2013). It should be noted, however, that despite the commonalities in daily sensory-related practices, the ways that the sensory experiences were created, unfolded, and scaffolded were distinct to each classroom based on infants' developmental status, interests, and unique needs.

Infancy is a very unique and critical period for learning and development. As infants experience rapid growth and the most dramatic developmental changes (Goldschmied & Jackson, 1994), infants should be given an opportunity to engage in appropriate and meaningful experiences based on their developmental status and particular needs. Our findings confirmed that infant teachers provided the opportunity for the young infants, who were able to sit and were not mobile yet, to have sensory items to explore and experiment with, as described by other scholars (Forbes, 2004; Goldschmied & Jackson, 1994; Hughes & Cousins, 2017; Page et al., 2013). For example,

using a sensory table and different sensory bins, Sarah was providing ample opportunities for all infants to enjoy sensory experiences based on their developmental status and interests. Sarah brought natural and safe sensory items in a bin to the floor for infants to explore and manipulate. While there were cornmeal, rice, and ice in sensory bins on the floor, Sarah also provided a sensory water table for her older infants, who had more developed mobility and advanced eye-hand-arm coordination. This study pointed out the importance of observing the infants' developmental status and adapting the activity accordingly. Consequently, infants in this study had multiple ways to utilize multisenses, receive sensory input, and explore the sensory materials (Forbes, 2004; Kovach & DaRos-Voseles, 2008; Lockhart, 2011). The question then should be how to make the sensory activities available and appropriate for all infants, not whether sensory play is appropriate for very young infants who are not even mobile yet.

The findings support the notion that multisensory experiences could scaffold the infants' cognitive, social-emotional, and physical development (Bergen et al., 2001; Goldschmied & Jackson, 1994; Honig, 2007; Koster, 1997; Lockhart, 2011; Schwarz & Luckenbell, 2012). For instance, the cooking activity can promote multisensory experiences, as well as physical, social, and cognitive experiences. During the cooking activity, Sarah provided different baking ingredients for a group of infants to touch, see, and smell. She also noticed that Leah wanted to taste the batter, recognizing and mentioning that Leah might be used to baking things at home. It could be a great way to connect a sensory activity with funds of knowledge. Different cognitive skills were fostered as infants needed to follow directions, put ingredients in sequence, and explore measuring ingredients; they took turns putting ingredients in the bowl and mix the batter together. While holding the spatula, mixing the batter and putting ingredients into the mix, infants had opportunities to use their muscular senses. While infants had an opportunity to get a hands-on science experience, Sarah also created a warm, social atmosphere as infants working together, fostering social skills (Dahl, 1998). As infants baked muffins for a snack to share later in the day, it created a sense of togetherness in the group (Mortlock, 2015). Sensory play, therefore, can support the whole child development as developmental domains are interrelated.

Researchers argue for the importance for teachers to be an active observer, follow infants' lead, and capitalize infants' ideas and interests during infant play (Goldschmied & Jackson, 1994; Page et al., 2013). For example, when Melissa offered a group sensory water play, it was clear that infants had their own ideas to explore and manipulate the given sensory materials. Melissa did not impose her own 'teaching' agenda. Instead, she let infants freely pursue their own interests and ideas, and thus infants became more individual in their chosen activities. Also, it should be pointed out that Melissa was attentive throughout the sensory water table play, maintaining a close physical proximity to a group of infants and offering positive comments and encouragement. As a result, Melissa was able to provide 'emotional anchorage' to infants, and they were able to enjoy the play, build autonomy in the play, and experience a sense of empowerment (Canning, 2007; Goldschmied & Jackson, 1994; Page et al., 2013). Also, because sensory materials are open-ended and have no 'right' or 'wrong' way to use them, sensory play can enable infants to follow their own interests, facilitate creativity and imagination, and sustain their own level of involvement (Hughes & Cousins, 2017; Page et al., 2013).

The findings also revealed that infants demonstrated individual preferences about and responses to sensory stimuli (Bagdi et al., 2007; Thompson & Raiser, 2013). In Melissa's classroom, there were some infants who were not hesitant at all about getting wet and touching and exploring paint with hands. There was an infant who was engaged with sensory activity initially by intensely watching others. Also, there was a specific infant with a sensory sensitivity, who was reluctant to explore sensory materials. It seems crucial to understand that individual temperaments make each child unique in how (s)he responds to the world around them. Therefore, careful observation is crucial to identifying individual needs and preferences and thus to providing appropriate multisensory experiences. For example, when the specific infant was hesitant about painting even using a paint brush, Melissa offered a 'paint with a toy car' activity, incorporating the specific infant's interest in cars. This specific sensory experience was adapted and individualized based on her careful

observation about the specific infant' temperament, understanding of the infant's interest in cars, and her discussion with the early intervention team. Even though the activity was more instructive and direct, the individualized and adapted sensory materials and painting experience would provide a stimulating, yet not overwhelming, environment (Lee et al., 2016; Page et al., 2013; Recchia & Shin, 2010; Shin & Partyka, 2017). What is important to recognize is that teachers need to maintain a fine balance between child-initiated activity and teacher-supported activity. It is critical for the teachers to observe the infants carefully, constantly assess and reflect on their involvement with the infants, and provide the infants with an optimal learning experience.

It is noteworthy that infants may benefit from unrushed, low-key, quiet space to explore multisensory experiences. In Lindsay's classroom, for instance, a group of infants were enjoying their time together while listening to music, kicking their feet along to the music, watching themselves dancing in the mirror, and making music using musical instruments, and dancing together. Surely, music can be enjoyable as well as social sensory experiences (Parlakian & Lerner, 2010; Trehub, 2003). Yet, this study revealed that a quiet space for a small number of infants could offer a unique and beneficial multisensory experiences. For example, Bennett and Chris got a chance to have a whole room by themselves after a group of older infants went to a gym space. Bennett and Chris were able to explore and enjoy the sensory materials freely and on their own in an unrushed, peaceful atmosphere. They shook shakers and rattles, made music, and reached towards each other. A quiet space made infants focus and concentrate on their sensory exploration (Goldschmied & Jackson, 1994). It is critical, therefore, that infant teachers should provide an unrushed space for infants to take time to absorb the information, engage in the process, and just be rather than pursue a certain goal, such as an adult set agenda.

There were a few limitations inherent in this study. This study was a site-specific case study and the findings of this study cannot be readily generalized to other infants in diverse child care settings. Additionally, despite the careful and elaborated field notes, it is very much possible that I may have not been able to capture some aspects of interaction and fail to notice subtle nuances of participants' gestures and facial expressions. Also, as each classroom had its own unique atmosphere and culture created by the infants and the teachers, sensory experiences in one classroom were very different from other classrooms. Further study is needed to explore what might be the factor that influences the teachers' decision to provide and create different sensory activities and experiences in their classroom. The teachers' perceptions and perspectives of sensory experiences could be a further topic to pursue.

While I recognize that limitations, it was my aim to provide thick descriptions regarding teacher-facilitated multisensory experience of a group of infants in their infant classroom and the potential benefit of a range of sensory experiences. Sensory play can potentially provide some challenges to the practitioners as it can be 'messy,' 'slippery,' 'gooey,' 'sticky,' 'noisy,' or 'dangerous.' This study highlighted that sensory experiences can provide the infants with a meaningful, social pathway for learning and development. Sensory experiences were found to be integrated and embedded in daily practices. Considering that little research has been done to examine specifically how infant teachers provide and facilitate sensory experiences in everyday practices, it is my hope to provide new insight to the field of infancy.

Notes

1. Bubble wrap is a pliable plastic material used for packaging and has protruding air-filled hemispheres (bubbles) provide cushioning.
2. Clean-up song: 'This is the way we wash our hands. This is the way we wash our hands. This is the way we wash our hands when we are done with our [snack or lunch]'
3. In this centre, 'baby sign language,' non-verbal communication through hand gestures, has been used to help young children communicate and express their needs effectively. For example, to do sign for more, you will flatten out your hands then bring your thumbs under to make O shape. Then, bring your hands together, tap your fingertips together and separate them repeatedly.

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