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# Preschool Children's Cooperative Problem Solving during Play in Everyday Classroom Contexts: China and the US

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**Preschool Children's Cooperative Problem Solving during Play in Everyday Classroom  
Contexts: China and the US**

**A Dissertation Presented for the  
Doctor of Philosophy  
Degree  
The University of Tennessee, Knoxville**

**Meilan Jin  
May 2018**

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## **Abstract**

There is value in studying young children's cooperative problem solving (CPS) during play in different cultures since children in our society will continue to face problems that are not unique to a particular culture, but also relevant to people from other countries. Cognitive development theory and sociocultural theory contend that play contexts can support children in the construction of their knowledge through explorations with different play materials and engagement in social interactions with peers during CPS experiences. However, there is a lack of research studying children's CPS during play in their everyday preschool classrooms, and particularly, cross-culturally. Therefore, this dissertation, that includes three manuscripts, was designed to investigate (a) preschool children's different patterns of engagement in play and CPS in Chinese and US preschool classrooms and (b) their teachers' beliefs about their roles and pedagogical decisions for supporting children's CPS in particular settings in these two cultures. In the first manuscript, a systematic literature review was conducted framed by PRISR, and it was found that there is a lack of cross-cultural studies that have investigated (a) preschool children's CPS during play in their everyday classroom contexts and (b) teachers' roles in children's development of CPS. These research gaps were addressed in the second and third manuscripts by conducting (a) a 10-month, ethnographic informed observational study in a Chinese kindergarten and a US preschool center that included (b) semi-structured, teacher interviews with the integration of the visual stimulated recall approach. The data and findings are presented, based on over 960 minutes of (a) 16, four- and five-year-old children's video recordings, (b) six classroom teachers' interview transcriptions from two early care and education centers, and (c) the researcher's field notes and journal entries. Findings support that there were cultural and gender differences in children's engagement in their types of play

(constructive play, fantasy play, and rough-and-tumble play) and CPS (debating and mentoring).

Further, teachers in both cultures showed similarities and differences, within and across the cultural contexts, in their beliefs and pedagogy regarding their image of the child, their role as teachers, and their arrangements of classroom environments.

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## **Chapter 1. Introduction**

## Introduction

Problem solving is a complex cognitive process, essential for individuals to solve during everyday events (van Merriënboer, 2013). On a daily basis, it is crucial to learning, creativity, and academic success (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009; Treffinger, Selby, & Isaksen, 2006). More broadly, on a global scale, it empowers us to be creative and critical in solving worldwide issues, such as global warming (Keen, 2011). Bilateral cooperation on complex issues is first learned during childhood (Ramani, 2012). Studying the development of children's cooperative problem solving skills, within and across cultures, has value in the 21st Century as our children continue to be faced with problems that are no longer unique to particular cultures but are also relevant to people in diverse cultures around the world.

Cognitive development theory and sociocultural theory advocate that children are more likely to develop the skills of cooperative problem solving during play since they have more opportunities to socially interact with peers and surpass their potentials to challenge more complex problems (Piaget, 1951; Vygotsky, 1978). *Cooperative problem solving* can be viewed as a process in which two or more children work together by coordinating their individual perspectives and investigating new solutions to solve a shared problem (Ashley & Tomasello, 1998). There is developmental evidence to support that preschool-aged children show abilities to solve problems with peers through social interactions (e.g., negotiations and discourse) (Brownell, Ramani, & Zerwas, 2006; Chen, 2003; Eckerman & Peterman, 2001; Hamann, Warneken, & Tomasello, 2012; Siegler & Jenkins, 1989; Warneken, Chen, & Tomasello, 2006).

Children's engagement in cooperative problem solving and play reveals dynamic characteristics in everyday classroom contexts. Preschool classrooms are often viewed as the "third educator" by the pedagogues of the Reggio Emilia Approach to Early Education

(Edwards, Gandini, & Forman, 1992, p. 148). This perspective comprises three key elements (classroom settings, class materials, and class schedules) that reflect teachers' pedagogical and cultural beliefs (Cuffaro, 1995, Dewey, 1899 -1997). Teachers' pedagogical decisions reflect their particular cultures in which they have lived, learned and taught and often includes variations in their provision of (a) spaces for children's play and cooperative problem solving, (b) material selections that encourage children's engagement in a range of play episodes, and (c) uninterrupted time for children's play and learning.

With the acknowledgement of the impact of classroom contexts on children's learning and development, this dissertation study was designed to add to the knowledge regarding children's cooperative problem solving during play by investigating (a) previous research on the study of children's cooperative problem solving during play in everyday classroom contexts, (b) preschool children's different patterns of engagement in play and cooperative problem solving in Chinese and US preschool classrooms, and (c) preschool teachers' beliefs about their roles and pedagogical decisions for supporting children's cooperative problem solving during play in both cultures. With these goals in mind, three independent manuscripts were written for later publication in peer-reviewed journals. Each manuscript is named as Chapter 2, Chapter 3, and Chapter 4, and each chapter includes its own (a) abstract, (b) introduction, (c) literature review, (d) methodology, (e) results or findings, (f) discussion, and (g) references.

The purpose of Chapter 2 was to conduct a saturated literature review regarding children's cooperative problem solving during play. With this purpose in mind, Preferred Reporting Items for Systematic Reviews (PRISR) (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009) was used to identify methodologies and findings regarding children's cooperative problem solving during play and discuss what additional studies are needed in the

field of early care and education for future research. This chapter is a foundation that leads to Chapters 3 and 4 since its findings point to the need for future empirical research to (a) investigate children's cooperative problem solving during play in everyday preschool classroom contexts, within and across cultures and (b) explore the relationship between teachers' beliefs and their pedagogical decisions when supporting children's cooperative problem solving.

The purpose of Chapter 3 was to investigate children's different characteristics and patterns of cooperative problem solving and play through a cross-cultural methodological lens. This methodology included a 10-month field work experience in a Chinese kindergarten and a US preschool center with the integration of ethnographic informed observations. Data and findings are presented based on (a) the video recordings of 16, four- and five-year-old children and (b) the researcher's field notes and research journal entries. In particular, 60-minutes of classroom footage for each child was analyzed using MANOVA and ANOVA, and field notes and research journal entries were analyzed using qualitative content analysis (Hsieh & Shannon, 2005). Quantitative findings in this chapter include: (a) cultural and gender differences in children's engagement in types of play (constructive play, fantasy play, and rough-and-tumble play), and (b) cultural and gender differences in children's cooperative problem solving experiences (debating and mentoring) during play. However, no age differences were identified either in children's engagement in types of play or cooperative problem solving. Qualitative findings present a contextual understanding of (a) teachers' beliefs about the impact of age and gender on children's engagement in a particular type of play and cooperative problem solving, and (b) teachers' decision on play space, play materials, and play schedule for supporting children's needs and interests and their successful transition to elementary school.

The purpose of Chapter 4 was to uncover teachers' beliefs about their roles and pedagogical decisions related to supporting children's cooperative problem solving during play in the Chinese and US preschools. Three Chinese teachers and three US teachers were interviewed using a semi-structured interview protocol with the integration of the visual stimulated recall approach (Hadfield & Haw, 2012; Stevenson, 2015). Data include teacher interview transcriptions, researcher field notes, and research journal entries to triangulate and analyze data using the constant comparative analysis method (Geertz, 1973; Glaser & Strauss, 1967; Lincoln & Guba, 1985). Findings regarding (a) teachers' image of the child, (b) the role of the teacher in scaffolding children's problem solving experiences, and (c) teachers' decisions regarding the creation of classroom environments for children's play and problem solving emerged.

This dissertation ends with a conclusion, Chapter 5. This chapter includes (a) a summary of the overall findings from the three manuscripts (Chapters 2, 3, and 4), and (b) discussion, limitations, and implications of the findings for future research and practice.



## References

- Ashley, J., & Tomasello, M. (1998). Cooperative problem solving and teaching in preschoolers. *Social Development*, 7(2), 143–163.
- Brownell, C. A., Ramani, G. B., & Zerwas, S. (2006). Becoming a social partner with peers: Cooperation and social understanding in one- and two-year-olds. *Child Development*, 77(4), 803–821. doi: 10.1111/j.1467-8624.2006.00904.x
- Chen, Z. (2003). Worth one thousand words: Children's use of pictures in analogical problem solving. *Journal of Cognition and Development*, 4(4), 415-434. doi: 10.1207/S15327647JCD0404\_02
- Cuffaro, H. K. (1995). *Experimenting with the world: John Dewey and the early childhood classroom*. New York, NY: Teachers College Press.
- Dewey, J. (1899). *Psychology and philosophic method: The annual public address before the union*. Berkeley, CA: University of California Press.
- Dewey, J. (1902). *The child and the curriculum*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1938/1963). *Experience and education*. New York, NY: Collier Books.
- Dewey, J. (1907). *The school and society: Being three lectures*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1997). *Experience and education*. New York, NY: Touchstone.
- Eckerman, C. O., & Peterman, K. (2001). Peers and infant social/communicative development. In G. Bremner & A. Fogel (Eds.), *Blackwell handbook of infant development: Handbooks of developmental psychology* (pp. 326 – 350). Malden, MA: Blackwell Publishers.
- Edwards, C., Gandini, L., & Forman, G. (1992). *The hundred languages of children: The Reggio Emilia approach to early childhood education*. Norwood, NJ: Alex.

- Geertz, C. (1973). *The interpretation of cultures*. New York, NY: Basic Books.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine Pub.
- Hadfield, M., & Haw, K. (2012). Video: Modalities and methodologies. *International Journal of Research & Method in Education*, 35(3), 311-324. doi: 10.1080/1743727X.2012.717434
- Hamann, K., Warneken, F., & Tomasello, M. (2012). Children's developing commitments to joint goals. *Child Development*, 83(1), 137-145. doi: 10.1111/j.1467-8624.2011.01695.x
- Hirsh-Pasek, K., Golinkoff, R., Berk, L., & Singer, D. (2009). *A mandate for playful learning in preschool: Presenting the evidence*. New York, NY: Oxford University Press.
- Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288. doi: 10.1177/1049732305276687
- Keen, R. (2011). The development of problem solving in young children: A critical cognitive skill. *Annual Review of Psychology*, 62, 1-21. doi: 10.1146/annurev.psych.031809.130730
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRSIMA Group (2009). Preferred reporting items for systematic reviews and meta-analysis. *PLos Med*, 6(7), 1-6. doi:10.1371/journal.pmed1000097
- Piaget, J. (1951). *Play, dreams and imitation in childhood*. London, UK: Heinemann.
- Ramani, G. B. (2012). Influence of a playful, child-directed context on preschool children's peer cooperation. *Merrill-Palmer Quarterly*, 58(2), 159-190
- Siegler, R. S., & Jenkins, E. A. (1989). *How children discover new strategies*. Hillsdale, NJ: Erlbaum.

- Stevenson, B. (2015). Third spaces and video-stimulated recall: An exploration of teachers' cultural role in an indigenous education context. *Educational Action Research*, 23(2), 290-305. doi: 10.1080/09650792.2014.990986
- Treffinger, D. J., Selby, E. C., Isaksen, S. G. (2008). Understanding individual problem-solving style: A key to learning and applying creative problem solving. *Learning and Individual Differences*, 18(4), 390-401. doi:10.1016/j.lindif.2007.11.007
- van Merriënboer, J. J. G. (2013). Perspectives on problem solving and instruction. *Computers & Education*, 64, 153-160. doi: 10.1016/j.compedu.2012.11.025
- Vygotsky, L. S. (1933/1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Warneken, F., Chen, F., & Tomasello, M. (2006). Cooperative activities in young children and chimpanzees. *Child Development*, 77(3), 640-663. doi: 10.1111/j.1467-8624.2006.00895.x

**Chapter 2. Young Children's Cooperative Problem Solving during Play in Everyday  
Classroom Contexts: A Systematic Literature Review**

## **Abstract**

Cooperative problem solving is often viewed as a process in which two or more children work together by coordinating their individual perspectives and investigating new ways of approaching a shared problem (Ashley & Tomasello, 1998). Theoretically, it has been supported that children are likely to develop the skills of cooperative problem solving during play since they have more opportunities to socially interact with peers and surpass their potentials to challenge more complex problems (Piaget, 1951; Vygotsky, 1978). In particular, children's engagement in cooperative problem solving and play reveals dynamic characteristics in everyday classroom contexts. In such settings, opportunities for the emergence of children's cooperative problem solving is fluid and often "needs-based" in contrast to experimental contexts, in which problems and settings are managed by researchers (Dewey, 1958). With this in mind, there is a need to explore previous research conducted to investigate children's cooperative problem solving during play in everyday classroom contexts, including cross-culturally. This focus was guided by a systematic literature review using the Preferred Reporting Items for Systematic Reviews (PRISR). There were 453 studies initially identified from which eight remained based on the inclusion and exclusion created by the author. The eight studies were then critiqued based on the (a) participants' demographics, (b) research strategies, (c) measurable behaviors of cooperative problem solving (e.g., sharing and negotiation), and (d) findings regarding children's cooperative problem solving during play. The results of this examination include: (a) a preponderance of experimental methods in which play episodes were encouraged using selected materials, toys, and games, changes in physical surroundings, and time frames by the researchers; and (b) the discovery that all studies were conducted in Western cultures. Further, none of the studies investigated teachers' beliefs as they related to their pedagogical practices

toward facilitating children's cooperative problem solving during play. Consequently, further empirical research, focused on children's cooperative problem solving during play, is warranted by taking into consideration (a) everyday preschool classroom contexts, (b) cross-cultural contexts, and (c) teachers' beliefs and pedagogical practices for supporting children's cooperative problem solving.

### **Introduction**

Studying the development of children's cooperative problem solving during play, within and across cultures, has value in the 21st Century. As our children live in a global society, they will likely face problems that are no longer unique to particular cultures but also relevant to people in diverse cultures around the world. Cooperative problem solving is often viewed as a process in which two or more children work together by coordinating their individual perspectives and investigating new ways of approaching a shared problem (Ashley & Tomasello, 1998). This process not only promotes children's social interaction but also enables them to learn new skills, knowledge, and dispositions with others (Rogoff & Morelli, 1997; Rubin, Bukowski, & Parker, 2006). Children's engagement in cooperative problem solving during play has been valued theoretically since play provides a pathway through which children learn to construct their own knowledge (Piaget, 1951) and develop their problem-solving skills through interacting with advanced peers (Vygotsky, 1978). It is frequently noted that "play leads development" because children strive to remain in play episodes even when they are challenged in order to remain a member of the learning group (Bodrova & Leong, 2007). This effort to remain engaged with others during play encourages a child, at times, to behave in more advanced ways – to stand "a head taller" than what is typical for that child (Vygotsky, 1978, p. 102).

Although there is a theoretical emphasis toward the role of play in children's development of cooperative problem solving, this emphasis is often grounded in experimental settings within Western cultures in previous research. This experimental approach is perceived as a limitation of understanding children's diverse developmental characteristics because it separates them from their cultural contexts (Rogoff & Morelli, 1997). In these cases, compared to experimental settings, preschool-aged children spend a long period of time in their schools, outside of their families, and engage in various types of play in classrooms. Children's play occurs within social contexts that coexist within classroom settings. The melding of children's diverse experiences from outside of their school contexts are brought into their classrooms to coexist with school practice and expectations, co-created by teachers' beliefs and practice (VanHoorn, Nourrot, Scales, & Alward, 2011). Teachers with different cultural experiences often have diverse beliefs about how children learn best and how and when teachers should intervene, for example. These beliefs are often reflected in variations in their classroom decision-making resulting in a wide range of settings, materials, and time frames for children's indoor play (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997). It is likely, then, that children's different behaviors during play and cooperative problem solving may align with such variations.

Therefore, studying children's cooperative problem solving during play in everyday classrooms, within and across cultures, may reveal more dynamic developmental characteristics of cooperative problem solving that may not be easily identified in experimental settings. Associated with this perspective, the purpose of this chapter is to better understand the degree (a) to which studies have investigated children's cooperative problem solving during indoor play and (b) to which the focus of and approach to future research can be determined.

With this in mind, a systematic literature review focused on children's cooperative problem solving during indoor play was conducted by using the Preferred Reporting Items for Systematic Reviews (PRISR). By following the search procedure of the PRISR, eight studies out of 453 were ultimately identified. These eight studies were analyzed and critiqued based on (a) participants' demographics, (b) research strategies, (c) the measurable behaviors of cooperative problem solving behaviors (e.g., sharing and negotiation), and (d) findings about children's cooperative problem solving during play. Moreover, the implications of the findings are discussed based on the discovery that there is a lack of research that investigates children's cooperative problem solving during play in everyday preschool classrooms within a culture, and in particular, across cultures.

### **Theoretical, Contextual, & Developmental Considerations**

#### **Theoretical Considerations**

Cooperative problem solving that takes place in play contexts promotes children's learning of problem solving, task performance, and motivation (Ames & Murray, 1982; Azmitia & Montgomery, 1993; Blaye, Light, Joiner, & Sheldon, 1991; Damon & Killen, 1982; Doise & Mugny, 1984; Fawcett & Garton, 2005; Golbeck, 1998; Kruger, 1992; Light & Glachan, 1985; Phelps & Damon, 1989; Schulz & Bonawitz, 2007; Teasley, 1995; Tudge, Winterhoff, & Hogan, 1996; Walker, 1983; Yarrow & Topping, 2001). In particular, the role of play in children's development of cognitive and social skills has been supported by both the *cognitive development theory* (Piaget, 1962, 1983) and *sociocultural theory* (Vygotsky, 1978).

Both theories agree that children are free to pursue their own psychological desires during play. Piaget (1962, 1983) stated that play is not only about pleasure but also about children reaching a sense of control of themselves and their environments that includes solving



problems and mastering new skills. Similarly, Vygotsky (1978) viewed play as a psychological phenomenon caused by unrealizable desires, and posited that children's desires can be satisfied in their created, imaginary play contexts.

Although these two theorists acknowledge the importance of play in children's learning and development, they perceived the role of play differently. Piaget (1962, 1983) viewed play as a tool to construct new knowledge through the process of *assimilation*; in other words, children bring their experiences into play episodes to learn new things. He emphasized that young children construct their knowledge through play by representing their imagination using various objects (1951). Play materials act as mediational tools for children to learn a language, problem solving, and social interactions (Piaget, 1951). For Vygotsky (1978), play is viewed as a source and context of development in which children continue to learn within their zones of proximal development (ZPDs). Vygotsky defined the ZPDs as the "distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (1978, p. 86). He further noted that in play contexts, children have opportunities to socially interact with advanced peers and improve their potentials to challenge complex problems, internalize the skills learned from their interactions, and apply new knowledge to solve future problems. In fact, Vygotsky noted that "in play, a child is always above his average age, above his daily behavior; in play, it is as though he were a head taller than himself" (1978, p. 102).

### **Preschool Classroom Contexts**

Children's engagement in cooperative problem solving often occurs during play, and children spend a lot of time in play when they are in preschool settings. Preschool classrooms are

often viewed as the “third educator” by the educators of the Reggio Emilia Approach to Early Education (Edwards, Gandini, & Forman, 1992, p. 148). This perspective is based on the fact that there are key elements including classroom settings and spaces, class schedules, and materials that contribute to young children’s learning and development (Cuffaro, 1995; Dewey, 1899-1997). These elements reflect teachers’ pedagogical beliefs that are influenced by their cultural experiences (Cuffaro, 1995). Teachers’ values regarding the role of play, and cooperative problem solving, in particular, may influence the ways in which they create or modify classroom settings (e.g., provide a large space for children’s play or cooperative problem solving). Further, teachers’ beliefs about what is meaningful and significant for children is often reflected in their classroom practices. For example, teachers may provide uninterrupted time for children’s engagement in cooperative problem solving and promote children’s experimentation and reflection on their own thinking, actions, and consequences of their learning experiences (Cuffaro, 1995; Dewey, 1938/1963/1997). Additionally, teachers’ beliefs about what children need to experience and how they might best actualize their learning potentials influence their decisions for selecting children’s play materials. For instance, teachers may provide a wide range of materials such as toys (e.g., blocks, dolls, and trucks), natural objects (e.g., rocks, sticks, and water), and other materials (e.g., paints, clay, and paper products) (Dewey, 1938/1963/1997; Kontos & Wilcox- Herzog, 1997; Meehan, Hughes, & Cavell, 2003; Meyer, Wardrop, Hastings, & Linn, 1993; Pellegrini, 2009; Pianta, 1999; Pianta & Stuhlman, 2004; Piaget, 1951). Teachers’ decisions can potentially impact the type of and range of play episodes, and thus influence children’s development of skills and competencies including language development, problem solving, and social interactions (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997; Pellegrini & Gustafson, 2005).

## Play as Context

Although children's play is influenced by teachers' decision-making in the classroom, it is viewed as a self-motivated and self-chosen activity, that is enjoyable and actively engaging (Rubin, Fein, & Vandenberg, 1983). Based on the cognitive and social forms of play, play can be differentiated into various categories. Piaget's (1951) categorization (i.e., practice play, symbolic play, and games with rules) was adapted by Smilansky (1968) and classified as (a) functional play, (b) constructive play, (c) fantasy/symbolic play, and (d) games with rules. First, *functional play* includes children's physical movements with or without objects (e.g., running, jumping, and stacking objects). Second, *constructive play* includes children's use of objects (e.g., blocks, Legos, sand, and clay) for organizing or making something in a goal-oriented way. Third, *fantasy play* often includes role playing or make-believe play such as pretending to be a parent or using a block of wood as a car. Last, *games with rules* include experiences in which children play games with peers following implicit or negotiated rules such as Mother-May-I and Duck-Duck-Goose. Each type of play acts as a mediation to promote children's physical, cognitive, and social development.

Regarding the social forms of play, Parten (1932) identified six types of play that include: (a) unoccupied behavior, (b) onlooker, (c) solitary play, (d) parallel play, (e) associate play, and (f) cooperative play. Children reveal *unoccupied behaviors* when they show physical movements without engaging in play. *Onlooker play* occurs when children interact with peers but without actually engaging in peers' play. *Solitary play* occurs when children play alone without any direct interaction with peers. *Parallel play* occurs when children play alone in activity or use play materials that are similar to their peers' that are close by them. *Associative play* occurs when children engage in a common activity with peers yet do not typically share a goal or make

a mutual contribution to solve a problem or complete a task. *Cooperative play* occurs when children have a shared goal and mutually contribute to solve a problem. Based on Parten's (1932) findings, children engage in more cooperative play as they become older. Specifically, children who are approximately two-years-old tend to be more engaged in solitary, onlooker, and parallel play, but also engaged in periodic cooperative play. Starting around the age of three, children are increasingly more engaged in cooperative play. Leung (2014) also conducted a similar study in Hong Kong and found that children between three and six also engaged in more cooperative play as they became older.

### **Cooperative Problem Solving**

While engaging in cognitive and social forms of play, children also confront problems or conflicts that require their cooperative problem solving skills. *Cooperative problem solving* often occurs when two or more children work together by coordinating their individual perspectives and investigating new solutions to solve a shared problem (Ashley & Tomasello, 1998). The skills of cooperative problem solving are vital for children to develop since they are living in social environments in which problematic situations arise that require individual's cooperation to solve them.

From a developmental perspective, children have different levels of cooperative problem solving abilities. By the age of one, children can reach and grab an object as well as use the object as a tool (Chen & Siegler, 2000). This ability means that they are physically prepared to solve problems in their environments. When children experience challenges, they are also able to seek help from others. By the age of two, children remember the events that they have experienced and use previous experiences to solve similar problems (DeLoache, Cassidy, & Brown, 1985). Children can seek information and learn skills through verbally interacting with

adults and peers (Piaget, 1950; Green & Piel, 2010). Developmental studies show that two-year-old children begin to solve problems cooperatively with peers by coordinating their behaviors without the presence of adult scaffolding (Brownell, Ramani, & Zerwas, 2006; Eckerman & Peterman, 2001; Warneken, Chen, & Tomasello, 2006). By the age of three, children recall different types of events and differentiate them from a new event (Chen, 2003). In other words, children slowly begin to generalize knowledge, applying previously used strategies to solve new, similar problems. Also, they begin to demonstrate an ability to help partners during cooperative problem solving (Hamann, Warneken, & Tomasello, 2012). By the age of four or five, some children can retrieve solutions from their experiences. They also show the skills of planning and monitoring their behaviors such as being aware of when they are using their strategies with self and others (Siegler & Jenkins, 1989).

As children begin to show more complicated skills of cooperative problem solving, their development of intersubjectivity has been a focus of study. *Intersubjectivity* or shared cognition and consensus between a child and her peer, is achieved through negotiations with another as well as self-regulation of thoughts and behaviors toward a mutual, sometimes implicit, agreement to solve a problem (Vygotsky, 1978). Children may perceive or interpret a problem differently from their peers. Thus, it is critical that they have the chance to share what is on their minds, understand their different ideas, and decide how to move forward to solve a problem by regulating their individual needs to take over.

In summary, from a theoretical perspective, the positive impact of play and diverse, child-centered classroom contexts for children's optimal development of cooperative problem solving is valued (Cuffaro, 1995; Dewey, 1899-1997; Piaget, 1951, 1962, 1983; Vygotsky, 1978). Different classroom settings that incorporate a range of opportunities for children's play

episodes influence children's engagement in and development of cooperative problem solving. Particularly, the role of teachers in these settings is critical since their beliefs are often reflected in their decisions on the creation of these classroom environments. Historically, the case has been made that there is a positive impact on children's development of cooperative problem solving within play contexts. Sociocultural and cognitive developmental theories provide a deep understanding of how play affects children's learning and development, particularly, cooperative problem solving. While engaging in different types of play, children not only exercise autonomy to choose playmates, they also develop competencies such as intersubjectivity by learning to share individual understandings and regulating their own thoughts and behaviors in order to come together to solve problems with others. Although theoretical and pedagogical perspectives support the positive impact of play on children's development of cooperative problem solving during play in everyday classroom contexts, it is less clear that whether there are empirical studies that support these beliefs in classroom settings during play.

Therefore, the purpose of this systematic review is to unfold methodologies and findings regarding children's cooperative problem solving during indoor play and discuss what more studies are needed in this field for future research. With this purpose, three research questions are developed.

1. What cultural contexts have been included in the field of early childhood to investigate preschool children's cooperative problem solving during indoor play?
2. What research methodologies have been used in the field of early childhood to investigate preschool children's cooperative problem solving during indoor play?
3. What major findings have been found regarding the variations of cooperative problem solving during indoor play?

## Methods

The purpose of this study was to utilize the Preferred Reporting Items for Systematic Reviews (PRISR) as an investigative framework to determine if there were any previous research studies regarding young children's cooperative problem solving during play conducted in everyday classroom contexts, within or across cultures. The PRISR served as an organizational framework and guide for the systematic review and analysis of "what was done, what was found, and the clarity of reporting," based on a four-phase flow diagram (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009, p. 1). Four phases are comprised of (a) identification, (b) screening, (c) eligibility, and (d) final studies included in the synthesis. Within each phase, detailed steps were incorporated that illustrated search procedures, the number of studies that were kept for analysis in the next phase, and the rationale for the elimination of specific studies.

### Four-Phase Search Procedure

The four phases were pursued and completed in June and July 2017; the software EndNote X7.7.1 was used to organize searched documents. Through the four phases, eight peer-reviewed studies were included in the final analysis (see Figure 2.1).

**The first phase: Identification.** In this phase, the result from the initial search was the identification of 453 studies (i.e., empirical or data-based articles and dissertations, only) across three databases. Three electronic databases related to the early childhood research field were utilized, including: (a) EBSCO (1996 – present), (b) PsychINFO and Dissertation Abstract (1800s – present), and (c) Web of Science (1990 – present). In each database, the function of the advanced search was used by entering key terms paired with the words *cooperative problem solving* OR *collaborative problem solving* OR *cooperative behaviors* OR *collaborative behaviors* OR *cooperative inquiry* OR *collaborative inquiry* AND *play* AND *preschool* OR

*kindergarten OR early childhood education*. Among the 453, 19 studies were duplicates and three studies were unavailable from the University of Tennessee libraries, interlibrary services, or other online resources (e.g., Google Scholar). Hence, 431 studies were kept for the second search phase.

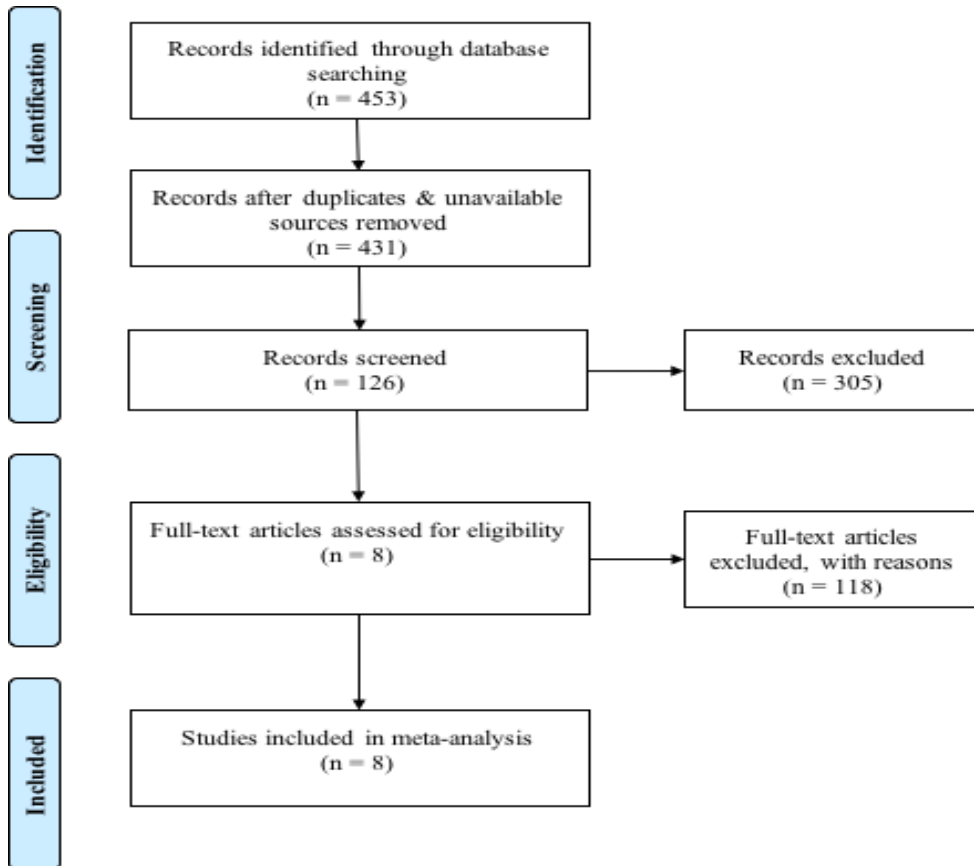


Figure 2.1. The four-phase flow diagram of the search process.

**The second phase: Screening.** In this phase, 305 studies were removed from the 431, with 126 studies kept for further review based on the application of the inclusion and exclusion criteria. These criteria were created based on the purpose of this study to identify research that investigated young children's cooperative problem solving during play in everyday classroom contexts (see Table 2.1).



Table 2.1

*The Inclusion and Exclusion Criteria for Screening Documents*

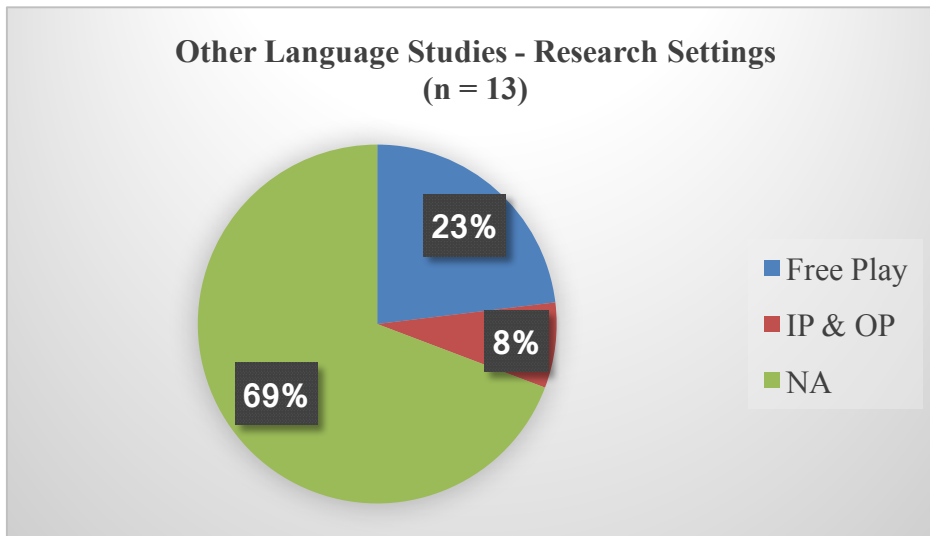
Categories	Inclusion Criteria	Exclusion Criteria
Document Types	<ul style="list-style-type: none"> <li>• Empirical or Data-Based Article Journals &amp; Dissertations/Theses</li> <li>• Written in English, Chinese, &amp; Korean</li> <li>• All countries</li> </ul>	<ul style="list-style-type: none"> <li>• Book /Book Chapters</li> <li>• Literature Reviews</li> <li>• Theoretical Papers</li> <li>• Meta-analysis research papers</li> <li>• Conference Proceeding papers</li> <li>• Reports</li> <li>• Editorial Material</li> <li>• Scripts (e.g., transcribed meeting/conference contents)</li> </ul>
Participants	<ul style="list-style-type: none"> <li>• Children who are typically developing</li> <li>• Children's ages between two – six years</li> </ul>	<ul style="list-style-type: none"> <li>• Children are developmentally delayed, have psychological problems, or are in special education programs, etc.</li> <li>• Children that are younger than two or older than six years of age.</li> <li>• Animals that are treated as research subjects.</li> </ul>
Research Settings	<ul style="list-style-type: none"> <li>• School-based settings</li> <li>• Indoor play settings</li> </ul>	<ul style="list-style-type: none"> <li>• Home-based setting</li> <li>• Outdoor play setting</li> </ul>
Research Topics	<ul style="list-style-type: none"> <li>• Children's cooperative/collaborative problem solving</li> <li>• Children's play</li> </ul>	<ul style="list-style-type: none"> <li>• Siblings' interactions during play/problem solving</li> <li>• Adult-Child interactions during play/problem solving</li> </ul>

**The third phase: Eligibility.** In this phase, 118 studies were removed from the 126, leaving eight studies remaining for the final analysis. 118 studies were deemed ineligible (see Appendix A), and they were grouped into three themes.

1. Studies were written in a language other than English (n = 13).
2. Studies focused on children's play, only, with no reference to cooperative problem solving (n = 85).
3. Studies solely investigated children's cooperative problem solving with no mention of children's play (n = 20).

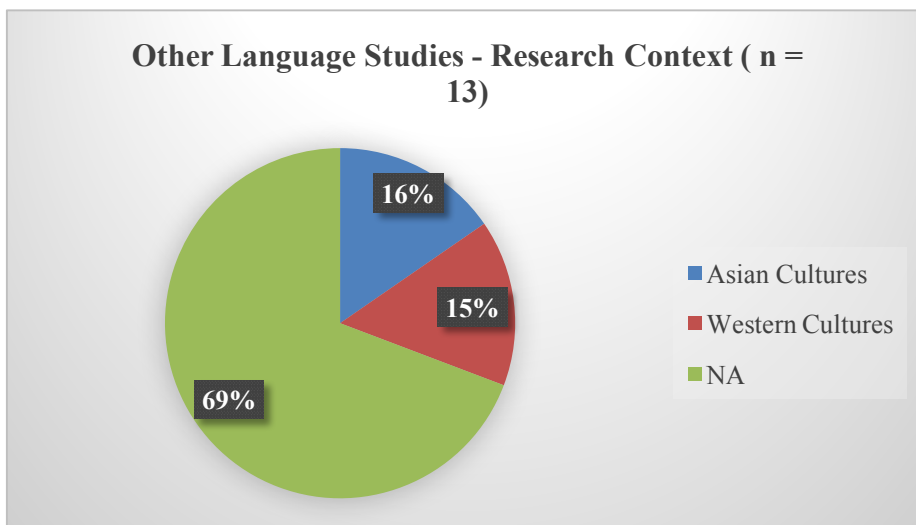
Even though the 118 studies were not kept for the final synthesis, it was of interest to explore the studies' research settings, contexts and measured variables. The following tangential analysis was conducted to provide much needed information regarding which studies investigated play, only and cooperative problem solving behaviors, only.

***Theme I: Studies written in a language other than English.*** There were 13 studies written in German, Italian, Japanese, Spanish, Russian, and Portuguese with English abstracts (see Appendix B). The English abstracts were reviewed, with particular attention devoted to (a) research methodology, (b) research settings (i.e., indoor play, outdoor play, and free play), (c) research contexts (i.e., Asian culture and Western culture), and (d) measured variables. Among the studies, 11 were experimental and two were deemed by the author as naturalistic observational studies. For the purpose of this analysis, “naturalistic observational studies” are defined as the studies that use the technique that involves observing children’s cooperative problem solving or play behaviors in their everyday classroom environments (e.g., outside of experimental settings). Although two studies used a natural observational approach, they were not matched with inclusion criteria. For example, one study conducted by Oh-Uchi and Sakurai (2008) investigated Japanese children’s behaviors in a school setting, however, the researchers only used teachers’ self-reports of children’s cooperative skills instead of a methodical evaluation of children’s behaviors by the researchers. The second study conducted by Viana and Pedrosa (2014), included observations of children’s cooperative coordinated actions; however, the sample was comprised of toddler-aged children, only. Regarding the research settings, three of the 13 studies included free play that was not defined as to whether it was free play in the inside or outside of the classroom. Another study included both indoor and outdoor play spaces. The remaining nine studies did not specify their research settings (see Figure 2.2).



*Figure 2.2.* The percentages of research settings used in the studies written in a language other than English. IP & OP represents both indoor and outdoor play are observed synchronously, and NA represents “no available information”.

Only four of the 13 studies specified their research contexts as Asian or Western. Two were conducted in Japan, one in Italy, and one in Brazil. The remaining nine studies did not identify their research contexts (see Figure 2.3).



*Figure 2.3.* The percentages of included research contexts in the studies written in a language other than English. NA represents “no available information”.

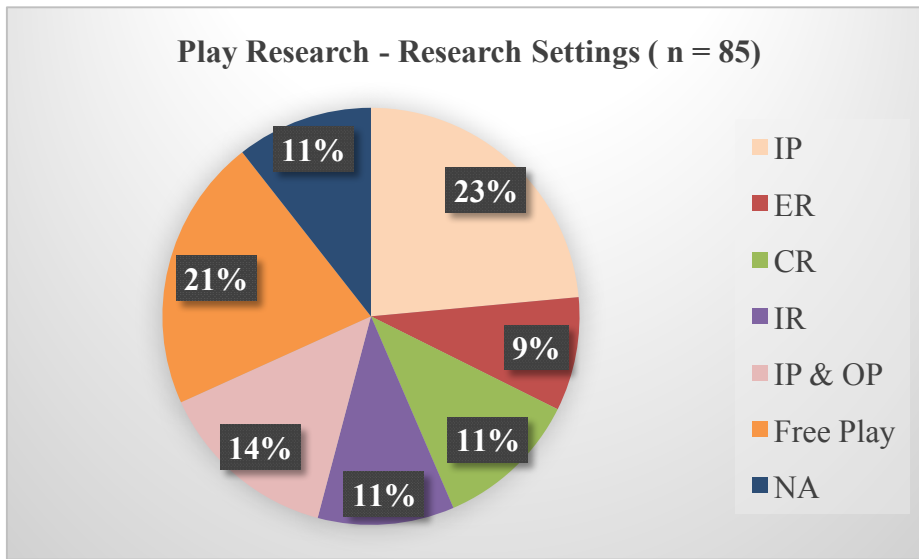
There were 11 studies that measured children's cooperative behaviors and other variables, whereas two additional studies did not include children's cooperative behaviors but rather focused solely on other variables. These variables included children's play (i.e., cooperative play), social interactions (e.g., aggressive behavior and interpersonal relationships), and self-assurance behaviors (see Table 2.2).

Table 2.2

*Categories of Measured Variables Among the 13 Studies Written in A Language Other Than English*

NO.	Child Play	Social Interaction	Other Factors
1	Cooperative play	Aggressive behavior	Self-assurance
2	–	Oppositional behavior	–
3	–	Interpersonal relationship	–
4	–	Social competence/ skills	–
5	–	Positive behavior	–
6	–	Qualitative of peer relationship	–

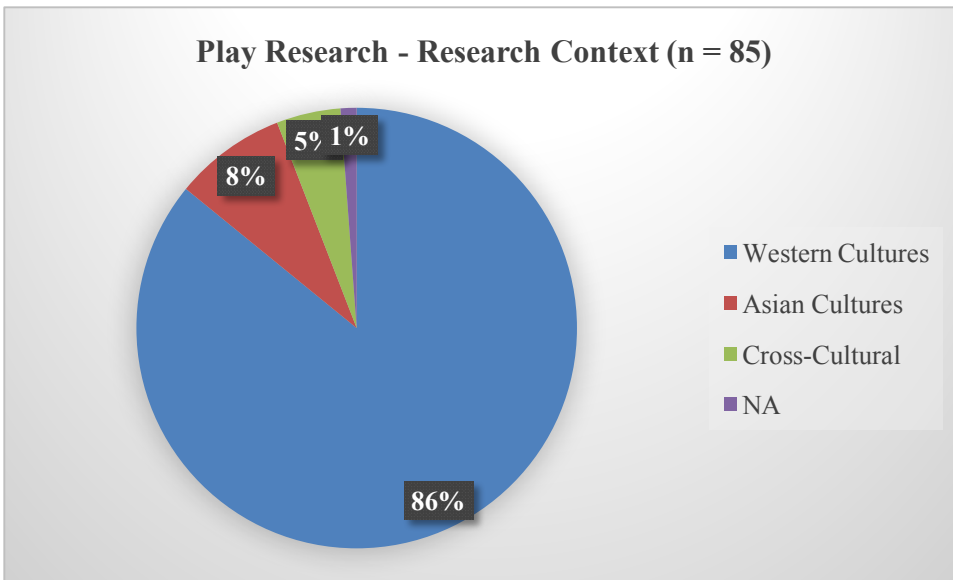
**Theme II: Play research.** There were 85 studies that focused solely on children's play, and did not include children's cooperative problem solving behaviors. The research settings, research contexts, and measured variables were organized. Across the studies, 54% used experimental methods and 46% used natural observations. Research settings included indoor play (23%), experimental spaces (e.g., rooms set up for the research experiment) (9%), classrooms (11%), instructional rooms in schools (11%), both indoor and outdoor play spaces (14%), and free play spaces (21%), while 11% of the studies did not specify the research settings (see Figure 2.4).



*Figure 2.4.* The percentages of research settings used in the play research among the 85 studies. IP represents indoor play; ER represents experiment room; CR represents classroom; IR represents instructional room in schools; IP & OP represent both indoor and outdoor play are observed synchronously; and NA represents “no available information”.

Classrooms and instructional rooms in schools are typically viewed as a part of school settings. Across the studies, they were typically dominated by the role of researchers who were present and who (a) measured the impact of intervention programs (e.g., television or music) and (b) controlled variables (e.g., types of play or gender) related to children’s experiences. Further, a few studies included free play settings, yet they did not define the spaces as either indoor or outdoor play settings.

Regarding the research contexts, 86% of the studies were conducted in the West including the US, Canada, England, Australia, Norway, New Zealand, the Netherlands, and Republic of Slovenia; 8% were in Asian cultures including China, Japan, Singapore, and Korea; and 5% were cross-cultural studies (i.e., Germany, Finland, and Sweden; Sweden and Italy; Canada and the US; China and the US), while 1% of the studies did not specify information regarding the name of countries or geographic locations (see Figure 2.5).



*Figure 2.5.* The percentages of included cultures in the play research among the 85 studies. NA represents “no available information”.

A range of variables were measured across the 85 studies with the exception of children’s cooperative problem solving. These variables are categorized as (a) child play (e.g., play types, play settings, or materials), (b) child cognition (e.g., metacommunication, theory of mind, or creativity), (c) child language (e.g., speech, linguistic style, or discourse), (d) social interaction (e.g., social problem solving skills, negotiation, or self-regulation), (e) environment (i.e., home or school contexts), (f) intervention programs (e.g., music or modeling), (g) participants’ demographics (i.e., gender, SES, or age), and (h) other factors (e.g., identity, self-concept, or personality) (see Table 2.3).

***Theme III: Cooperative problem solving research.*** There were 20 studies that investigated children’s cooperative problem solving but not within play episodes. The research methodologies, research settings, research contexts, and measured variables were analyzed. All of the studies used experimental methods. Further, the research settings were dominated by the researchers. The studies were conducted in three primary research settings that included

experiment rooms (75%), classrooms (5%), and instructional rooms in schools (15%), while 5% of the studies did not specify a research place (see Figure 2.6).

Regarding the research contexts, the cooperative problem solving research was conducted in a range of cultures that included Western (85%), Asian (5%), and cross-culturally (10%) (see Figure 2.7). Specifically, the majority of cooperative problem solving research has been conducted in Western cultures (i.e., the US, Italy, Spain, and Germany); one study was conducted in China; and the others were cross-cultural studies (i.e., Mexico and the US; Taiwan and the US).

A range of variables were measured across the 20 research studies. These were categorized as (a) child cognition (e.g., attention, competition, or metacommunication), (b) child language (i.e., argumentation), (c) child social interaction (e.g., interpersonal style, complementary partner, or aggression), (d) intervention strategies (i.e., modeling or problem-solving tasks), and (e) participants' demographics (i.e., gender or age) (see Table 2.4).

In the third phase, 118 of the 126 studies were categorized as ineligible for the final analysis because they were either not written in English or did not investigate children's cooperative problem solving during play in everyday classroom contexts, within or across cultures. Therefore, there were only eight studies that remained for the fourth, and final phase.

Table 2.3

*Categories of Measured Variables Among the 85 Play Research Studies*

NO.	Child Play	Child Cognition	Child Language	Social Interaction	Environment	Intervention Programs	Participants' Demographics	Other Factors
1	Types of play/activities	Metacommunication	Speech (verbal & nonverbal abilities)	Social strategy knowledge	Home & school contexts	Television	Gender differences	Identity construction
2	Sequential patterns of play	Intellectual	Linguistic style	Social problem solving skills	—	Music	SES differences	Self-concept
3	Complexity of play	Theory of mind	Internal state words	Social Competence	—	Modelling	Age differences	Personality
4	Play settings	Creativity	Discourse	Intersubjectivity	—	—	—	Perceptions of play
5	Play materials	Cognitive competence	—	Negotiation	—	—	—	Authority
6	Play time	Justification	—	Self-regulation	—	—	—	—
7	Play behaviors	Organization	—	Social interaction	—	—	—	—
8	—	—	—	Social behaviors (prosocial/nonsocial; verbal/nonverbal interactions)	—	—	—	—
9	—	—	—	Social indirect reciprocity	—	—	—	—
10	—	—	—	Empathy	—	—	—	—
11	—	—	—	Peer Conflict	—	—	—	—
12	—	—	—	Social rejection	—	—	—	—
13	—	—	—	Role-taking skills	—	—	—	—



Table 2.3 Continued

NO.	Child Play	Child Cognition	Child Language	Social Interaction	Environment	Intervention Programs	Participants' Demographics	Other Factors
14	—	—	—	Friendship/familiarity	—	—	—	—
15	—	—	—	Social status	—	—	—	—
16	—	—	—	Sharing	—	—	—	—
17	—	—	—	Help solicitation/peer tutoring	—	—	—	—
18	—	—	—	Emotional understanding	—	—	—	—

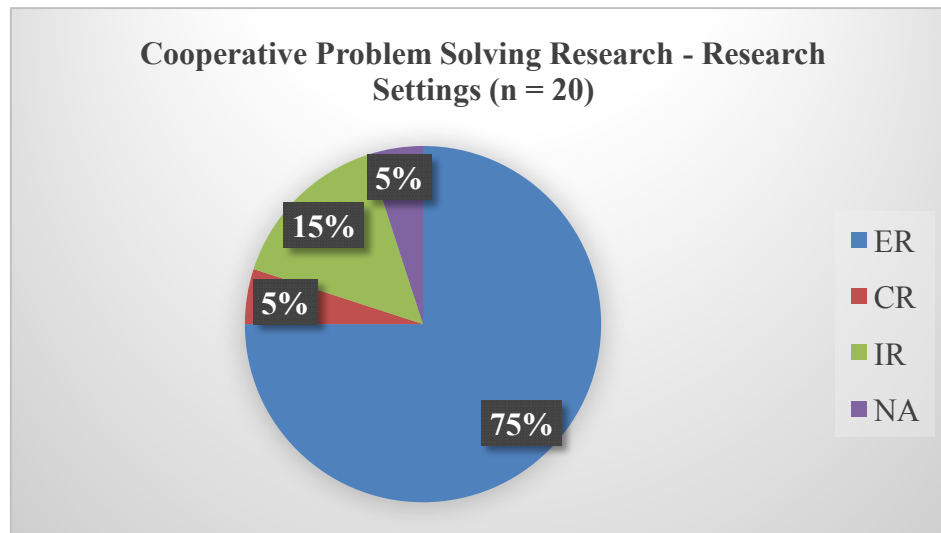
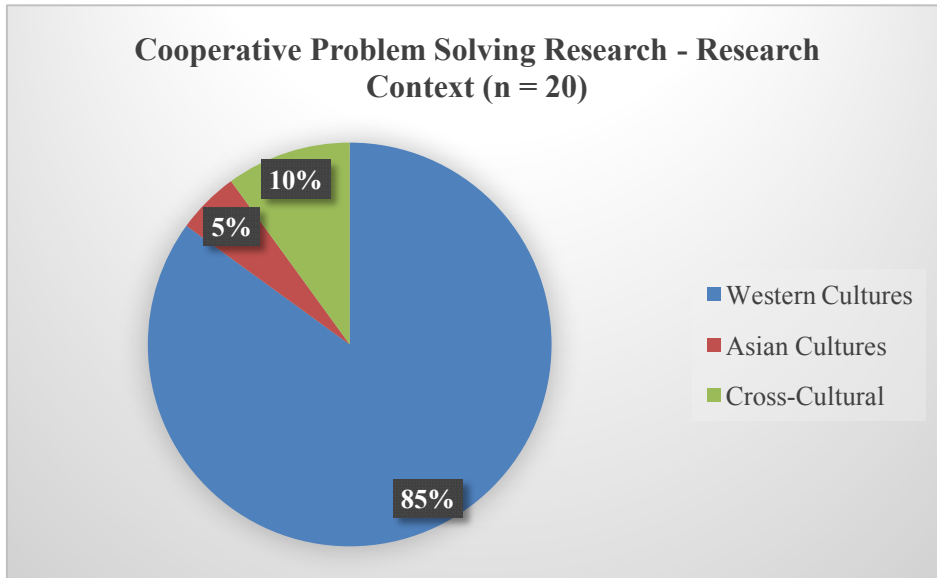


Figure 2.6. The percentages of used research settings in the cooperative problem solving research among the 85 studies. ER represents experiment room; CR represents classroom; IR represents instructional room in schools; and NA represents “no available information”.



*Figure 2.7. The percentages of included cultures in the cooperative problem solving research among the 20 studies.*

**Table 2.4**

*Categories of Measured Variables Among the 20 Cooperative Problem Solving Research Studies*

NO.	Child Cognition	Child Language	Social Interaction	Interventional Strategies	Participants' Demographics
1	Attention	Argumentation	Self-other differentiation	Modeling	Gender differences
2	Competition	—	Social-affective relations	Problem-solving tasks	Age differences
3	Flexibility	—	Interpersonal style	—	—
4	Metacommunication	—	Complementary partner	—	—
5	—	—	Non-social behavior (aggression)	—	—

**The fourth phase: Final studies included in the synthesis.** There were eight studies included in the final synthesis. These studies matched the inclusion criteria, and included the components of cooperative problem solving and play.

In summary, a review of 453 manuscripts resulted in a final compilation of eight studies for the in-depth examination. This PRISR protocol was followed and provided the opportunity to not only determine which studies should remain and which should be omitted but also the background information regarding the research of play and cooperative problem solving. This information is helpful in situating a study that is focused only on cooperative problem solving and in play using natural observational approaches and in settings not dominated by the researcher.

## **Results**

The eight studies were analyzed and critiqued based on the following components: (a) participants' demographics, (b) research strategies, (c) measured behavioral components of cooperative problem solving behaviors (e.g., sharing and negotiation), and (d) findings regarding cooperative problem solving behaviors during play.

### **Participant Demographics**

Across the studies, children's demographics included: (a) the number of child participants, (b) gender, (c) age, (d) ethnicity/race, (e) countries, and (f) socioeconomic status (SES) as well as the number of teacher participants (see Table 2.5).

Table 2.5

*Participants' Demographics Across Eight Studies*

No.	Authors (Year)	Child Participants' Demographics								Teacher Participants
		Child Participants	Boys	Girls	Min Age (years)	Max Age (years)	Ethnicity/ Race	Countries	SES	
1	Bay-Hinitz, A. K., Peterson, R. F., & Quilitch, H. R. (1994)	70	NA	NA	4	5	NA	US	LSES; MSES	Teachers (N = 6)
2	Caulfield, M. J. (2002)*	32	16	16	4	5	African- American; Asian; Caucasian; Latino	US	NA	None
3	LeJeune, C. W. (1994)*	60	NA	NA	4	5	NA	US	MSES	Teachers (Number was not noted)
4	Liebenau, K. L. (1993)*	34	34	0	4	5	African- American; Asian; Caucasian; Latino	US	NA	None
5	Ramani, G. B. (2012)	76	NA	NA	4	5	Asian; Caucasian; Hispanic	US	NA	None

Table 2.5 Continued

No.	Authors (Year)	Child Participants' Demographics								Teacher Participants
		Child Participants	Boys	Girls	Min Age (years)	Max Age (years)	Ethnicity/ Race	Countries	SES	
6	Read, M. A. (1996)*	30	15	15	3	5	Caucasian	US	LSES; MSES; HSES	None
7	Verba, M. (1993)	NA	NA	NA	3	4	NA	France	NA	None
8	Vriens-van Hoogdalem, A.-G., de Haan, D. M. P., & Boom, J. (2015)	24	12	12	4	5	Dutch; Inter- Racial; Migrant	Germany	LSES; MSES; HSES	None

*Note.* NA represents “no available information”. Under the SES, LSES represents Low-SES; MSES represents Mid-SES; HSES represents High-SES. “\*” represents studies that are dissertations.

The number of child participants ranged from 24 to 76. There were three studies that recruited an equal number of children by gender (Caulfield, 2002; Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015), and one study included only girls (Liebenau, 1993), while the remaining four studies did not specify the gender of the child participants. Regarding children's ages, six studies focused on children aged four and five (Bay-Hinitz, Peterson, & Quilitch, 1994; Caulfield, 2002; LeJeune, 1994; Liebenau, 1993; Ramani, 2012; Vriens-van Hoogdalem, de Haan, & Boom, 2015); one study included children whose ages ranged from three to five years old (Read, 1996); and one study recruited children aged three and four (Verba, 1993). Children's information about ethnicity or race was also recorded. Specifically, five studies included children from diverse racial/ethnic backgrounds (i.e., African-American, Asian, Caucasian, Latino, Hispanic, Dutch, Inter-Racial, and Migrant) (Caulfield, 2002; Liebenau, 1993; Ramani, 2012; Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015), whereas the remaining three studies did not indicate children's ethnicities. Across the studies, two recruited children from low-SES, mid-SES, and high-SES (Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015), one included children from low-SES and mid-SES (Bay-Hinitz, Peterson, & Quilitch, 1994), and one included only children from mid-SES (LeJeune, 1994), while the remaining four studies did not include SES information. Regarding the research contexts, six studies were conducted in the US (Bay-Hinitz, Peterson, & Quilitch, 1994; Caulfield, 2002; LeJeune, 1994; Liebenau, 1993; Ramani, 2012; Read, 1996); one in France (Verba, 1993); and one in Germany (Vriens-van Hoogdalem, de Haan, & Boom, 2015). There were no cross-cultural studies among the eight. Besides child participants, teachers were treated as secondary participants who were responsible to implement particular teaching strategies intended to guide children's cooperation in two studies (Bay-Hinitz, Peterson, & Quilitch, 1994; LeJeune, 1994). However, the

researchers did not report teachers' demographic information, years of teaching, or educational levels, for example. Bay-Hinitz, Peterson, and Quilitch (1994) included six teachers in their study who were trained to demonstrate researcher-prepared cooperative and competitive games in their respective classrooms. These teachers were interviewed about their beliefs regarding cooperative and competitive games. In LeJeune's study (1994), teachers were asked to lead cooperative or competitive games in their classrooms, provided to them by the researchers, followed by the completion of a survey that measured their responses regarding the impact of the games on children's behaviors.

Based on the analysis of participants' demographic information across all eight of the studies, children whose ages ranged from three to five were identified as primary research subjects. They represented diverse characteristics in gender, ethnicity/race, and SES. The children were recruited when they were living in a Western culture, and the majority were in the US. Teachers were also included in two studies as secondary participants, trained to implement researcher-designed protocols and activities.

### **Research Strategies**

Research strategies in each of the eight studies were analyzed. These included: (a) research design, (b) research methodology, (c) data sources, (d) research settings, (e) materials, and (f) observational strategies (see Table 2.6).

Table 2.6

*The Components of Research Strategies Across Eight Studies*

No.	Authors (Year)	Research Design	Research Methodology	Data Sources	Research Settings	Materials	Observational Strategies
1	Bay-Hinitz, A. K., Peterson, R. F., & Quilitch, H. R. (1994)	Mixed Method	Experimental	Group observation in vivo; Teacher interview	Outdoor play & Indoor play	Competitive & Cooperative games	70 children were assigned into 4 groups. Each group was observed for 4 times, and each time observational period ranged from 10 to 30 mins. All observations were completed in 5 days.
2	Caulfield, M. J. (2002)	Quantitative	Experimental	Video-recorded observation	Experimental room	War & Non-war toys	32 children were assigned into 16 dyads. Each dyad was observed for twice, and each time was 20-min long.
3	LeJeune, C. W. (1994)	Quantitative	Experimental	Group observation in vivo; Likert-type scales for teachers	Indoor play	Competitive & Cooperative games	60 children were assigned into 3 groups. Each group was observed twice a day, and each time was 30-min long. All observations were completed in 5 days.
4	Liebenau, K. L. (1993)	Quantitative	Experimental	Video-recorded group observation	NA	Toys (violent & aggressive; nurturant & nonviolent; puzzles)	34 girls were assigned into 9 groups. Each group was observed for 3 times, and each time was 10-min long.



Table 2.6 Continued

No.	Authors (Year)	Research Design	Research Methodology	Data Sources	Research Settings	Materials	Observational Strategies
5	Ramani, G. B. (2012)	Quantitative	Experimental	Video-recorded observation	Instructional room in school	Building tasks	76 children were assigned into 38 dyads. Each dyad was observed for 8 mins in the first observation, and then observed for 18 mins in the second observation.
6	Read, M. A. (1996)	Quantitative	Experimental	Video-recorded observation; Measurement with Standard Pseudoisochromatic Plates and Screening Plates and the Oregon Preschool Test of Interpersonal Cooperation (OPTIC)	Experimental room	Neutral-colored blocks and cylinders, manipulatives et al.	30 children were assigned into 8 groups. Each group was observed 4 times, each time was 10-min long. All observations completed in 25 days.
7	Verba, M. (1993)	Qualitative	Experimental	Video-recorded group observation	Indoor play	Beads, rods, blocks, cylinders, cloth, and wooden bars.	The number of children or groups was not noted. Each group was observed for 30 mins.
8	Vriens-van Hoogdalem, A.-G., de Haan, D. M. P., & Boom, J. (2015)	Quantitative	Experimental	Video-recorded observation; Measurement with Language test	Indoor play & Instructional room in school	Construction Tasks	Each of 24 children were observed for 30 mins during free play and 30 mins during a constructive task. The total of 1200-min video records were used for their analysis.

*Note.* NA represents “no available information”. Group observation in vivo means that researchers observed and coded children’s behaviors in research settings, simultaneously.

Across the studies, six used quantitative methods (Caulfield, 2002; LeJeune, 1994; Liebenau, 1993; Ramani, 2012; Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015); one used qualitative methods (Verba, 1993); and one used a mixed methodology (Bay-Hinitz, Peterson, & Quilitch, 1994). All of the studies were experimental and included researcher-designed tasks, toys, and/or games. The researchers implemented their experiments in various research settings, and the settings were designed or managed by the researchers. There were two studies that observed children's behaviors in an experimental room that was equipped with play materials selected by the researchers (Caulfield, 2002; Read, 1996). In another study, children were observed while they were using researcher-provided materials and constructive tasks in an instructional room located in a school (Ramani, 2012). Two additional studies in which children were observed during indoor play also included play episodes and either prescribed games or play materials selected by the researchers (LeJeune, 1994; Verba, 1993). Specifically, in LeJeune's study, teachers were asked to implement designed cooperative and competitive games in their classrooms in order to measure the impact of the games on children's aggressive and cooperative behaviors. In the study conducted by Verba, she provided play materials to children at a child care center and observed their play episodes with the purpose of identifying children's different forms of cooperation (i.e., transmission-appropriation, consensual co-elaboration, and conflict co-elaboration). Additionally, the sixth and seventh studies included observations of children in two different settings, synchronously (Bay-Hinitz, Peterson, & Quilitch, 1994; Vriens-van Hoogdalem, de Haan, & Boom, 2015). For example, Bay-Hinitz, Peterson, and Quilitch observed children in both indoor and outdoor play while implementing predesigned cooperative and competitive games; and Vriens-van Hoogdalem, de Haan, and Boom observed children in

indoor play and an instructional room while assigning problem solving tasks to the children. Finally, there was one study that did not specify the research setting (Liebenau, 1993).

All experimental studies used observation as a major data collection strategy. Researchers either video-recorded children's behaviors or observed them without video-recording but writing codes or memos during observations. Specifically, researchers in two studies observed groups of children and coded their behaviors in the research settings, simultaneously (Bay-Hinitz, Peterson, & Quilitch, 1994; LeJeune, 1994), while the remaining six studies included video-recordings of children's behaviors for later analysis (Caulfield, 2002; Liebenau, 1993; Ramani, 2012; Read, 1996; Verba, 1993; Vriens-van Hoogdalem, de Haan, & Boom, 2015). Children were observed in groups, dyads, and individually. Four studies observed children in groups (Bay-Hinitz, Peterson, & Quilitch, 1994; LeJeune, 1994; Liebenau, 1993; Read, 1996) with observational periods ranging from 10 to 60 minutes for each group. Two studies observed children in dyads (Caulfield, 2002; Ramani, 2012) with their observational periods ranging from 26 to 40 minutes. One study observed individual children (Vriens-van Hoogdalem, de Haan, & Boom, 2015) for 60 minutes each, whereas the eighth study did not specify (Verba, 1993). In addition to observational strategies, researchers also included teacher interviews (Bay-Hinitz, Peterson, & Quilitch, 1994), a scaled survey for teachers (LeJeune, 1994), and tests for evaluating children's cooperation or language abilities (Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015).

Based on the analysis of research strategies across the studies, all used experimental methods and manipulated research settings by providing researcher-designed tasks, toys, and games. The research settings were predominantly school-based with some observations in children's classrooms, inside and outside of the school building, and in an isolated instructional

room. None of the studies observed children's behaviors during play in an everyday classroom context.

### **The Measured Behaviors of Cooperative Problem Solving**

Across the studies, seven used the terminology, cooperative behaviors, and one used cooperative problem solving. Although these studies used different terminologies, they all provided cooperative problem solving tasks to children to work with others. Hence, cooperative behaviors were treated as cooperative problem solving behaviors in this analysis. Measured behaviors of cooperative problem solving were analyzed across the eight studies including observed behaviors, sources of the observed behaviors, and analysis of cooperative behaviors (see Table 2.7). Generally, across the eight studies, cooperative behaviors were differentiated as verbal and non-verbal cooperation. For example, verbal cooperation included demonstration, agreement/disagreement, reasoning, discussion, asking questions, attention directing, negotiation, etc., and nonverbal cooperation included sharing, helping, working together toward a common goal, controlling, observing, imitating, dividing labor, etc. These specific behaviors were observable, and they were often identified by researchers prior to data collection (during practice observations), through data analysis, or by referencing other research. Five studies identified behaviors by referencing previous research studies (Caulfield, 2002; Liebenau, 1993; Ramani, 2012; Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015); two studies identified behaviors prior to data collection (Bay-Hinitz, Peterson, & Quilitch, 1994; LeJuene, 1994); and one study qualitatively analyzed various behaviors that emerged from the data (Verba, 1993).

Table 2.7

*The Measured Behaviors of Cooperative Problem Solving Across the Eight Studies*

No.	Authors (year)	Studied Behaviors	Observed Behaviors	Sources of Observed Behaviors	Analysis of Cooperative Behaviors
1	Bay-Hinitz, A. K., Peterson, R. F., & Quilitch, H. R. (1994)	Cooperative Behaviors	a) Sharing, b) Helping, c) Working together toward a common goal, d) Physical contact of an affectionate nature, e) Demonstration, and f) Agreement	Identified prior to the data collection by researchers	Observed behaviors were collapsed and treated as cooperative behaviors.
2	Caulfield, M. J. (2002)	Communicative Acts for Cooperativeness	a) Collaboration (directing influence and being affiliative in involvement), b) Oblige (no directing influence and being affiliative in involvement), c) Control (directing influence and distancing in involvement), and d) Withdraw (no directing influence and distancing in involvement)	Utilized behaviors identified by Leaper (1991), and Leaper, Tennenbaum, & Shaffer (1999)	Observed behaviors were analyzed independently.
3	LeJeune, C. W. (1994)	Cooperative Behaviors	a) Cooperative task behavior (sharing; helping; working together toward a common goal), b) Cooperative physical contact (physical supports; affectionate physical contact), and c) Cooperative verbal behavior (demonstration; agreements)	Identified prior to the data collection by researchers	Observed behaviors were collapsed and treated as cooperative behaviors.
4	Liebenau, K. L. (1993)	Cooperation	a) Taking turns b) Sharing, c) Reasoning, d) Discussing, and e) Working together on a common goal	Drew from the research of Tanner & Holliman (1988), Friedrich & Stein (1973), and Parten (1993)	Observed behaviors were collapsed and treated as cooperative behaviors.

Table 2.7 Continued

No.	Authors (year)	Studied Behaviors	Observed Behaviors	Sources of Observed Behaviors	Analysis of Cooperative Behaviors
5	Ramani, G. B. (2012)	Cooperative Behaviors & Communication	a) Cooperative interaction (Asking questions; Explanation; Attention directing; Demonstration), b) Joint communication (Suggestion; Narration; Agreement), c) Shared task responsibility (Coordinating behavior; Negotiation; Dividing labor), d) Observational learning (Observation; Imitation), e) Unproductive behavior and communication (Controlling; Disagreement; Talking with adults)	Drew from the research of Ashley & Tomasello (1998), Brownell & Carriger (1990, 1991), Cooper (1980), Gauvain & Rogoff (1989), Howes (1985), and Howes et al. (1992)	Observed variables were analyzed independently.
6	Read, M. A. (1996)	Cooperative Behaviors	a) Level 5: Cooperation (jointly resolve a problem), b) Level 4: Active interaction (respond to peers), c) Level 3: Parallel play, d) Level 2: Watching, e) Level 1: Minimal interaction (play alone), and f) Level 0: Obstructive interaction (stop peers from the attainment of a goal)	Drew from the research of Paulson (1974)	Children's cooperative behavior was rated from 0 to 5.
7	Verba, M. (1993)	Joint Elaboration	a) Fictional component/Symbolic ideas (Proposing an idea through language or action), b) Sharing (Establishing social bonds; Transaction for understanding and agreement), and c) Management (Attention directing; Proposing ideas; Giving or obtaining information; Making decisions; Planning; Approval/Disapproval; Giving feedbacks to peers)	Emerges from the data analysis	The dynamics of verbal exchange were qualitatively analyzed.

Table 2.7 Continued

No.	Authors (year)	Studied Behaviors	Observed Behaviors	Sources of Observed Behaviors	Analysis of Cooperative Behaviors
8	Vriens-van Hoogdalem, A.-G., de Haan, D. M. P., & Boom, J. (2015)	Non-Verbal Cooperation	a) Lowest level 1: Simple (no interaction during play), b) Middle level 2: Cooperative (playing together without sharing a common goal), and c) Highest level 3: Coordinated non-verbal cooperation (playing together with sharing a common goal)	Drew from the research of Howes & Matheson (1992)	Non-verbal cooperation was rated from 1 to 3.
		Verbal Cooperation	a) Content (give <i>no</i> new information relevant for play or task; give new or additional information), b) Contribution (elaboration of self contribution; elaboration of peer's contribution), and c) Use metacommunication (negotiation; planning; explanation; evaluation; requesting a role; appreciation of the play/task)	Drew from the research of Beizer & Howes (1992), Corsaro (1983), Farver (1992), Howe et al. (2005), Whittington & Floyd (2009), Bornstein, Haynes, Legler, O'Reilly, & Painter (1997), Whitebread & O'Sullivan (2012), Giffin (1984), and Sawyer (1997, 2003)	Observed variables were analyzed independently.

*Note.* In the column of cooperative behaviors, researchers' languages of naming cooperative problem solving were used.

The observed behaviors were analyzed either independently or collapsed together and measured as cooperative behavior. There were three studies that analyzed observed behaviors, independently (Caulfield, 2002; Read, 1996; Vriens-van Hoogdalem, de Haan, & Boom, 2015). Caulfield (2002) studied children's communicative acts for cooperativeness and categorized four types of behaviors that he could observe, including collaboration, oblige, control, and withdraw. Then, he calculated the frequencies of each type of behavior and illustrated how frequently they occurred in an experimental setting. In Read's study (1996), she rated children's behaviors from low (obstructive interaction) to high (cooperation) and mainly analyzed children's levels of cooperation in an experimental setting. Similar to Read's and Caulfield's analyses, Vriens-van Hoogdalem, de Haan, and Boom (2015) studied children's non-verbal and verbal cooperation. Specifically, the researchers rated children's non-verbal behaviors from low (no interaction) to high (coordinated non-verbal cooperation) and analyzed how skilled children were in non-verbal cooperation. Meanwhile, they categorized three types of behaviors for the verbal cooperation including content, contribution, and metacommunication. They counted the frequencies of each type of behavior and analyzed them separately. On the other hand, other studies by Bay-Hinitz, Peterson, and Quilitch (1994), LeJuene (1994), and Liebenau (1993) coded each observed behavior (e.g., sharing, helping, and discussing) and calculated their frequencies. Then, they collapsed all the frequencies of the observed behaviors and treated them as the frequency of cooperative behaviors.

Different from other research, Ramani (2012) studied children's cooperative problem solving with the identification of specific observable behaviors (e.g., explanation, suggestion, and dividing labor). She coded each behavior and counted their frequencies. Then, she collapsed particular behaviors into different categories of behaviors including cooperative interaction, joint



communication, shared task responsibility, observational learning, and unproductive behavior and communication. For instance, she clustered the behaviors of asking questions, explanation, attention directing, and demonstration into the category of cooperative interaction. She analyzed each category of behaviors independently.

Based on the analysis of measured variables across the studies, children's cooperative behaviors were analyzed either quantitatively or qualitatively. The children's cooperative behaviors were studied qualitatively with the analysis of different forms of cooperative behaviors during play. The cooperative behaviors included various behaviors that can be observed and quantified, and the behaviors were perceived as components of cooperation in order to measure how frequently children showed cooperative behavior or evaluated how skilled children were at cooperating in experimental settings.

### **The Summary of Eight Study Findings**

Among the eight studies, it was found that children's cooperative behaviors could be influenced by factors such as types of games, types of toys, types of play, and play settings. Games were differentiated as cooperative and competitive, and it was found that children who played cooperative games were more likely to show cooperative behaviors (Bay-Hinitz, Peterson, & Quilitch, 1994; LeJuene, 1994). In addition, girls and boys showed similar rates of cooperation during cooperative games (LeJuene, 1994). However, there was a contradictory finding regarding the competitive games. Bay-Hinitz, Peterson, and Quilitch (1994) concluded that children who played competitive games were more likely to show aggressive behaviors; whereas, LeJuene (1994) did not find a significant occurrence of aggression during competitive games.

Researchers in three studies provided different types of toys to children, and the toys were differentiated as aggressive toys (e.g., war toys, Ninja Turtles, or toy soldiers), nurturant toys (e.g., animals or doctors' kits), and neutral toys (e.g., puzzles). These toys were assigned to children in order to measure their cooperative behaviors. Caulfield (2002) supported that although boys were more likely to engage with aggressive toys than girls, the children showed more cooperation and less controlling while playing with aggressive toys. Particularly, children presented much more communicative acts in the negotiations while playing with aggressive toys. On the other hand, Liebenau (1993), who included only girls in her study, found that girls who played with neutral toys showed more cooperation as well as aggressive behaviors than the girls who played with nurturant toys. This finding was plausible because the neutral toys (puzzles) encouraged children's competition rather than neutral reactions. Meanwhile, Liebenau (1993) identified that girls who played with aggressive toys showed less cooperative behaviors than the ones who played with neutral toys.

In the Verba (1993) study, she provided play materials (e.g., beads, rods, blocks, cylinders, cloth, and bars) for children's pretend play in a classroom and qualitatively analyzed children's three different forms of cooperation. First, *transmission-appropriation* was identified when children not only developed their own ideas but also respected partner's perspectives or reactions. Second, *consensual co-elaboration* was identified when children jointly developed ideas with partners without conflict. Lastly, *conflict co-elaboration* was distinguished from the first two forms when children not only jointly developed ideas with partners but also adjusted conflicts.

Besides different types of games and toys, the impact of various play settings on children's cooperative behaviors was also compared, for instance, free play versus construction

task, playful condition versus structured condition, and differentiated spaces versus undifferentiated spaces. Vriens-van Hoogdalem, de Haan, and Boom (2015) measured children's verbal and nonverbal cooperation when they were in free play and construction task settings with the consideration of their language abilities. It was found that children with high language abilities showed more complex nonverbal cooperation in free play than in the construction task. However, there were no differences in verbal cooperation when children were in free play or construction task settings. Instead of free play settings, Ramani (2012) designed a playful condition (child-centered play) and compared children's cooperative problem solving behaviors with the behaviors they exhibited in a structured condition (adult-directed play). The study findings revealed that children in the playful condition showed more behaviors of suggestions, narrations, agreements, observations, and imitations than the children in the structured condition. Although older children and the children in the playful condition presented more cooperative behaviors and communication than in the structured condition, this finding was not significant. Different from other research, Read (1996) measured children's cooperative behaviors in four different physical environments (differentiated ceiling height, differentiated wall color, undifferentiated ceiling, and undifferentiated wall color). It was found that children in differentiated ceiling height *or* wall spaces showed more cooperative behaviors than the children in the undifferentiated ceiling height *and* wall color spaces. However, the occurrence of children's cooperative behaviors in the differentiated ceiling height *and* wall color settings was not significantly different from the ones in the undifferentiated ceiling height *and* wall color setting. Across all of the different environments, boys showed more cooperative behaviors than girls, and older children showed more cooperative behaviors than the younger children.

In summary, eight studies regarding children's cooperative problem solving during play were conducted in Western cultures. Although researchers included children with different races or ethnicities and varied socio-economic status in their studies, none of the researchers targeted children's behaviors across different cultures. Further, all studies used experimental approaches, and observed children's cooperative behaviors in pre-designed settings. The observational periods ranged from 10 minutes to 60 minutes for each group, dyad, or individual. Finally, the majority of the studies clustered behavioral components (e.g., verbal with non-verbal) to comprise composite cooperative problem solving behaviors and provided evidence that particular factors such as games, toys, types of play, and play settings influenced children's cooperative behaviors.

### **Discussion**

Through implementing the procedures of PRISR, eight studies were identified that investigated children's cooperative problem solving behaviors during play. All studies were experimental and conducted in Western cultures. Thus, it was revealed that there is a lack of studies that have investigated children's cooperative problem solving during play in everyday preschool classrooms, within and/or across cultures. Further, the limitations of the studies were discussed regarding (a) the experimental methodologies, (b) the replication of cooperative problem solving measurements, (c) the participation of teachers' roles in children's development of cooperative problem solving, and (d) the value of cross-cultural studies.

Through the manipulation of factors such as games, toys, symbolic play materials, and play settings, the significant impact of each factor on children's cooperative behaviors was identified (Bay-Hinitz, Peterson, & Quilitch, 1994; Caulfield, 2002; LeJeune, 1994; Liebenau, 1993; Ramani, 2012; Read, 1996; Verba, 1993; Vriens-van Hoogdalem, de Haan, & Boom,

2015). The experimental approach of these studies has contributed to our understandings regarding which elements significantly influence children's behaviors by controlling auxiliary variables (e.g., research settings). However, this approach has limitations that include the researchers' biases and the creation of artificial environments that are different from children's everyday, real world learning and play experiences. Hence, one should be mindful when one interprets as well as generalizes these experimental findings.

Preschool children engage in various types of play as well as a range of play episodes in their daily classroom activities, in which teachers often select a variety of materials and create related learning centers and areas. Even as the researchers had biases regarding the selection of particular play materials, games, play settings, or types of play, teachers also have their own preferences regarding these types of selections for their classrooms. Experimental contexts were contrived and not authentic play spaces, as children do not typically play in sanitized spaces with materials chosen by people who don't know them with imposed time constraints determined by people who do not know them. In essence, the natural occurrence of play is expected to take place in artificially designed contexts that likely omit or distort important cultural influences. As Rogoff and Morelli (1997) argued, experimental approaches, by their very nature, are limited in uncovering the emergent, nuanced aspects of children's diverse developmental characteristics of cooperative problem solving as they relate to children's cultural contexts. Rather than narrowing the research scope by studying only children's cooperative behaviors in contrived play episodes within experimental contexts, there is a need to emancipate research studies from laboratory settings toward research focused on the natural, everyday occurrence in children's own classrooms.

Regarding the measurement of cooperative problem solving, the eight studies delineated a range of components of cooperative behaviors and analyzed the behaviors either quantitatively or qualitatively. For future research, researchers should be cautious when they attempt to replicate the study components to analyze the cooperative problem solving behaviors in different settings, particularly, in everyday classroom contexts. Although the studies provided a comprehensive understanding of the components of cooperation, the generalization of the components of cooperative problem solving may not be applicable in everyday classroom contexts. For example, the everyday classroom context is complicated, and includes variations that are influenced by children's in-the-moment experiences, cultural differences, as well as teacher's pedagogical decision-making. While it is worthwhile that we call upon and reference previous research on children's cooperative problem solving during play, it is important that we continue to explore this topic with new approaches and during children's everyday play episodes. For example, while the components of cooperative behavior described above may be evidenced in children's everyday classroom spaces, it is also possible that new or different components would emerge when our methodological lens is one of studying the child *in situ*.

Among the studies, only two included teachers as secondary participants. Bay-Hinitz, Peterson, and Quilitch (1994) interviewed teachers' beliefs about cooperative and competitive games that were implemented by researchers, and LeJeune (1994) asked teachers to complete a survey to measure their responses toward the impact of the games on children's behaviors. However, none of the studies investigated teachers' beliefs and related to their pedagogical practices regarding children's cooperative problem solving during play. Teachers' beliefs about what is important in children's learning and development and their decisions for allowing them to engage in a range of play episodes or materials not only reflects on the uniqueness of their

classroom settings, but also further affects children's language development, problem solving, and social interactions (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997; Pellegrini & Gustafson, 2005). Therefore, there is a need to investigate teachers' perspectives about children's cooperative problem solving during play as well as their practices of supporting children while interpreting the variations of children's cooperative problem solving in different classroom settings.

From a cross-cultural perspective, the eight studies focused only on children in Western cultures. Thus, the findings are limited, because there is no evidence of how or whether children's cultural contexts (e.g., Asian culture) would reveal similar patterns of cooperative problem solving as those by children in the West. Therefore, cross-cultural studies are needed in this field of research in early childhood education in order to provide more global understandings of children's developmental characteristics of cooperative problem solving.

### **Limitations**

Although this study conducted a saturated literature review regarding children's cooperative problem solving during play, there is a limitation in the study methodology. Based on the initial search procedure, there were 453 studies. Among 453 studies, three of them were unavailable, and 13 were written in a language other than English. Hence, these 16 studies were excluded from the final analysis. Thus, there is a possibility that one or more of these might investigate children's cooperative problem solving during play in everyday classroom settings, within and/or across cultures. Therefore, the generalization of the PRISR results should be considered with caution.

## **Implications for Research and Practice**

This study has provided an historical background of research on children's cooperative behaviors, in particular, cooperative problem solving behaviors, during play since 1968 as well as the limitations of research methodologies of previous research in this area. The implications include the need for future empirical research to investigate children's cooperative problem solving (a) during play, (b) in everyday preschool classroom contexts, and (c) in cross-cultural contexts. Further, there is a need for future research focused on the relationship between teachers' beliefs and their pedagogical decision-making related to supporting children's cooperative problem solving.



## References

- Altman, K. (1971). Effects of cooperative response acquisition on social behavior during free-play. *Journal of Experimental Child Psychology*, 12, 387-395.
- Ames, G., & Murray, F. (1982). When two wrongs make a right: Promoting cognitive change by social conflict. *Developmental Psychology*, 18(6), 894-897. doi: 10.1037/0012-1649.18.6.894
- Anderson, G. T. (2000). *Sequential bridging in the natural play of preschool children: Examining the role of parallel play*. Department of Marriage, Family, and Human Development Program. Bell & Howell Information and Learning, Brigham Young University. Ph.D.
- Andrews, D., & Krantz, M. (1982). The effects of reinforced cooperative experience on friendship patterns of preschool children. *The Journal of Genetic Psychology*, 140, 197-205.
- Ashley, J., & Tomasello, M. (1998). Cooperative problem solving and teaching in preschoolers. *Social Development*, 7(2), 143-163.
- Ausch, L. (1994). Gender comparisons of young children's social interaction in cooperative play activity. *Sex Roles*, 31(3-4), 225-239.
- Azmitia, M., & Montgomery, R. (1993). Friendship, transactive dialogues, and the development of scientific reasoning. *Social Development*, 2(3), 202-221. doi: 10.1111/j.1467-9507.1993.tb00014.x
- Bakeman, R., & Brownlee, J. R. (1980). The strategic use of parallel play: A sequential analysis. *Child Development*, 51, 873-878.

- Barnes, K. E. (1971). Preschool play norms: A replication. *Developmental Psychology*, 5(1), 99-103.
- Bay-Hinitz, A. K., Peterson, R. F., & Quilitch, H. R. (1994). Cooperative games: A way to modify aggressive and cooperative behaviors in young children. *Journal of Applied Behavior Analysis*, 27(3), 435-446.
- Beer, J. (2007). *Preschoolers' play negotiations: The development of interpersonal understanding*. Psychology. ProQuest Information and Learning Company, The City University of New York. Ph.D.
- Besevegis, E., & Lore, R. (1983). Effects of an adult's presence on the social behavior of preschool children. *Aggressive Behavior*, 9, 243-252.
- Bilsky, W., & Ernst, D. (1985). Vorhersagbarkeit des Spielverhaltens von Kindergartenkindern bei Kooperationsspielen. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 17(1), 17-26.
- Blaye, A., Light, P., Joiner, R., & Sheldon, S. (1991). Collaboration as a facilitator of planning and problem solving on a computer-based task. *British Journal of Developmental Psychology*, 9, 471-483.
- Bodrova, E., & Leong, D. J. (1996). *Tools of the mind: The Vygotskian approach to early childhood education* (1st ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Bodrova, E., & Leong, D. J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education* (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson Education.
- Brownell, C. A., & Carriger, M. S. (1990). Changes in cooperation and self-other differentiation during the second year. *Child Development*, 61, 1164-1174.

- Brownell, C. A., Ramani, G. B., & Zerwas, S. (2006). Becoming a social partner with peers: Cooperation and social understanding in one- and two-year-olds. *Child Development*, 77(4), 803–821. doi: 10.1111/j.1467-8624.2006.00904.x
- Buhler, C. (1935). *From birth to maturity*. London, UK: Kegan Paul.
- Busse, T. V., Ree, M., & Gutride, M. (1970). Environmentally enriched classrooms and the play behavior of negro preschool children. *Urban Education*, 5(2), 128.
- Cauley, K., & Tyler, B. (1989). The relationship of self-concept to prosocial behavior in children. *Early Childhood Research Quarterly*, 4, 51-60.
- Caulfield, M. J. (2002). *The influence of war play theme on cooperation and affective meaning in preschoolers' pretend play*. Early Childhood/Elementary Education. Proquest Information and Learning, The State University of New Jersey. Ph.D.
- Chen, S. E. (2008). *Constructing gender in Hong Kong kindergartens*. University of Hong Kong, Pokfulam, Hong Kong. Ph.D. Retrieved from [http://dx.doi.org/10.5353/th\\_b3684893](http://dx.doi.org/10.5353/th_b3684893)
- Chen, Z. (2003). Worth one thousand words: Children's use of pictures in analogical problem solving. *Journal of Cognition and Development*, 4(4), 415-434. doi: 10.1207/S15327647JCD0404\_02
- Chen, Z., & Siegler, R. S. (2000). Across the great divide: Bridging the gap between understanding of toddlers' and older children's thinking. *Monographs of the Society for Research in Child Development*, 65(2), v-96.
- Cuffaro, H. K. (1995). *Experimenting with the world: John Dewey and the early childhood classroom*. New York, NY: Teachers College Press.

- Cugmas, Z. (2010). Relation between children's attachment to kindergarten teachers, personality characteristics and play activities. *Early Child Development and Care*, 181(9), 1271-1289.
- Damon, W., & Killen, M. (1982). Peer interaction and the process of change in children's moral reasoning. *Merrill-Palmer Quarterly*, 28(3), 347-367.
- DeLoache, J. S., Cassidy, D. J., & Brown, A. L. (1985). Precursors of mnemonic strategies in young children's memory. *Child Development*, 56(1), 125-137. doi: 10.2307/1130180
- Dewey, J. (1899). *Psychology and philosophic method: The annual public address before the union*. Berkeley, CA: University of California Press.
- Dewey, J. (1902). *The child and the curriculum*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1938/1963). *Experience and education*. New York, NY: Collier Books.
- Dewey, J. (1907). *The school and society: Being three lectures*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1997). *Experience and education*. New York, NY: Touchstone.
- Doise, W., & Mugny, G. (1984). *The social development of the intellect*. Oxford, United Kingdom: Pergamon.
- Dovigo, F. (2016). Argumentation in preschool: A common ground for collaborative learning in early childhood. *European Early Childhood Education Research Journal*, 24(6), 818-840.
- Dyer, S., & Moneta, G. B. (2006). Frequency of parallel, associative, and cooperative play in British children of different socioeconomic status. *Social Behavior and Personality*, 34(5), 587-592.

- Eckerman, C. O., & Peterman, K. (2001). Peers and infant social/communicative development. In G. Bremner & A. Fogel (Eds.), *Blackwell handbook of infant development: Handbooks of developmental psychology* (pp. 326 – 350). Malden, MA: Blackwell Publishers.
- Eberly, J. L. (2001). *Convergent and divergent task structure: Preschoolers' collaboration during play and problem solving with blocks*. Elementary/Early Childhood Education. Bell & Howell Information and Learning, The State University of New Jersey. Ph.D.
- Edwards, C., Gandini, L., & Forman, G. (1992). *The hundred languages of children: The Reggio Emilia approach to early childhood education*. Norwood, NJ: Alex.
- Farran, D. C., & Son-Yarbrough, W. (2001). Title I funded preschools as a developmental context for children's play and verbal behaviors. *Early Childhood Research Quarterly*, 16, 245-262.
- Farris, A. C. (1994). *Preschoolers' solicitations for help: Developmental appropriateness of peer-tutoring revisited*. The Department of Educational Psychology. A Bell & Howell Information Company, Georgia State University. Ph.D.
- Faulstich, C. K. (1979). *The effects of child feedback, parent feedback, and parent feedback plus training upon increasing sharing among preschool children*. Psychology. University Microfilms International, University of Montana. Ph.D.
- Fawcett, L. M., & Garton, A. F. (2005). The effect of peer collaboration on children's problem-solving ability. *British Journal of Educational Psychology*, 75(2), 157-169. doi: 10.1348/000709904X23411
- Feldbaum, C. L., Christenson, T. E., & O'Neal, E. C. (1980). An observational study of the assimilation of the newcomer to the preschool. *Child Development*, 51, 497-507.

- Finlinson, A. R., Austin, A. M. B., & Pfister, R. (2000). Cooperative games and children's positive behaviors. *Early Child Development and Care, 164*(1), 29-40.
- Fonzi, A., Tomada, G., & Ciucci, E. (1994). Uso di indici informativi nell'interazione tra bambini del nido. *Età Evolutiva, 47*, 5-13.
- Francescato, D., Putton, A., de Gennaro, L., & Locatelli, M. (1995). L'educazione socio-affettiva nella scuola materna. *Età Evolutiva, 50*, 40-51.
- Garaigordobil, M., Maganto, C., & Etxeberria, J. (1996). Effects of a cooperative game program on socio-affective relations and group cooperation capacity. *European Journal of Psychological Assessment, 12*(2), 141-152.
- Gervai, J., Turner, P. J., & Hinde, R. A. (1993). Parents' and teachers' perceptions of personality traits of young children: Sex differences, cross-cultural comparisons and relations with observed behavior. *British Journal of Developmental Psychology, 11*, 343-358.
- Getz, S. K. (1981). A dual look at spontaneous cooperative play in the preschool: Free play versus structured environment. *Journal of Applied Developmental Psychology, 2*, 59-78.
- Golbeck, S. L. (1998). Peer collaboration and children's representation of the horizontal surface of liquid. *Journal of Applied Developmental Psychology, 19*(4), 571-592. doi: 10.1016/S0193-3973(99)80056-2
- Goncu, A., & Kessel, F. (1988). Preschoolers' collaborative construction in planning and maintaining imaginative play. *International Journal of Behavioral Development, 11*(3), 327-344.
- Gouze, K. R. (1987). Attention and social problem solving as correlates of aggression in preschool males. *Journal of Abnormal Child Psychology, 15*(2), 181-197.

- Green, M., & Piel, J. A. (2010). *Theories of human development: A comparative approach* (2<sup>nd</sup> ed.). Boston, MA: Pearson.
- Grieger, T., Kauffman, J. M., & Grieger, R. M. (1976). Effects of peer reporting on cooperative play and aggression of kindergarten children. *Journal of School Psychology, 14*(4), 307-313.
- Grinder, E. L. (1994). *The influence of toy sex-type on preschoolers' social pretend and interactive behavior in same- and mixed-sex dyads*. Curriculum and Instruction. Bell & Howell Information Company, The Pennsylvania State University. Ph.D.
- Gruber, C. (1992). Naturally occurring play patterns in groups of latency aged children. *Child and Adolescent Social Work, 9*(1), 35-52.
- Hamann, K., Bender, J., & Tomasello, M. (2014). Meritocratic sharing is based on collaboration in 3-year-olds. *Dev Psychol, 50*(1), 121-128.
- Hamann, K., Warneken, F., & Tomasello, M. (2012). Children's developing commitments to joint goals. *Child Development, 83*(1), 137-145. doi: 10.1111/j.1467-8624.2011.01695.x
- Hannikainen, M. (2001). Playful actions as a sign of togetherness in day care centres. *International Journal of Early Years Education, 9*(2), 125-134.
- Hart, B. M., Reynolds, N. J., Baer, D. M., Brawley, E. R., & Harris, F. R. (1968). Effect of contingent and non-contingent social reinforcement on the cooperative play of a preschool child. *Journal of Applied Behavior Analysis, 1*(1), 73-76.
- Hendrickson, J. M., Strain, P., Tremblay, A., & Shores, R. E. (1981). Relationship between toy and material use and the occurrence of social interactive behaviors by normally developing preschool children. *Psychology in the Schools, 18*, 500-504.

- Holmes-Lonergan, H. A. (2003). Preschool children's collaborative problem-solving interactions: The role of gender, pair type, and task. *Sex Roles, 48*(11-12), 505-517.
- Howard, J., Jenvey, V., & Hill, C. (2006). Children's categorisation of play and learning based on social context. *Early Child Development and Care, 176*(3-4), 379-393.
- Hurd, T. L. (1995). *The construction of social competence and linguistic style in the same-gender dyadic play of preschool children*. Counseling and Developmental Psych. U.M.I., Boston College. Ph.D.
- Isaacs, S. (1933). *Social development in young children: A study of beginnings*. Loudon, UK: Routledge and Kegan Paul.
- Isobe, M., Kirk, M., Filho, C., & Maeda, K. (2004). Behavioral orientations and peer-contact patterns of relationally aggressive girls. *Psychological Reports, 94*, 327-334.
- Jahr, E., & Eldevik, S. (2002). Teaching cooperative play to typical children utilizing a behavior modeling approach: A systematic replication. *Behavioral Interventions, 17*(3), 145-157.
- Johnson, T. J., Goetz, E. M., Baer, D. M., & Green, D. R. (1981). The effects of an experimental game on the classroom cooperative play of a preschool isolate. *Revista Mexicana de Análisis de la Conducta, 7*(1), 37-48.
- Kagan, S., & Madsen, M. C. (1971). Cooperation and competition of Mexican, Mexican-American, and Anglo-American children of two ages under four instructional sets. *Developmental Psychology, 5*(1), 32-39.
- Kanayama, M., Hidaka, H., Nishimoto, F., Watanabe, T., & Sato, S. (2000). Effects of classroom-based social skills training for preschool children: The application of coaching in natural settings and the generalizability of training. *Japanese Journal of Counseling Science, 33*(2), 196-204.



- Kato-Shimizu, M., Onishi, K., Kanazawa, T., & Hinobayashi, T. (2013). Preschool children's behavioral tendency toward social indirect reciprocity. *Plos ONE*, 8(8), 1-10.
- Kontos, S., & Wilcox-Herzog, A. (1997). Teachers' interactions with children: Why are they so important? *Young Children*, 52(2), 4-12.
- Kruger, A. C. (1992). The effect of peer and adult-child transactive discussions on moral reasoning. *Merrill-Palmer Quarterly*, 38(2), 191-211.
- Kuriyama, Y., Ogihara, M., & Adachi, M. (1996). A developmental study of play strategies in a marble-pull game by pairs of children. *Japanese Journal of Developmental Psychology*, 7(1), 52-61.
- Kutnick, P. J., & Brees, P. (1982). The development of co-operation: Explorations in cognitive and moral competence and social authority. *British Journal of Educational Psychology*, 52(3), 361-365.
- Kyrtziz, A. (1999). Narrative identity: Preschoolers' self-construction through narrative in same-sex friendship group dramatic play. *Narrative Inquiry*, 1999, 9(2), 427-455.
- Ladd, G. W., & Mars, K. T. (1986). Reliability and validity of preschoolers' perceptions of peer behavior. *Journal of Clinical Child Psychology*, 15(1), 16-25.
- Lawton, J. T., & Berning, R. A. (1985). Effects of high-order rule instruction on the development of social problem solving skills in preschool children. *Journal of Structural Learning*, 8(3-4), 225-239.
- Leaper, C. (1991). Influence and involvement in children's discourse: Age, gender, and partner effects. *Child Development*, 62, 797-811.

- LeJeune, C. W. (1994). *The effects of participation in competitive and cooperative games on the free-play behavior of preschoolers*. Clinical Psychology. A Bell & Howell Information Company, University of Nevada. Ph.D.
- Leung, C. (2014). Validation of the penn interactive peer play scale with preschool children in low-income families in Hong Kong. *Early Childhood Development and Care*, 184(1), 118-137. doi: 10.1080/03004430.2013.773990
- Levine, L. E., & Hoffman, M. L. (1975). Empathy and cooperation in 4-year-olds. *Developmental Psychology*, 11(4) 533-534.
- Li, Y., Zhang, L., & Dai, B. (2000). Experimental researches on the developmental levels of children's cooperative strategy. *Psychological Science (China)*, 23(4), 425-429.
- Liebenau, K. L. (1993). *The impact of toy type on girls' subsequent aggressive, cooperative, and nurturant behaviors*. Psychology. A Bell & Howell Information Company, California School of Professional Psychology (Fresno Campus). Ph.D.
- Light, P., & Glachan, M. (1985). Facilitation of individual problem solving through peer interaction. *Educational Psychology*, 5(3-4), 217-225. doi: 10.1080/0144341850050305
- Lim, S. E., & Honig, A. S. (1997). Singapore preschoolers' play in relation to social class, sex and setting. *Early Child Development and Care*, 135(1), 35-39.
- Logue, M. E., & Detour, A. (2011). "You be the bad guy": A new role for teachers in supporting children's dramatic play. *Early Childhood Research & Practice*, 13(1), 1-16.
- Love, A., & Burns, M. S. (2007). "It's a hurricane! It's a hurricane!": Can music facilitate social constructive and sociodramatic play in a preschool classroom? *The Journal of Genetic Psychology*, 167(4), 383-391.

- Lu, W. (2010). An investigation of interactions between pretend play and peer conflict from the perspective of metacommunication and frame theory. *Bulletin of Educational Psychology, 41*(3), 657-683.
- Lupkowski, A. E. (1989). Social behaviors of gifted and typical preschool children in laboratory school programs. *Roeper Review: A Journal on Gifted Education, 11*(3), 124-127
- Marcus, M. (1987). The role of affect in children's cooperation. *Child Study Journal, 17*(2), 153-168.
- McElwain, N. L., Halberstadt, A. G., & Volling, B. L. (2007). Mother- and father-reported reactions to children's negative emotions: Relations to young children's emotional understanding and friendship quality. *Child Development, 78*(5), 1407-1425.
- McLeod, M., & Nowicki, S. (1985). Cooperative behavior as a function of interpersonal style in preschoolers. *Journal of Personality, 53*(1), 36-45.
- Meehan, B. T., Hughes, J. N., & Cavell, T. A. (2003). Teacher–student relationships as compensatory resources for aggressive children. *Child Development, 74*(4), 1145–1157. doi: 10.1111/1467-8624.00598
- Merino, N. M. (2009). *Parallel relations of pretend play, social competence, and theory of mind development in preschool aged children*. ProQuest LLC, University of California Santa Barbara. Ph.D.
- Meyer, L. A., Wardrop, J. L., Hastings, C. N., & Linn, R. L. (1993). Effects of abilities and settings on kindergarteners' reading performance. *Journal of Educational Research, 86*(3), 142–160.

- Michael, R. L. (1991). *Effects of learning history on children's flexibility to changes in a cooperative play situation*. Psychology. A Bell & Howell Information Company, The University of Nebraska. Ph.D.
- Mize, J., & Cox, R. A. (1990). Social knowledge and social competence: Number and quality of strategies as predictors of peer behavior. *The Journal of Genetic Psychology*, 151(1), 117-127.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRSIMA Group (2009). Preferred reporting items for systematic reviews and meta-analysis. *PLos Med*, 6(7), 1-6.  
[doi:10.1371/journal.pmed1000097](https://doi.org/10.1371/journal.pmed1000097)
- Mucha, G., Mucha, K., & Krenauer, M. (1979). Influence of an aggression-preventive instruction on the play behavior of 2 to 4 year old children. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 11(2), 141-143.
- Mugny, G., & Doise, W. (1979). Factores sociologicosy psicosociologicos en el desarrollo cognitivo: Una nueva ilustracion experimental. *Anuario de Psicología*, 21, 3-25.
- Naylor, B. A. (1977). *The comparative effectiveness of consistent and varied multiple exposure and single exposure modeling in the facilitation and transfer of cooperative behavior in younger and older boys*. Social Psychology. University Microfilms International, Hofstra University. Ph.D.
- Neppl, T. K., & Murray, A. D. (1997). Social dominance and play patterns among preschoolers: Gender comparisons. *Sex Roles*, 36(5-6), 381-393.
- Nordquist, V. M., & Bradley, B. (1973). Speech acquisition in a nonverbal isolate child. *Journal of Experimental Child Psychology*, 15, 149-160.

- Obanawa, N., & Joh, H. (1995). The influence of toys on preschool children's social behavior. *Psychologia*, 38(2), 70-76.
- O'Brien, M., Huston, A. C., & Risley, T. R. (1983). Sexy-typed play of toddlers in a day care center. *Journal of Applied Developmental Psychology*, 4, 1-9.
- Oh-Uchi, A., & Sakurai, S. (2008). Nonsocial play, social skills, and problem behavior in kindergarten children: A longitudinal study. *Japanese Journal of Educational Psychology*, 56(3), 376-388.
- Parten, M. B. (1932). Social play among preschool children. *The Journal of Abnormal and Social Psychology*, 28(2), 136-147. doi: 10.1037/h0073939
- Pellegrini, A. D. (2009). *The role of play in human development*. New York, NY: Oxford University Press.
- Pellegrini, A. D., & Gustafson, K. (2005). Boys' and girls' uses of objects for exploration, play, and tools in early childhood. In A. D. Pellegrini & P. K. Smith (Eds.), *The nature of play: Great apes and humans* (pp. 113–138). New York, NY: Guilford Press.
- Peters, C. A. (1996). *Preschool activity centers: Effects on opportunities to engage in social interactions*. School Psychology Program. A Bell & Howell Information Company, University of Cincinnati. Ph.D.
- Petersson, E., & Brooks, A. (2006). Virtual and physical toys: Open-ended features for non-formal learning. *CyberPsychology & Behavior*, 9(2), 196-199.
- Phelps, E., & Damon, W. (1989). Problem solving with equals: Peer collaboration as a context for learning mathematics and spatial concepts. *Journal of Educational Psychology*, 81(4), 639–646. doi: 10.1037/0022-0663.81.4.639

- Phillip, G. J. (1998). *The role of play in the development of social competence of at-risk preschoolers: An observational study*. A Bell & Howell Information Company, University of Florida. Ph.D.
- Piaget, J. (1950). *The psychology of intelligence*. New York, NY: Harcourt, Brace.
- Piaget, J. (1951). *Play, dreams and imitation in childhood*. London, UK: Heinemann.
- Piaget, J., & Inhelder, B. (1962). *The Psychology of the child*. New York, NY: Basic Books.
- Piaget, J. (1983). Piaget's theory. In W. Kessen (Ed.), *Handbook of child psychology: History, theory, and methods* (pp. 103–128). New York, NY: Wiley.
- Pianta, R. C. (1999). *Enhancing relationships between children and teachers*. Washington, DC: American Psychological Association.
- Pianta, R. C., & Stuhlman, M. W. (2004). Conceptualizing risk in relational terms: Associations among the quality of child–adult relationships prior to school entry and children's developmental outcomes in first grade. *Educational and Child Psychology*, 21, 32–45.
- Polnariiev, B. A. (2006). *Dynamics of preschoolers' self-regulation: Viewed through the lens of conflict resolution strategies during peer free-play*. Psychology. ProQuest Information and Learning Company, The City University of New York. Ph.D.
- Price, J. M., & Dodge, K. A. (1989). Reactive and proactive aggression in childhood: Relations to peer status and social context dimensions. *Journal of Abnormal Child Psychology*, 17(4), 455-471.
- Ramani, G. B. (2012). Influence of a playful, child-directed context on preschool children's peer cooperation. *Merrill-Palmer Quarterly*, 58(2), 159-190

- Ramani, G. B., Brownell, C. A., & Campbell, S. B. (2010). Positive and negative peer interaction in 3- and 4-year-olds in relation to regulation and dysregulation. *The Journal of Genetic Psychology, 171*(3), 218-250.
- Read, M. A. (1996). *The impact of space and color in the physical environment on children's cooperative behavior*. A Bell & Howell Information Company, Oregon State University. Ph.D.
- Robinson, C. C., Anderson, G. T., Porter, C. L., Hart, C. H., & Wouden-Miller, M. (2003). Sequential transition patterns of preschoolers' social interactions during child-initiated play: Is parallel-aware play a bidirectional bridge to other play states? *Early Childhood Research Quarterly, 18*(1), 3-21.
- Rodney, C. C. (1997). *The influence of selected toys on the cooperative play behaviors of preschool children*. Department of Psychology. A Bell & Howell Information Company, Pace University. Ph.D.
- Rogoff, B., & Morelli, G. (1997). Perspectives on children's development from cultural psychology. In M. Gauvain & M. Colre (Eds.), *Readings on the development of children* (2<sup>nd</sup> ed., pp. 10 – 18). New York, NY: W. H. Freeman.
- Roopnarine, J. L., Ahmeduzzaman, M., Donnelly, S., Gill, P., Mennis, A., Arky, L., Dingler, K., McLaughlin, M., & Talukder, E. (1992). Social-cognitive play behaviors and playmate preferences in same-age and mixed-age classrooms over a 6-month period. *American Educational Research Journal, 29*(4), 757-776.
- Ross, M. K. (1977). *Interrelation of cooperative task behavior, cooperative play behavior, and creativity in four and five year old children*. Early Childhood Education. University Microfilms International, The Florida State University. Ph.D.

- Rubin, K. H. (1976). Relation between social participation and role-taking skill in preschool children. *Psychological Reports*, 39(3), 823-826.
- Rubin, K. H. (1977). Play behaviors of young children. *Young Children*, 32(6), 16-24.
- Rubin, K. H., Bukowski, W., & Parker, J. G. (2006). Peer interactions, relationships, and groups. In W. Damon, R. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (6th ed., Vol. 3, pp. 571–645). New York, NY: Wiley.
- Rubin, K. H., Fein, G., & Vandenberg, B. (1983). Play. In E. M. Hetherington (Ed.), *Handbook of child psychology: Socialization, personality and social development* (Vol. 4, pp. 693-774). New York, NY: Wiley.
- Rubin, K. H. M., Maioni, T. L., & Hornung, M. (1976). Free play behaviors in middle- and lower-class preschoolers: Parten and Piaget revisited. *Child Development*, 47(2), 414-419.
- Sanders, K. M., & Harper, L. V. (1976). Free-play fantasy behavior in preschool children: Relations among gender, age, season, and location. *Child Development*, 47(4), 1182-1185.
- Sato, S., Sato, Y., Takayama, I., & Aikawa, A. (1993). Social skills training with aggressive kindergarten children: Maintenance of social skills by coaching. *Japanese Journal of Behavior Therapy*, 19(2), 20-31.
- Schober-Peterson, D. & Johnson, C. J. (1991). Non-dialogue speech during preschool interactions. *Journal of Child Language*, 18(1), 153-170.



- Schulz, L. E., & Bonawitz, E. B. (2007). Serious fun: Preschoolers engage in more exploratory play when evidence is confounded. *Developmental Psychology*, 43(4), 1045–1050. doi: 10.1037/0012-1649.43.4.1045
- Serbin, L. A., Tonick, I. J., & Sternglanz, S. H. (1977). Shaping cooperative cross-sex play. *Child Development*, 48(3), 924-929.
- Sheldon, A. (1996). You can be the baby brother but you aren't born yet: Preschool girls' negotiation for power and access in pretend play. *Research on Language and Social Interaction*, 29(1), 57-80.
- Shin, Y. (1997). The relationship between preschoolers' friendships, social status, and play behaviors. *Korean Journal of Child Studies*, 18(2), 47-56.
- Shinako, T., Toshitaka, T., Hiraku, I., Katsutoshi, K., & Tatsuya, K. (2011). The effect of preschoolers' peer relationships on their sharing behavior. *Japanese Journal of Developmental Psychology*, 22(3), 274-285.
- Siegler, R. S., & Jenkins, E. A. (1989). *How children discover new strategies*. Hillsdale, NJ: Erlbaum.
- Slaby, R. G., & Crowley, C. G. (1977). Modification of cooperation and aggression through teacher attention to children's speech. *Journal of Experimental Child Psychology*, 23, 442-458.
- Sloane, H. N., Johnston, M. K., & Bijout, S. W. (1967). Successive modification of aggressive behaviour and aggressive fantasy play by management of contingencies. *Child Psychology & Psychiatry & Allied Disciplines*, 8(3-4), 217-226.
- Smilansky, S. (1968). *Sociodramatic play on disadvantaged preschool children*. New York, NY: John Wiley & Sons.

- Smirnova, R. A. (1981). Use of the "trusted individual" in the study of preschoolers' social interaction. *Novye Issledovaniya v Psikhologii*, 1(24), 27-31.
- Smith, A. B., & Inder, P. M. (1993). Social interaction in same and cross gender pre-school peer groups: A participant observation study. *Educational Psychology*, 13(1), 29-42.
- Smith, E. W., & Howes, C. (1994). The effect of parents' presence on children's social interactions in preschool. *Early Childhood Research Quarterly*, 9, 45-59.
- Sturzbecher, D. (1990). Befähigung von Vorschulkindern zu kooperativem Spiel. *Psychologie für die Praxis*, 90(2), 135-149.
- Sparkes, K. K. (1991). Cooperative and competitive behavior in dyadic game-playing: A comparison of Anglo-American and Chinese children. *Early Child Development and Care*, 68, 37-47.
- Steenbeek, H., van der Aalsvoort, D., & van Geert, P. (2014). Collaborative play in young children as a complex dynamic system: Revealing gender related differences. *Nonlinear Dynamics, Psychology, and Life Sciences*, 18(3), 251-276.
- Stingle, S. F., & Cook, H. (1985). Age and sex differences in the cooperative and noncooperative behavior of pairs of American children. *The Journal of Psychology*, 119(4), 335-345.
- Strein, W., & Kachman, W. (1984). Effects of computer games on young children's cooperative behavior: An exploratory study. *Journal of Research & Development in Education*, 18(1), 40-43.
- Takahashi, M. (2016). Consumers at play: Negotiations of identity in a Japanese preschool. *Young Consumers*, 17(1), 94-106.
- Taylor, A. R., & Machida, S. (1994). The contribution of parent and peer support to head start children's early school adjustment. *Early Childhood Research Quarterly*, 9, 387-405.

- Teasley, S. (1995). The role of talk in children's peer collaborations. *Development Psychology*, 31(2), 207–220. doi: 10.1037/0012-1649.31.2.207
- Tizard, B., Philps, J., & Plewis, I. (1976). Play in pre-school centres - I. Play measures and their relation to age, sex and I.Q. *Child Psychology & Psychiatry & Allied Disciplines*, 17(4), 251-264.
- Tudge, J., Winterhoff, P. A., & Hogan, D. M. (1996). The cognitive consequences of collaborative problem solving with and without feedback. *Child Development*, 67(6), 2892–2909. doi: 10.1111/j.1467-8624.1996.tb01894.x
- Tyler, R. (1978). *Social interactions of preschool children as correlates of play activities*. Department of Human Development. University of Kansas. Ph.D.
- Uzomah, C. N. (1987). *The role of challenge/initiative recreation games as a therapeutic regimen in fostering a positive self-concept for inner-city preschool children*. University of Maryland. Ph.D.
- Valentine, C. W. (1942). *The psychology of early childhood*. London, UK: Methuen.
- VanHoorn, J., Nourot, P. M., Scales, B., & Alward, K. R. (2011). *Play at the center of the curriculum* (5<sup>th</sup> ed.). Boston, MA: Pearson.
- Verba, M. (1993). Cooperative formats in pretend play among young children. *Cognition and Instruction*, 11(3-4), 265-280.
- Viana, K. M. P., & Pedrosa, M. I. (2014). Cooperative coordinated play and sharing intentions among children. *Psicologia Reflexao e Critica*, 27(3), 564-572.
- Vriens-van Hoogdalem, A. G., de Haan, D. M. P., & Boom, J. (2015). The role of language ability in young children's cooperation during play and collaborative interactions. *Early Child Development and Care*, 186(9), 1491-1504.

- Vygotsky, L. S. (1933/1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Walker, L. (1983). Sources of cognitive conflict for stage transition in moral development. *Developmental Psychology*, 19(1), 103–110. doi: 10.1037/0012-1649.19.1.103
- Walker, S. (2009). Sociometric stability and the behavioral correlates of peer acceptance in early childhood. *The Journal of Genetic Psychology*, 170(4), 339-358.
- Wang, Y. (1999). *Metacommunication and problem solving in a collaborative task of young children*. Early Childhood Education and Development. Bell & Howell Information and Learning, University of Massachusetts Amherst. Ph.D.
- Warneken, F., Chen, F., & Tomasello, M. (2006). Cooperative activities in young children and chimpanzees. *Child Development*, 77(3), 640-663. doi: 10.1111/j.1467-8624.2006.00895.x
- Whiteside, M. F., Busch, F., & Horner, T. (1976). From egocentric to cooperative play in young children: A normative job study. *Journal of the American Academy of Child Psychiatry*, 15(2), 294-313.
- Wilson, H. E. (2015). Patterns of play behaviors and learning center choices between high ability and typical children. *Journal of Advanced Academics*, 26(2), 143-164.
- Wright, L. (1990). The social and nonsocial behaviors of precocious preschoolers during free play. *Roeper Review*, 12(4), 268-274.
- Yang, L., Zou, X., & Bergen, D. (1995). The development of social and cognitive complexity in preschoolers' play: A cross cultural comparison. *Acta Psychologica Sinica*, 27(1), 84-90.

- Yarrow, F., & Topping, K. (2001). Collaborative writing: The effect of metacognitive prompting and structured peer interaction. *British Journal of Educational Psychology*, 71(2), 261–282. doi: 10.1348/000709901158514
- Young, B. A. (1995). *A comparison of the play of aggressive and non-aggressive kindergartners*. Psychology. A Bell & Howell Information Company, The City University of New York. Ph.D.
- Zielinska, I. E., & Chambers, B. (1995). Using group viewing of television to teach preschool children social skills. *Journal of Educational Television*, 21(2), 85-99.

## Appendix A

*Excluded Studies (n = 118)*

NO.	Abstract Only (n = 13)	Play (n = 85)	CPS (n = 20)
1	Bilsky, W., & Ernst, D. (1985) [German]	Anderson, G. T. (2000)	Altman, K. (1971)
2	Fonzi, A., Tomada, G., & Ciucci, E. (1994) [Italian]	Ausch, L. (1994)	Andrews, D., & Krantz, M. (1982)
3	Francescato, D., Putton, A., de Gennaro, L., & Locatelli, M. (1995) [Italian]	Bakeman, R., & Brownlee, J. R. (1980)	Brownell, C. A., & Carriger, M. S. (1990)
4	Kanayama, M., Hidaka, H., Nishimoto, F., Watanabe, T., & Sato, S. (2000) [Japanese]	Barnes, K. E. (1971)	Brownell, C. A., Ramani, G. B., & Zerwas, S. (2006)
5	Kuriyama, Y., Ogihara, M., & Adachi, M. (1996) [Japanese]	Busse, T. V., Ree, M., & Gutride, M. (1970)	Dovigo, F. (2016)
6	Mucha, G., Mucha, K., & Krenauer, M. (1979) [German]	Chen, S. E. (2008)	Eberly, J. L. (2001)
7	Mugny, G., & Doise, W. (1979) [Spanish]	Cugmas, Z. (2010)	Garaigordobil, M., Maganto, C., & Etxeberria, J. (1996)
8	Oh-Uchi, A., & Sakurai, S. (2008) [Japanese]	Dyer, S., & Moneta, G. B. (2006)	Gouze, K. R. (1987)
9	Sato, S., Sato, Y., Takayama, I., & Aikawa, A. (1993) [Japanese]	Farran, D. C., & Son-Yarbrough, W. (2001)	Hamann, K., Bender, J., & Tomasello, M. (2014)
10	Shinako, T., Toshitaka, T., Hiraku, I., Katsutoshi, K., & Tatsuya, K. (2011) [Japanese]	Faulstich, C. K. (1979)	Holmes-Lonergan, H. A. (2003)
11	Smirnova, R. A. (1981) [Russian]	Feldbaum, C. L., Christenson, T. E., & O'Neal, E. C. (1980)	Kagan, S., & Madsen, M. C. (1971)
12	Sturzbacher, D. (1990) [German]	Gervai, J., Turner, P. J., & Hinde, R. A. (1993)	Lawton, J. T., & Berning, R. A. (1985)
13	Viana, K. M. P., & Pedrosa, M. I. (2014) [Portuguese]	Grieger, T., Kauffman, J. M., & Grieger, R. M. (1976)	Li, Y., Zhang, L., & Dai, B. (2000)

14		Grinder, E. L. (1994)	McLeod, M., & Nowicki, S. (1985)
15		Gruber, C. (1992)	Michael, R. L. (1991)
16		Hannikainen, M. (2001)	Naylor, B. A. (1977)
17		Hart, B. M., Reynolds, N. J., Baer, D. M., Brawley, E. R., & Harris, F. R. (1968)	Sparkes, K. K. (1991)
18		Hendrickson, J. M., Strain, P., Tremblay, A., & Shores, R. E. (1981)	Strein, W., & Kachman, W. (1984)
19		Howard, J., Jenvey, V., & Hill, C. (2006)	Stingle, S. F., & Cook, H. (1985)
20		Isobe, M., Kirk, M., Filho, C., & Maeda, K. (2004)	Wang, Y. (1999)
21		Jahr, E., & Eldevik, S. (2002)	
22		Johnson, T. J., Goetz, E. M., Baer, D. M., & Green, D. R. (1981)	
23		Kato-Shimizu, M., Onishi, K., Kanazawa, T., & Hinobayashi, T. (2013)	
24		Kutnick, P. J., & Brees, P. (1982)	
25		Kyratzis, A. (1999)	
26		Ladd, G. W., & Mars, K. T. (1986)	
27		Levine, L. E., & Hoffman, M. L. (1975)	
28		Lim, S. E., & Honig, A. S. (1997)	
29		Logue, M. E., & Detour, A. (2011)	
30		Love, A., & Burns, M. S. (2007)	
31		Lu, W. (2010)	
32		Lupkowski, A. E. (1989)	
33		Merino, N. M. (2009)	
34		Mize, J., & Cox, R. A. (1990)	
35		Neppl, T. K., & Murray, A. D. (1997)	
36		Nordquist, V. M., & Bradley, B. (1973)	
37		O'Brien, M., Huston, A. C., & Risley, T. R. (1983)	

38		Parten, M. B. (1932)	
39		Peters, C. A. (1996)	
40		Petersson, E., & Brooks, A. (2006)	
41		Phillip, G. J. (1998)	
42		Price, J. M., & Dodge, K. A. (1989)	
43		Robinson, C. C., Anderson, G. T., Porter, C. L., Hart, C. H., & Wouden-Miller, M. (2003)	
44		Rodney, C. C. (1997)	
45		Roopnarine, J. L., Ahmeduzzaman, M., Donnelly, S., Gill, P., Mennis, A., Arky, L., Dingler, K., McLaughlin, M., & Talukder, E. (1992)	
46		Ross, M. K. (1977)	
47		Rubin, K. H. (1976)	
48		Rubin, K. H. (1977)	
49		Rubin, K. H. M., Maioni, T. L., & Hornung, M. (1976)	
50		Sanders, K. M., & Harper, L. V. (1976)	
51		Schober-Peterson, D. & Johnson, C. J. (1991)	
52		Serbin, L. A., Tonick, I. J., & Sternglanz, S. H. (1977)	
53		Shin (1997)	
54		Sloane, H. N., Johnston, M. K., & Bijout, S. W. (1967)	
55		Smith, A. B. & Inder, P. M. (1993)	
56		Smith, E. W., & Howes, C. (1994)	
57		Steenbeek, H., van der Aalsvoort, D., & van Geert, P. (2014)	
58		Takahashi, M. (2016)	
59		Taylor, A. R., & Machida, S. (1994)	
60		Tizard, B., Philips, J., & Plewis, I. (1976)	
61		Tyler, R. (1978)	



62		Uzomah (1987)	
63		Walker, S. (2009)	
64		Whiteside, M. F., Busch, F., & Horner, T. (1976)	
65		Wilson, H. E. (2015)	
66		Wright, L. (1990)	
67		Yang, L., Zou, X., & Bergen, D. (1995).	
68		Young, B. A. (1995)	
69		Zielinska, I. E., & Chambers, B. (1995)	
70		Hurd, T. L. (1995)	
71		Beer, J. (2007)	
72		Besevegis, E., & Lore, R. (1983)	
73		Cauley, K., & Tyler, B. (1989)	
74		Farris, A. C. (1995)	
75		Finlinson, A. R., Austin, A. M. B., & Pfister, R. (2000)	
76		Getz, S. K. (1981)	
77		Goncu, A., & Kessel, F. (1988)	
78		Leaper, C. (1991)	
79		Marcus, M. (1987)	
80		McElwain, N. L., Halberstadt, A. G., & Volling, B. L. (2007)	
81		Obanawa, N., & Joh, H. (1995)	
82		Polnariiev, B. A. (2006)	
83		Ramani, G. B., Brownell, C. A., & Campbell, S. B. (2010)	
84		Sheldon, A. (1996)	
85		Slaby, R. G., & Crowley, C. G. (1977)	

## Appendix B

### *The English Abstracts of Thirteen Not Written in English Studies*

NO.	Articles	Abstracts	Types of Research	Measured Variables
1	Bilsky, W., & Ernst, D. (1985) [German]	Observed nursery schoolchildren's behavior in 3 cooperation games to determine whether behavioral scores of different games were correlated and whether it is possible to predict behavior by knowledge of play group membership and of behavior ratings during free play. Findings reveal that Ss' behavior in 2 games was moderately correlated. While group membership proved to be an efficient predictor of behavior in these games, behavior in the 3rd game showed significant correlations with several rating scales. By means of jackknifing, the significance of correlations was confirmed.	Experimental	The behaviors occurred during cooperative games
2	Fonzi, A., Tomada, G., & Ciucci, E. (1994) [Italian]	Studied whether and to what extent the interaction of 2–3-yr-old children can be influenced by verbal information about their peers, and assessed the effect of a negative assessment of the abilities of a peer by a nonsignificant adult on interaction with that peer. Human Ss: 20 normal male and female Italian preschool children (aged 29–34 mo). 20 normal male and female Italian preschool children (aged 35–39 mo). Ss were divided into pairs of the same gender and age, were observed in 2 joint play sessions (assembling puzzles), and were rated for different aspects of their interaction (e.g., collaborative or oppositional initiatives and responses to such initiatives, or affectionate behavior). One play session served as the control condition; the 2nd took place after 1 S had been given a negative assessment of the abilities of the other.	Experimental	Collaborative or oppositional initiatives and responses to such initiatives, or affectionate behavior
3	Francescato, D., Putton, A., de Gennaro, L., & Locatelli, M. (1995) [Italian]	Studied the effects of a socio-affective educational program on preschool children. Ss were 49 normal Italian kindergarten students. 30 students participated in the socio-affective training program and 19 were controls. The socio-affective program trained Ss in communication, discussion, and self-learning skills. Ss were evaluated at the beginning and end of the school year during play activities and while carrying out a task. A systematic observation schedule was used to analyze behavior. The results were evaluated according to changes in aggressive and cooperative behaviors, self-assurance, interpersonal relationships, and social competence. Statistical tests were used.	Experimental	Aggressive and cooperative behaviors, self-assurance, interpersonal relationships, and social competence

4	Kanayama, M., Hidaka, H., Nishimoto, F., Watanabe, T., & Sato, S. (2000) [Japanese]	Examined the effects of classroom-based social skills training designed to improve the social skills of preschool children. Ss were 6 male and 5 female preschool children in Miyazaki, Japan. Ss were administered 6 sessions (1 session 20–30 min) of social skills training and videotaped for 2 wks in the classroom and the schoolyard. The training program was designed to increase children's skills in appropriate social interactions and cooperative behaviors. After training, generalization of skills to natural free play settings was assessed. The results show great improvements in teacher-rated social skills and social behaviors assessed through behavior observations. These improvements suggest that the Ss generalized their social skills acquired in training to natural settings.	Experimental	Social skills and social behaviors
5	Kuriyama, Y., Ogihara, M., & Adachi, M. (1996) [Japanese]	Studied developmental changes and developmental differences in dyadic interactions and game-playing strategies, with emphasis on the establishment of the self, the partner, and the object through social interaction during game playing. Human Ss: 84 normal male and female Japanese preschool and school-age children (aged 3 yrs 7 mo to 9 yrs 6 mo) (preschoolers, kindergartners, and 1st–3rd graders). 28 same-sex pairs in 3 age groups—aged 3 yrs 7 mo to 5 yrs 6 mo, aged 5 yrs 7 mo to 7 yrs 6 mo, and aged 7 yrs 7 mo to 9 yrs 6 mo—were videotaped during 2 10-trial sessions of the marble pull game. Cooperative vs competitive behaviors were assessed. Regression analysis was performed.	Experimental	Cooperative and aggressive behaviors
6	Mucha, G., Mucha, K., & Krenauer, M. (1979) [German]	In a study with 160 children in 2 age groups (20–36 mo and 37–48 mo), the use of preventive instruction diminished aggression only among the older females, and increased cooperative behavior among all of the females.	Experimental	Aggressive and cooperative behaviors
7	Mugny, G., & Doise, W. (1979) [Spanish]	Investigated the behavior of 95 children of high socioeconomic status (SES) and 95 of low SES. Ss were grouped according to age: 5–6, 6–7, and 7–8 yrs. Three phases of cooperative play were implemented. The 1st phase, the pre-exploration of each S, showed considerable differences between Ss of the 2 economic levels, especially at 6–7 yrs of age. In the 2nd phase, Ss worked again in cooperative play, some individually and some in groups of 2 or 3, obliging them to coordinate their actions. Finally, Ss were again observed individually. Results show that the differences between the 2 sociocultural levels tended to disappear, although a difference reappeared between 5–6 yrs. It is suggested that the decrease of the	Experimental	Behaviors occurred during cooperative play

		<p>difference may be attributed to the work in common that the children had carried out. Based on a psycho-sociological theory of cognitive development, a progressive autonomy in this development can be observed based on an initial social interdependency. From a sociological point of view, the differences normally observed can be attributed, at least partly, to the fact that the methodology currently in use is based on an individualistic epistemology, completely ignoring the psychosocial conditions of the cognitive development.</p>		
8	<p>Oh-Uchi, A., &amp; Sakurai, S. (2008) [Japanese]</p>	<p>The present study examined changes in nonsocial play (reticent behavior, solitary-passive behavior, and solitary-active behavior) and the relations between nonsocial play and social skills and problem behavior for boys (N = 50) and girls (N = 35) in 2-year-course kindergartens. Children's nonsocial play was observed immediately upon their entering kindergarten (Time 1) and 6 months later (Time 2). Their social skills and problem behavior were rated by their teachers at Time 1, Time 2, and just before graduation (Time 3). The results revealed that the rate of reticent behavior decreased from Time 1 to Time 2. Reticent behavior was negatively related to assertive skills in both the boys and the girls. Solitary-passive behavior at Time 2 was related to low cooperative skills and high carelessness/hyperactivity for the girls, and predicted low assertive skills at Time 3 for the boys. There were no significant relationships to solitary-active behavior at the same point in time. However, one of them at Time 1 predicted subsequent low assertive skills for the boys, and one at Time 2 predicted externalizing problem behavior at Time 3 for the girls.</p>	<p>Naturalistic Observation</p>	<p>Social skills and problem behaviors including reticent behavior, assertive skills, solitary-passive behavior, solitary-active behavior, cooperative skills, and carelessness/hyperactivity</p>
9	<p>Sato, S., Sato, Y., Takayama, I., &amp; Aikawa, A. (1993) [Japanese]</p>	<p>Conducted social skills training using the coaching method and token economy method combined. Ss were 2 kindergartners displaying aggressiveness and disruptive behavior. Nine training sessions were conducted to promote rule-following behavior and appropriate social interaction with peers. Training effects were assessed right after training and 1 mo later. For 1 S, the rate of cooperative play during a free play session, an indicator of the generalization effect of skills training, was assessed. The incidence of positive behavior modification was evaluated.</p>	<p>Experimental</p>	<p>Cooperative play and positive behavior</p>
10	<p>Shinako, T., Toshitaka, T., Hiraku, I.,</p>	<p>This study examined the process by which relationships among peers become closer, and the effect of these relationships on strategies for</p>	<p>Experimental</p>	<p>Quality of peer relationship</p>

	Katsutoshi, K., & Tatsuya, K. (2011) [Japanese]	sharing candy when conflicts could easily occur. Children ages 5 ( n = 48) and 6 years ( n = 52) were grouped in same-sex and same-aged sets of four children unfamiliar with one another. Peer interactions were observed through a series of play sessions under a caregiving scenario, whereby the caregiver conducted systematic observations of the children. The results showed that the quality of peer relationships assessed over two sessions by observations of children's free play progressed to higher levels of quality between the first session and the second. In the first session, peer interactions among the four group members were rarely observed. In the second session, however, the movement and pretend play of 5-year old groups of four became synchronized, and 6-years old groups often structured their complex social pretend play sequences based on a common theme and rules. When asked to share candy, 6-year olds who had engaged in complex and cooperative play in the second free play session were more likely to interact with each other than those who had not engaged in such play.		
11	Smirnova, R. A. (1981) [Russian]	Divided preschoolers into 3 age groups to investigate their psychological motive for affection within peer groups. During cooperative social activity 1 child in each group, functioning as the trusted individual (TI), was taken into the tester's confidence and was instructed to praise other Ss or to engage them in collaborative play. The TI's behavior was evaluated on cooperation with the tester, implementation of the tester's instructions, reaction to the tester's instructions, and dynamics of TI's behavior during the experiment. At the end of each series of experiments non-TIs rated their preference of the various programs contained within the experiment. Even though different individuals functioned as the TI, the non-TI Ss preferred all programs where the TI had praised them. Results indicate that preschoolers satisfy their most important social need (i.e., the need for affection) in peer groups.	Experimental	Behaviors occurred during the cooperation with the tester
12	Sturzbecher, D. (1990) [German]	Studied ways of teaching preschool children (aged 4–5 yrs) cooperative play behavior. These behaviors were defined to include ability to recognize and consider intention, emotions, and the partners' level of information. Cooperation was influenced significantly via puppet shows, role playing, and cooperating on a ropewalk. Analysis of effectiveness of these training methods was demonstrated by studying groups with and without such training, and it is argued	Experimental	Cooperative play behavior

		that teaching the preschoolers via the described methods increased cooperation significantly. It is concluded following specific descriptions that learning of cooperation furthers other specific learning goals in preparation for beginning academic curricula.		
13	Viana, K. M. P., & Pedrosa, M. I. (2014) [Portuguese]	Children between 19 and 31 months of age from a daycare center in the Metropolitan region of <b>Recife</b> were video recorded in order to identify their most frequent strategy to initiate and maintain a cooperative coordinated action as well as to reflect about their ability of sharing intentions with peers. Through a qualitative analysis of play episodes in two different conditions (big group and triplet group), one may conclude imitation is the main strategy to engage in a cooperative coordinated action. Yet the children have also used complementary actions and verbal language to build up this type of play. The data highlighted children's skills of understanding others as an intentional agent while negotiating and coordinating a common topic of play. Child-child interactions appear as an instigator of the constant use of such abilities.	Naturalistic Observation	Cooperative coordinated action including imitation, complementary actions, verbal language

**Chapter 3. Understanding Preschool Children's Cooperative Problem Solving during Play  
in Everyday Classroom Contexts: China and the US**

## **Abstract**

There is a value in studying children's cooperative problem solving during play in different cultures. Increasingly, our children will grow up in a global context that requires the skills, dispositions and knowledge to work with others to solve problems that are relevant to people from diverse countries. There are key theoretical tenets that support that children construct their own knowledge during play through the exploration with different types of materials (Piaget, 1951) and develop cooperative problem solving skills with peers through social interactions (Vygotsky, 1978). Previous research regarding children's cooperative problem solving during play is dominated by experimental designs in reframed settings and conducted in Western cultures. An experimental approach has often been disputed since children are more likely to show their dynamic and complex problem solving skills outside of the laboratory (Cole, 1975; Cole, Hood, & McDermott, 1978; Gladwin, 1970; Lave, 1988; Rogoff & Morelli, 1997; Scribner, 1976). Therefore, this cross-cultural study was designed to conduct 10 months of field work in a Chinese kindergarten and US preschool center during play as part of young children's everyday classroom experiences. Sources of data include (a) the video recordings of 16, four- and five-year-old children and (b) researcher's field notes and research journal entries. Particularly, children's 60-minute footage was used as the quantitative data and analyzed using MANOVA and ANOVA, and field notes and research journal entries were analyzed using qualitative content analysis (Hsieh & Shannon, 2005). Quantitative findings suggest that: (a) there were cultural and gender differences in children's engagement in types of play (constructive play, fantasy play, and rough-and-tumble play), and (b) there were cultural and gender differences in children's cooperative problem solving experiences (debating and mentoring) during play. However, no age differences were identified either in children's



engagement in types of play or cooperative problem solving. Qualitative findings provide contextual understanding of (a) teachers' beliefs about the impact of age and gender on children's engagement in a particular type of play and cooperative problem solving, and (b) teachers' decision on play space, play materials, and play schedule for supporting children's needs and interests and their successful transition to elementary school. There are expectations that this study will contribute to the field of early childhood education (ECE) as well as public education in which teachers are increasingly challenged to draw upon a deeper understanding of the range of children's cultural heritages, identities, and ways of learning with others.

### **Introduction**

Children who live in the United States and China are in one of the most powerful nations in terms of economic, cultural, political, and military dominance (Stewart, 2012). This global position continually draws upon competent citizens who are able to cooperate with other people not only within the nation but also across a wide range of countries in order to solve national and global issues (e.g., global warming, pollution, and economic collapse). *Cooperative problem solving* can be viewed as a process in which two or more people work together by coordinating their individual perspectives and investigating new solutions to solve a shared problem (Ashley & Tomasello, 1998). The skill of cooperative problem solving should be valued and encouraged to develop in our field early childhood education since children need the skill to solve problems that are no longer unique to their own particular culture but also relevant to people from other countries. It has been shown that preschool-aged children show abilities to solve problems with peers through social interactions (e.g., negotiations and discourse) (Brownell, Ramani, & Zerwas, 2006; Chen, 2003; Eckerman & Peterman, 2001; Hamann, Warneken, & Tomasello, 2012; Siegler & Jenkins, 1989; Warneken, Chen, & Tomasello, 2006). Their peer interactions

often occur during play in which children engage in a self-motivated and self-chosen activity that is enjoyable and actively engaging (Rubin, Fein, & Vandenberg, 1983).

Preschool children engage in various play episodes during their daily lives, and play has a positive impact on their development. From the perspective of neuroscience, it has been suggested that as children engage in more play in their earlier years of lives, they are more likely to develop complex neural structures that equip them with abilities to engage in more complex play later (Frost, Wortham, & Reifel, 2008). Play provides various stimuli to children's brain development, and children gradually show more engagement in task analysis, problem solving, negotiation, and discourse mediated by social and cultural norms (Frost, 1992). Hence, play promotes children's development of "mental and emotional mastery and cooperation and leadership skills" (Frost, Wortham, & Reifel, 2008, p. 68). From a theoretical perspective, the role of play in children's development of cooperative problem solving is also valued. During play, children construct their own knowledge through exploring different types of play materials (Piaget, 1951) as well as developing problem solving skills with peers through social interactions (Vygotsky, 1978). In particular, play can be viewed as a context that promotes children's cooperative problem solving (Ames & Murray, 1982; Azmitia & Montgomery, 1993; Blaye, Light, Joiner, & Sheldon, 1991; Damon & Killen, 1982; Doise & Mugny, 1984; Fawcett & Garton, 2005; Golbeck, 1998; Kruger, 1992; Light & Glachan, 1985; Phelps & Damon, 1989; Schulz & Bonawitz, 2007; Teasley, 1995; Tudge, Winterhoff, & Hogan, 1996; Walker, 1983; Yarrow & Topping, 2001).

The nature of play is complex, and its complexity requires researchers to understand children's play through studies that situate them in their cultures, as well as local communities (Goncu & Vadeboncoeur, 2016). Children's play often occurs in a social context that coexists

within classroom cultures in which children's behaviors are enculturated to be the social norms that are shaped by teachers' pedagogical beliefs and practices (Heath, 1983; Van Hoorn, Nourot, Scales, & Alward, 2011). Teachers with different cultural experiences have diverse beliefs about what is important in children's learning and development, and these beliefs often influence and inform their decisions on a wide range of decisions including the creation of classroom settings, the selection of materials, and the time frames provided for children's play (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997).

Previous experimental research has revealed the impact of a range of factors on children's cooperative behaviors during play, including types of games (i.e., cooperative and competitive games), types of materials (i.e., aggressive toys, nurturant, and neutral toys), pretend play, and physical settings (Bay-Hinitz, Peterson, & Quilitch, 1994; Caulfield, 2002; LeJuene, 1994; Liebenau, 1993; Ramani, 2012; Read, 1996; Verba, 1993; Vriens-van Hoogdalem, de Haan, & Boom, 2015; see Chapter 2). These findings were all situated in Western cultures in experimental settings, dominated by researchers' manipulation of contexts and play activities. Such experimental designs have often been disputed by other researchers since children are more likely to show their dynamic and complex problem solving skills outside of a laboratory setting (Cole, 1975; Cole, Hood, & McDermott, 1978; Gladwin, 1970; Lave, 1988; Rogoff & Morelli, 1997; Scribner, 1976). For example, it has been found that there are cultural differences in children's cooperation as well as play through ethnographic studies, and these differences suggest researchers should be mindful not to overgeneralize how children engage in cooperative problem solving during play across different cultural contexts (Goncu & Vadeboncoeur, 2016; Madsen & Shapira, 1970; Rogoff, 2003; Shapira & Madsen, 1969). Therefore, scholars in the field of children's cooperative problem solving during play need to ponder the impact of (a)

everyday classroom contexts and (b) cultures on children. The over-arching goals of this study include (a) the creation of a methodology that is sensitive to the study of children's cooperative problem solving during play in two cultures and (b) the design of a protocol for identifying the possible variation in patterns of children's engagement cooperative problem solving during play in two cultures using a developmental lens. Only a part of the data (16 children's footage from a total of 43 children) were analyzed due to the limited time with this demanding analysis. These data were generated during a 10-month field work in Chinese and US preschool centers that included the integration of ethnographic informed focal-child observations and video-stimulated recall teacher interviews.

## **Literature Review**

### **Theoretical Underpinnings**

Cognitive development theory (Piaget, 1983; Piaget & Inhelder, 1962) and sociocultural theory (Vygotsky, 1978) serve as the underpinning of studying and understanding children's development of cooperative problem solving during play. Play is viewed as a pleasurable and spontaneous activity that children engage in during their daily lives (Piaget, 1951). It can be viewed as a tool to promote children's construction of new knowledge through the process of *assimilation* as a way to bring their experiences into play episodes to learn new things (Piaget, 1951, 1983). Consequently, as children make mental accommodations for new knowledge, they slowly begin to adapt their behaviors, incorporating new ways of coming to know into their everyday experiences. Piaget's (1983) theory helps explain the process of mental changes and the emergence of new behaviors that play enables among young children. A continual trial and error exchange among peers is one of the most efficient avenues through which children gain a

sense of control of their behaviors and environments that include solving problems and mastering new skills.

It is supported that children can use different symbols to represent their thoughts and experiences through the engagement of various play materials (Piaget, 1951). Piagetian stage theory includes that between two and seven years of age children often show their abilities to use imagination and construct their knowledge during symbolic play. For example, children may pretend a block is a car, a pencil is a magic stick, or a doll is a real baby. Indeed, more recent studies have shown that symbolic play begins before age two among many children. Through the engagement of this symbolic play, children have an opportunity to develop their “symbolic function, their thinking, memory, imagination, speech, creativity, and all other cognitive functions” (Petrovic-Soco, 2014, p. 236). Particularly, play materials during symbolic play act as mediational tools for children to learn a language, to solve a problem, and engage in social interactions, motivate them to explore, discover, and develop new understandings of their world (Cheyne & Rubin, 1983; Garvey, 1990; Heidemann & Hewitt, 2010; Moyles, 1989; Paley, 1993; Pellegrini & Gustafson, 2005; Rubin, Watson, & Jambor, 1978; Schulz & Bonawitz, 2007; Smith, 2005; Vandenburg, 1980).

In his later work, Piaget (1951) suggested that peer interactions occurring during play often promote children’s learning, practice, and development of cognitive abilities and skills (p. 257). Preschool children’s degree of *egocentrism*, described as the difficulty perceiving an event from another’s perspective, is believed to complicate their abilities to consider others’ ideas (Piaget, 1932). Thus, engaging in cooperative problem solving during play can promote children’s understandings of other’s perspectives in order to reach a joint solution and resolve conflicts (Paley, 2004; Ramani, 2012; Tomasello, 2009).

This shared understanding and consensus between a child and her peers was also studied by Vygotsky (1978), which he described as intersubjectivity. Intersubjectivity can be achieved through negotiations with others and self-regulation of our own thoughts and behaviors in order to solve a shared problem (Vygotsky, 1978). Particularly in play contexts, children confront many problems and conflicts in their daily play experiences. Being exposed to this context, comprised of same age or near same age peers, often allows children to share their thoughts, understand peers' different perspectives, and solve conflicts through regulating their needs and behaviors.

Vygotsky (1978) viewed play as a created, imaginary experience for children not only to fulfill their unrealizable desires, that are not satisfied in a real world, but also to practice and develop their problem solving skills with advanced peers (p. 93). Vygotsky suggested that “in play, a child is always above his average age, above his daily behavior; in play, it is as though he were a head taller than himself” (1978, p. 102). In other words, through play, children continue to learn and develop within their zones of proximal development (ZPDs), which are defined as the “distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (1978, p. 86). In particular, playing with advanced peers promotes children's potentials to challenge complex problems, internalize the skills learned from the interactions, and apply them to solve future problems. This process of transformation relates to what Rogoff (1995) has termed, *participatory appropriation*, when “the process by which individuals transform their understanding of and responsibility for activities through their own participation” (p. 150). Through this process, children and playmates are not only actively engaged and interdependent with each other but also assume dynamic roles (e.g.,

observer, listener, and scaffolder) that are relevant to different problem situations. Through cooperating with advanced peers, children can observe and model peers' verbal and nonverbal behaviors (Rogoff, 1990) and learn how to use materials, define problems, and solve problems in different ways (Ramani & Brownell, 2014; Sylva, Bruner, & Genova, 1976). These understanding and learned skills can be applied to solve future problems.

## **Play**

The role of play in children's learning and development has been formally studied since at least the eighteenth century (Rubin, Fein, & Vandenberg, 1983). This historical trajectory extends back to the emergence of the *surplus energy theory* prior to contemporary theories such as cognitive development and sociocultural theories. In the early years, play was viewed as an outcome of children's excess energy since they did not need to consume too much for their survival (Schiller, 1795/1967). Later, play was perceived as "children's work" in which children use play materials as tools to learn about their world, themselves, and others (Montessori, 1948/2007). Many theorists attempted to explain the origins of children play and its impact on children's development of physical, cognitive, socio-emotional as well as their psychological wellbeing (e.g., Erikson, 1940 – 1977; Freud, S., 1955 - 1961; Freud, A., 1964; Groos, 1901; Hall, 1920; Patrick, 1916; Piaget, 1951; Schiller, 1795/1967; Spencer, 1873; Vygotsky, 1978). Nevertheless, play is so complex that there is no definitive agreement on the definition of play.

**The nature of play.** Even though the nature of play is complex, many researchers endeavor to perceive it based on the perspectives of the physical, causal, functional, and psychological aspects of play (Pellegrini, 2009; Rubin, Fein, & Vandenberg, 1983). Play includes children's muscle and body movements such as "play face, soft-hit, alternating roles, run, jump, and incomplete or disrupted sequences of functional behavior" (Pellegrini, 2009, p.

12). As the physical movements (e.g., run, jump, and hit) can be easily distinguished, so is the play face. Play face is described as a happy face (e.g., smile, laugh, and giggle), and humans have no difficulty identifying whether people are happy or sad by observing their facial expressions. Children's play occurs more often when children are in plentiful and safe environments rather than when they experience hunger or danger (Burghardt, 2005; Rubin, Fein, & Vandenberg 1983). Their play behaviors are often viewed as pleasurable and resemble functional behaviors but without functional purpose. For example, children may make a castle with sand without an actual purpose of living in the castle. Although the nature of play is interpreted with composite perspectives, its most important feature is that *play* should be a self-motivated, self-chosen, enjoyable, and an actively engaged activity (Rubin, Fein, & Vandenberg, 1983). This definition of play is used in this study since it reflects both Western and Asian perspectives on play.

This definition of play has been widely used in Western cultures as well as Asian cultures such as China (e.g., Lu, 2010; Yang, Zou, & Bergen, 1995; Wang & Lam, 2017). For instance, Wang and Lam (2017) in their qualitative study defined free play as “play activities that are freely chosen by children,” and this definition was adapted from Garvey's work (1991). Resembling the Western definition of play, Chinese scholars view free play as child-initiated activities that are:

[...] solely motivated by inner forces, such as children's own curiosity and/or pursuit for pleasure, manifesting itself without the encouragement or even involvement of the teachers. (Wang & Lam, 2017, p. 29)



Hence, the definition of play used in this study has been equivalently used by both Western and Asian scholars. Further, Asian scholars also adopted the categorization of play that developed in the West to investigate children's engagement in different types of play.

**The forms of play.** Play is categorized variously, including (a) social forms of play (Parten, 1932), (b) cognitive forms of play (Piaget, 1950, Smilansky, 1968) and (c) rough-and-tumble play (Aldis, 1975; Humphreys & Smith, 1984). Parten (1932) observed children during their free-play period which was described as the period that children were permitted to play with peers and materials with which they wanted to play, "or with none at all" as they desired (p. 248). In this period, teachers could provide a few suggestions to children "but are in sight of the children in order to help settle any problems that may arise" (p. 248). Through observations, Parten identified six types of play that include: (a) unoccupied behavior, (b) onlooker, (c) solitary play, (d) parallel play, (e) associate play, and (f) cooperative play. Children show the *unoccupied behavior* when they show physical movements without engaging in play. *Onlooker play* occurs when children interact with peers but without actually engaging in peers' play. *Solitary play* occurs when children play alone without any direct interaction with peers. *Parallel play* occurs when children play alone in activity or use play materials that are similar to their peers' close by them. *Associative play* occurs when children engage in a common activity with peers yet do not typically share a goal or make a mutual contribution to solve a problem or complete a task. *Cooperative play* occurs when children have a shared goal and mutually contribute to solve a problem. Parten found that children engaged in more cooperative play as they became older. Specifically, children who were approximately two-year-old tended to be more engaged in solitary, onlooker, and parallel play, but also engaged in periodic cooperative play. Starting around the age of 3, children were increasingly more engaged in cooperative play. Following

Parten's study, many researchers continued to extend their focus to children's different patterns of social types of play across different age periods, genders, socioeconomic status (low-, mid-, and high-SES), play context (playground, classroom, and home), and cultures (Western and Asian cultures and cross-cultures), as well as its impact on children's social and cognitive development (e.g., aggressive behavior, cooperative behaviors, and theory of mind) (e.g., Anderson, 2000, Ausch, 1993; Barbu, Cabanes, & Le Maner-Idrissi, 2011; Barnes, 1971; Chen, 2006; Dyer & Moneta, 2006; Farran & Son-Yarbrough, 2001; Grinder, 1994; Lim & Honig, 1997; Merino, 2009; Roopnarine et al., 1992; Rubin, 1977; Steenbeek, van der Aalsvoort, & van Geert, 2014).

Regarding the cognitive forms of play, Piaget is considered as a pioneer in this field. Piaget (1951) differentiated children's play as practice play, symbolic play, and games with rules. *Practice play* is perceived as non-goal oriented actions with materials, that are behaviors that infant-aged children often engage in (e.g., banging and dropping). As children become older (between two and seven years old), they start to use symbols to represent their thoughts and experiences through engaging in various play materials, in which play is defined as symbolic. Also, older children become engaged in rule-governed games (game with rules) more frequently than when they were young.

Referring to Piaget's work, Smilansky (1968) classified four types of play, that include: (a) *functional play*: children's physical movements with or without objects (e.g., running, jumping, and stacking objects), (b) *constructive play*: children's uses of objects (e.g., blocks, Legos, sand, and clay) for organizing or making something in a goal-oriented way, (c) *fantasy/symbolic play*: children's role playing or make-believe play such as pretending to be a parent or using a block of wood as a car, and (d) *games with rules*: children play games with

peers following implicit or negotiated rules such as Mother-May-I and Duck-Duck-Goose. Smilansky's classification of play is often used in the current research field, suggesting that children's engagement in each type of play varies by age as well as gender. For children aged from one to six, they become engaged in less functional play and more constructive play, game with rules and fantasy play across time. At one to two years, children often engage in more functional play compared with other types of play (Sponseller & Jaworski, 1979). Between three and five years, children become engaged in more constructive play and fantasy play although they still engage in functional play (Hetherington, Cox, & Cox, 1979; Johnson & Ershler, 1980; Rubin, Maioni, & Hornung, 1976; Rubin, Watson, & Jambor, 1978; Sponseller & Jaworski, 1979). As children become older, around six years of age, the frequency of engaging in game with rules increases (Eifermann, 1971).

*Rough-and-tumble play* was neglected until researchers revived children's developmental trends as well as functions in this type of play (e.g., Aldis, 1975; Blurton-Jones, 1972; Humphreys & Smith, 1984). Pellegrini (1987), a contemporary scholar in rough-and-tumble play research, described it as children's engagement in an activity that resembles play fighting (e.g., wrestle, chase, and flee). Rough-and-tumble play often occurs in children's outdoor play or on school playgrounds (e.g., Haywood, Rothenberg, & Beasley, 1974; Humphreys & Smith, 1984; Smith & Hagan, 1980), whereas it also occurs during fantasy play or in dress-up play areas in classrooms than when they were in other play areas (Bjorklund & Pellegrini, 2002; Pellegrini, 1984). Further, children who are between three and five years of age become engaged in more rough-and-tumble play although they still engage in other types of play (Hetherington, Cox, & Cox, 1979; Johnson & Ershler, 1980; Logue & Harvey, 2009; Rubin, Maioni, & Hornung, 1976; Rubin, Watson, & Jambor, 1978; Sponseller & Jaworski, 1979; Storli & Sandseter, 2015).

Additionally, it has been implied that boys are more likely to engage in rough-and-tumble play than girls, and this phenomenon has been shown across cultures (Blurton-Jones, 1972, 1976; Blurton-Jones & Konner, 1973; Brindley, Clarke, Hutt, Robinson, & Wethli, 1973; Smith, 1973; Smith & Connolly, 1972, 1980; Whiting & Edwards, 1973).

These categorizations of play evolved in the West were often adopted by Asian scholars to study children's different forms of play. For instance, Lim and Honig (1997) applied Piaget's/Smilansky's and Parten's categorizations to measure Singapore preschool children's level of engagement in each type of play in their home and school contexts. They found that children engaged in more dramatic, associative, and cooperative play in school contexts than home contexts, and they engaged in more functional play and parallel play in home contexts than in school contexts. Similarly, Yang, Zou, and Bergen (1995) adapted Piaget's and Parten's categorizations to study Chinese and US preschool children's cognitive and social forms of play. They found that US children engaged in more practice, solitary, and parallel play than the Chinese, whereas Chinese children engaged in more symbolic, games with rules, associative, and cooperative play than the US. In a study designed to investigate Korean children's play complexity (e.g., parallel, parallel aware, and simple social play), Kim (2001) used Howes' Peer Play Scale (Howes & Matheson, 1992) to measure the complexity in class sizes of 20, 30, and 40 children. She found that there were no significant differences in play complexity across different class sizes. Although scholars across cultures found there were cultural differences in children's engagement in different types of play, Asian scholars often adapted Western categorizations of play to study the children in their culture. Therefore, this adaptation also provides a rationale to guide the researcher to adopt a Western categorization of play (cognitive forms of play and

rough-and-tumble play) to study Chinese and US preschool children's engagement in play in this study.

***Gender and play.*** Preschool-aged children's preferences to engage in a particular type of play reflects gender differences. Some researchers suggest that boys engage in more constructive play than girls (play with vehicles, blocks, and other construction materials), whereas girls engage in more fantasy play than boys (play with dolls and domestic materials) (Benjamin, 1932; Berenbaum, Martin, & Ruble, 2008; Eisenberg, Murray, & Hite, 1982; Fagot, 1974; Farrell, 1957; Fein, Johnson, Kosson, Stork, & Wasserman, 1975; Honzik, 1951; Ruble, Martin, & Berenbaum, 2006; Sutton-Smith, 1979a, 1979b; Tauber, 1979; Tizard, Philps, & Plewis, 1976). These gender differences are also reported by Chinese scholars in their study (Yu, Winter, & Xie, 2010). Children's different preferences in a particular type of play are often associated with their learning experiences about how to "behave, think, and feel" as "normal" males or females through interactions with parents, teachers, peers, and others around them in their own societies (Goble, Martin, Hanish, & Fabes, 2012; MacNaughton, 1997, p. 63). For instance, Chen and Rao (2011) discussed that teachers' interactions with children in Hong Kong's kindergartens in China often reflected their traditional beliefs about gender differences, and they found that the teachers often used gender labels, segregated boys and girls, and expected children to show "desirable classroom behaviors to gender groups" (p. 112). These beliefs about gender differences might explain one of their findings that Chinese boys in their study preferred masculine activity and girls preferred feminine activity (2011). Further, MacNaughton (1997) explored the effect of power relations in children's gender-typed play. She found that the block play area was often viewed as "masculinist" space in which boys often showed their power to dominate whom could access in this area. When this space is dominated by boys who often practiced their masculine

behaviors (e.g., physical or aggressive behaviors), girls preferred the fantasy play area which was often viewed as “feminine” space that they could dominate.

Moreover, previous research suggests that children’s play partners’ gender and their interactions with teachers also influenced children’s engagement in gender-typed play (e.g., masculine and feminine activities). Fabes, Martin, and Harnish (2003) found that girls who played with boys engaged in fewer feminine-related activities than the girls who played with a mixed-gender group, and the boys who played with girls engaged in more masculine-related activities than the boys who played with a mix-gender group. Further, teachers’ presence in children’s play areas also influenced children’s activity preferences (Oettingen, 1985; Tomes, 1995). Particularly, Goble, Martin, Hanish, and Fabes (2012) found that girls with teachers’ present in their play area engaged in fewer feminine and masculine activities than the girls who played alone, whereas boys who played in the presence of their teachers’ were engaged in more feminine and fewer masculine activities than the boys who played alone. These gender differences in a particular type of play could influence children’s different experiences of practicing the skills of cooperative problems solving.

### **Cooperative Problem Solving**

*Cooperative problem solving* can be viewed as a process in which two or more children work together by coordinating their individual perspectives and investigating new solutions to solve a shared problem (Ashley & Tomasello, 1998). Cooperative problem solving can be viewed as “an important subset” of *cooperation* which comprises a process that “two or more children coordinating their behavior in some mutually satisfying way” (p. 144). Particularly, cooperative problem solving often requires children to bring their solitary problem solving skills and their social skills for forming mutual goals and resolving conflicts together. Establishing

mutual goals is a complex process since it demands not only partners' mutual understanding about goals but also their mutual commitment to accomplish the goals (Ramani & Brownell, 2014). Normally, mutual goals can be achieved through verbal and nonverbal interactions (e.g., negotiation and establishing and maintaining mutual goals) with partners. Through appropriate interactions, children often understand each other's intention and modify their behaviors for achieving certain goals (Bjork-Willen, 2007; Brownell & Carriger, 1990; Eckerman & Didow, 1996; Pellegrini, 2009).

Preschool children's cooperative problem solving has been studied by many Western scholars, whereas only a few scholars in China have studied in this field. Similar to Ashley's and Tomasello's (1998) definition of cooperation, Chinese scholars also perceive that children need to engage in cooperative behaviors and verbal exchanges to accomplish a shared goal in the process of cooperation, and they believed that cooperative behaviors are comprised with various positive behaviors such as helping and sharing. For instance, Li, Zhang, and Dai (2000) used an experimental approach to investigate preschool children's levels of cooperation. They described cooperation as a process in which individuals coordinate their behaviors in order to accomplish a shared goal. Yu (2007) used an observational approach to investigate preschool children's different patterns of cooperative behaviors. Particularly, Yu used the term peer cooperation and described it as a process that two or more children coordinate their behaviors and ideas to accomplish a shared goal. Unlike the scholars noted above, Chen, Chen, Li, and Wang (2009) only defined cooperative behaviors operationally in order to measure the impact of behavioral inhibition on Chinese children's cooperative behaviors. They identified cooperative behaviors included (a) cooperation ("verbally or nonverbally agreeing to help, share, or play upon request of another child), (b) polite actions ("making a polite response [...] after receiving help," or

“saying sorry after accidentally knocking over another child’s castle”), and (c) friendly comments and behaviors (“compliments to another child or positive comments”) (p. 1696). In this study, the conceptual definitions of cooperative problem solving used by US and Chinese scholars share a similarity, whereas the operational definition is developed based on the data analysis of children’s behaviors in the Chinese and US preschools centers in order to identify the equivalent meaning of cooperative problem solving.

Conflicts and discussions that occur during cooperative problem solving are vital mechanisms for promoting children’s learning. Nevertheless, the efficiency of conflicts on cooperative problem solving may vary depending on children’s developmental status. Young children often reveal egocentric viewpoints that challenge them from considering the perspectives of others (Piaget, 1932). Young children may experience more difficulty negotiating a mutual goal or even agreeing upon a joint solution compared to older children because of their ongoing development in self-regulation, communication with others, and/or resolving conflicts (Azmitia, 1996; Azmitia & Perlmutter, 1989; Cannella, 1992). Thus, conflicts can be a distraction as well as an opportunity for preschool children’s development during cooperation (Kochanska, Coy, & Murray, 2001; Kopp, 1989; Ramani, Brownell, & Campbell, 2010).

Rather than learning from conflicts, preschool children are more likely to learn and solve problems through observational learning and guidance. Although preschool children may find it challenging to resolve conflicts independently, they do show an ability to assist less advanced peers, for instance, modeling a solution or offering guidance (Johnson-Pynn & Nisbet, 2002). In some joint cognitive activities, children aged three and four have been shown to help their less advanced partners through modeling or doing for them and even through giving simple information and directions to them (Musatti, Verba, & Mayer, 1994; Verba, 199). Meanwhile,



observing advanced partners allows less advanced peers to internalize learned problem solving strategies (Verba, 1998; Ramani & Brownell, 2014).

From a developmental perspective, it has been supported that children aged four and five do show cooperative problem solving behaviors (e.g., Ramani, 2012). Previous research of children's cooperative problem solving has often focused more heavily on elementary-aged children and young adults, with little research on preschool-aged children (e.g., Azmitia, 1988; Azmitia & Hesser, 1993; Duran & Gauvain, 1993). Nevertheless, researchers have found that preschool children show abilities to use problem solving strategies, that included attention directing, suggesting, explaining, and demonstrating during cooperation.

### **Children's Cooperative Problem Solving during Play**

The role of play in children's development of cooperative problem solving has been identified by many research studies focused on children's cooperative problem solving during play conducted in experimental settings (e.g., Bay-Hinitz, Peterson, & Quilitch, 1994; Caulfield, 2002; LeJuene, 1994; Liebenau, 1993; Ramani, 2012; Read, 1996; Verba, 1993; Vriens-van Hoogdalem, de Haan, & Boom, 2015; see Chapter 2). The experimental findings support that particular factors can influence children's cooperative behaviors, including cooperative games, play materials, play settings, and play spaces, as well as children's gender and age.

**Play-associated factors.** Bay-Hinitz, Peterson, and Quilitch (1994) and LeJuene (1994) asked teachers to implement designed, cooperative and competitive games in their classrooms, and they found that children who engaged in cooperative games showed more cooperative behaviors than children who engaged in competitive games. In the studies conducted by Caulfield (2002) and Liebenau (1993), they provided children different play materials (aggressive, nurturant, and neutral toys). Surprisingly, Caulfield found that children who played

with aggressive toys (war toys) presented more cooperative behaviors than the children who played with non-aggressive toys (e.g., pot, cooking spoon, and pan). Different with Caulfield's finding, Liebenau observed girls, and she found that the girls who played with aggressive toys (toy soldiers and Ninja Turtles) showed less cooperative behaviors than the girls who played with neutral toys. Also, the girls who played with neutral toys (puzzles) presented less cooperative behaviors than the girls who played with nurturant toys (animals or doctors' kits).

Further, Vriens-van Hoogdalem, de Haan, and Boom (2015) and Ramani (2012) found that children who were in free play or child-centered play settings showed more cooperative behaviors than the children who were in construction tasks or adult-directed settings. For instance, Vriens-van Hoogdalem, de Haan, and Boom found that children with high language abilities presented more complex cooperative behaviors in free play than in construction task settings. In Ramani's study (2012), she created child-centered play and adult-directed settings for children and measured their cooperative problem solving behaviors. She found that the children in the child-centered play settings presented more cooperative behaviors (suggestions, narration, agreements, observations, and imitations) than the children in the adult-directed settings. Different from other studies, Read (1996) investigated the impact of different play spaces on children's cooperative behaviors. She found that children demonstrated the highest level of cooperative behaviors in two of four room conditions (i.e., higher ceiling with one red wall and lower ceiling with all white walls). However, when the ceiling height and wall color were changed simultaneously, there were no measurable differences in children's cooperative behaviors. From these studies, it has been shown that the structure of play settings, the role of adults, and the physical attributes of play spaces influence children's cooperative behaviors.

**Gender differences.** Besides the impact of play-associated factors on children's cooperative problem solving, other studies have also investigated gender differences in cooperative behaviors during play. LeJuene (1994) and Caulfield (2002) found that there were no gender differences in the rates of cooperation during cooperative games and during engagement with aggressive toys. Similarly, Li, Zhang, and Dai (2000) did not identify significant gender differences in Chinese children's cooperation. In contrast, Read (1996) found that boys, overall, presented more cooperative behaviors than girls across different play spaces. Different to Read's findings, Chen, Chen, Li, and Wang (2009) found that girls presented more cooperative behaviors during free play in an experimental room than boys. The study of gender differences in children's cooperative problem solving have continually remained an important topic of investigation aimed at contributing new knowledge to the field of cross-cultural understandings in young children's play experiences.

**Age difference.** Children's age is also associated with children's cooperative problem solving. Read (1996) has shown that five-year-old children across different play spaces showed more cooperative behaviors than three-year old children. Ramani (2012) also revealed similar findings that five-year-old children showed more cooperative behaviors and communication than the four-year-olds, even though this finding was not statistically significant. From a developmental perspective, it has been suggested that as children become older, by the age of four or five, they start to show more complex cooperative problem solving skills such as planning and monitoring their behaviors (Li, Zhang, & Dai, 2000; Siegler & Jenkins, 1989).

### **Experimental Settings Versus Everyday Preschool Classroom Settings**

Previous experimental findings provide evidence that the types of games, play materials, play settings, and play spaces, as well as child gender and age do influence children's

cooperative problem solving during play. Often, the strengths of an experimental approach are acknowledged (e.g., identifying significant elements that influence children's behaviors); however, this approach is often criticized because "[...] the collateral learning, in such premature structuring of experimentation is a diminishing of the child's budding perception of self as a source of power and ability" (Cuffaro, 1995, p. 81). As Dewey (1958) described, children's continuity of play as well as cooperative problem solving in their everyday classrooms can better represent the wholeness where "every successive part flows freely, without seam and without unfilled blanks, into what ensues" (p. 36).

Routinely, preschool children spend a long period of time playing, learning, and socially interacting with peers and teachers in their classrooms in which the contexts are perceived as more complex and dynamic than experimental settings. Preschool classroom contexts are featured with "the process of exchange and negotiation – culture creating" among teachers and children (Bruner, 1986, p. 132; Martin, 2000). Teachers and children bring their "understandings, concepts, explanations, and interpretations to the classroom that result from their experiences in their homes, families, and community cultures" (Banks, 1993, p. 12). The critical role of the classroom context in children's cooperative problem solving should be appreciated since the "intellectual skills children acquire are directly related to how they interact with others in specific problem-solving environments" (Moll, 1990, p. 11). Particularly, teachers' decisions can potentially impact the type and range of play episodes, and thus influence children's development of skills and competencies including language development, problem solving, and social interactions (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997; Pellegrini & Gustafson, 2005).

In summary, from a theoretical perspective, there is a value in understanding children's developmental characteristics of cooperative problem solving during play, particularly in their everyday classroom contexts (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997; Piaget, 1950, 1983; Vygotsky, 1978). Different classroom settings comprise a variety of opportunities for children's play episodes, and the settings impact children's engagement in and development of cooperative problem solving. Sociocultural and cognitive developmental theories provide a strong theoretical foundation to explain how play affects children's development of cooperative problem solving. From a developmental perspective, preschool children show different patterns of engagement in various types of play as well as their abilities to cooperate with peers to solve a shared problem. However, previous research focused on the study of children's cooperative problem solving during play has typically been conducted in an experimental setting and only in Western cultures. Therefore, there is a need for a cross-cultural study that is designed to investigate children's cooperative problem solving during play in their everyday classrooms.

### **Methodology**

The purpose of this cross-cultural study is to investigate four- and five-year-old children's cooperative problem solving during play in US and Chinese preschool classroom contexts. Two primary research questions guided the study and include:

1. What are the variations in the incidence of play (functional, constructive, fantasy, games with rules, and rough-and-tumble play) across gender and age (four- and five-year-olds) in two cultural contexts?
2. What variations of cooperative problem solving behaviors do children exhibit during play across gender and age in two cultural contexts?

One kindergarten located in the Northeast region of China and one preschool center located in the Southeastern region of the US participated in this study, and they were all in the urban areas. Directors in two centers both supported that the researcher could conduct her research at their sites. This study has the approval of the Institutional Review Board (IRB) that regulates all research activities involving human subjects on the University of Tennessee Knoxville campus. Since conducting research in a private kindergarten in the Northeast region of China only requires the approval of the kindergarten director, all research activities in China adhered to the protocol in the US. Pseudonyms are used for all participants and places.

### **Context**

The Chinese kindergarten is a private kindergarten located in the Northeast region of China. The kindergarten is affiliated with a private university that provides pedagogy courses for university students. The kindergarten seeks to provide child-centered education for children's learning and development across three programs that serve toddlers, preschoolers, and kindergarten aged children ( $n = 50$ ). Among the programs, there are two classrooms that include children between four and five years of age ( $n = 40$ ). Most of the children are from middle socioeconomic status (SES) families.

Similarly, the US preschool is a university laboratory school located in the Southeastern region of the US. This preschool is a site for researchers and students to study children's development and teaching practices of student teachers and professional teachers. The preschool includes four programs for infants, toddlers, preschoolers, and kindergarten aged children ( $n = 115$ ). Among the programs, there are three preschool classrooms and one kindergarten that primarily include children between four and five years of age ( $n = 46$ ). This center mainly serves

children from middle SES families. The images of the preschool classroom settings are included (see Figure 3.1 & Figure 3.2).



*Figure 3.1. Chinese kindergarten classrooms*



*Figure 3.2. US preschool classrooms*

## **Participants**

Originally, 43 children aged three to five years of age and their teachers ( $n = 7$ ) participated in the study. Among them, a sub-sample of 16, four- and five-year-old children from two centers were included in this analysis, as the scope of analysis for the entire data set was beyond the scope and timeframe for this manuscript. The experiences of these children are the focus of this manuscript.

**Sample.** The sampling method comprised two stages – convenience sampling and stratified sampling. The sample of 43 children was generated using a convenience sampling technique. Out of a total of 86 eligible children, 43 families agreed to participate in China and in the US. This group of children ranged in age from three to five, had parental consent to participate, and were enrolled in the selected schools in China and the US. Convenience

sampling was used due to the difficulty of recruiting participants from different countries. After multiple attempts of reaching out to different directors in Chinese kindergartens and a director in the US preschool center, only one Chinese director in a private kindergarten as well as one US director in a university laboratory preschool agreed to participate.

Among the 43 children, the sub-sample (n=16) was generated through a stratified sampling process. Specifically, 43 focal children were grouped into four different age ranges (see Table 3.1).

Table 3.1

*The Distribution of Children by Age, Gender, and Nation (n = 43)*

Child Participants	Age Range (Months)			
	36 < Age < 48	48 < Age < 55	55 < Age < 60	60 < Age < 72
Chinese Boys	3	0	4	3
Chinese Girls	1	0	4	10
US Boys	0	5	4	1
US Girls	0	3	4	1

Across different age ranges, only children whose ages ranged from 55 months to 60 months were equally distributed by gender as well as cultural setting. There were four children in each group (gender × cultural setting), and 16 children overall. Hence, the subsample (n = 16) was treated as a focus of this study.

A statistical power analysis (Cohen, 1988) was conducted. A sample size of eight children per group were used in order to test a medium effect size ( $d = .50$ ), with  $\alpha = .05$ , two-tailed, and power = .15. For a t-test for two independent groups, a medium effect size implies that there is 15% probability of correctly rejecting the null hypothesis, that is there is no



difference in mean of children's cooperative problem solving frequencies between the Chinese kindergarten and US preschool (Cohen, 1988, p. 30).

**Participants' demographic information.** Among the 16 children, eight children were from two different preschool classrooms in the Chinese kindergarten, and eight children were from three different preschool classrooms in the US preschool. Moreover, gender was normally distributed, with eight boys ( $n_{\text{China}} = 4$ ;  $n_{\text{US}} = 4$ ) and eight girls ( $n_{\text{China}} = 4$ ;  $n_{\text{US}} = 4$ ). Among the teachers, there were three Chinese teachers from two different classrooms, and three US teachers from three different classrooms. Particularly for the Chinese teachers, three of the four teachers were demonstration (master) teachers for eight Chinese children, and the other one was the demonstration teacher for the children who were three years old. Since this study focused on four- and five-year-old children, three demonstration teachers in China are included.

Children's demographic information (see Table 3.2) as well as teachers' (see Table 3.3) were collected with their consents.

Table 3.2

*Children's Demographic Information (n = 16)*

Country	Age Range (Months)	Gender	Race/ Ethnicity	First Language	Parent's Education Level	Parent's Marriage Status	Parental Social Status
China (n = 8)	55 - 60	50% Male; 50% Female	87.5% Han; 12.5% Man	100% Chinese	62.5% Bachelor's; 25% High School; 12.5% Middle School	100% Married	100% Middle Class
The US (n = 8)	55 - 60	50% Male; 50% Female	75% European-American; 12.5% African-American; 12.5% Inter-racial	75% English; 25% Bilingual	62.5% Ph.D.; 25% Master's; 12.5% Bachelor's	87.5% Married; 12.5% Domestic Partners	87.5% Middle Class; 12.5% Upper-Middle Class

Table 3.3

*Teachers' Demographic Information (n = 6)*

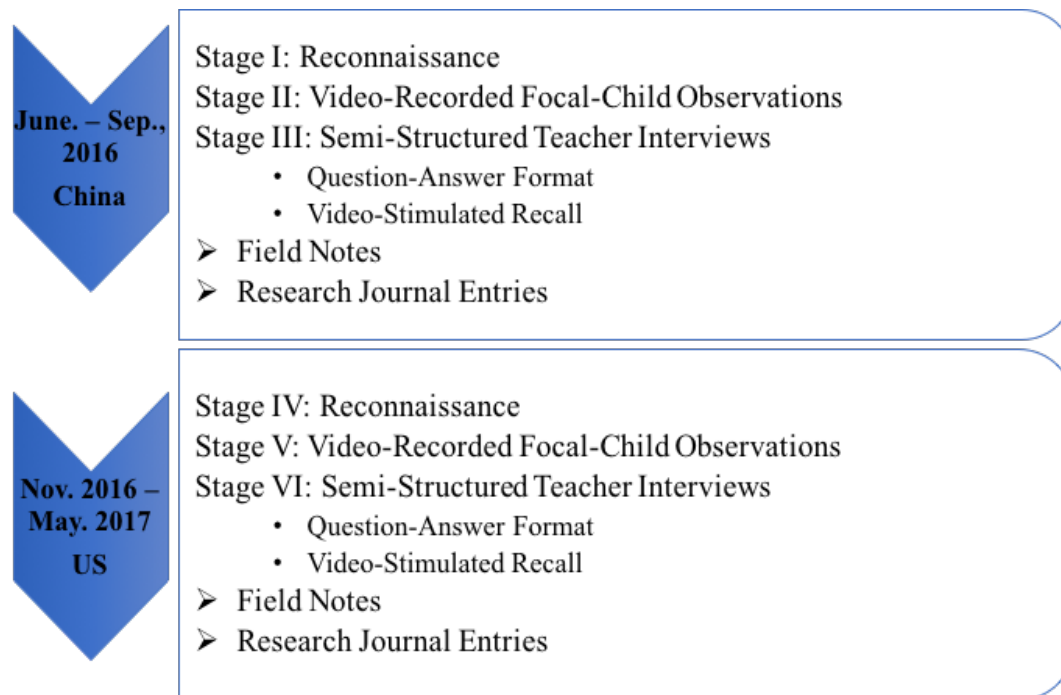
Country	Pseudonym	Age	Race/ Ethnicity	Educational Level	Years of Experience	Children's Age Range for Teaching
China	Melanie	43	Han	Undergraduate	23	2 - 6
	Hazel	26	Han	Junior College	4	3 - 5
	Bella	29	Han	Junior College	10	2 - 5
The US	Annabelle	31	European- American	Master's	10	3 - 6
	Reagan	28	European- American	Bachelor's	5	2 - 5
	Savannah	45	European- American	Bachelor's	20+	3 - 5

According to Chinese parents' reports, all parents were married, and all children were from middle-class families. Except for one child who was identified as a national minority, the remaining children were identified as Han ethnicity (majority population in China). Most Chinese parents graduated from a four-year institution, and some graduated from a high school or a middle school. According to US parents' reports, the majority of parents were married, and one parent was identified as a domestic partner. Also, most children were from middle-class families, with one child from an upper-middle-class family. Meanwhile, one child was identified as African-American; one child as Inter-racial; and the remaining children as European-American. The majority of the parents had either a Ph.D. or Master's degree, and one parent had a Bachelor's degree. Most US parents' level of education was higher than the Chinese parents, and this phenomenon is compatible with their national characteristics in higher education. The US Census Bureau reported that around 46.5 million people had a Bachelor's and 25.7 million had higher degrees in the US in 2015. Different from the US, the Chinese National Data reported that around 3.6 million people had a Bachelor's degree and .55 million had higher degrees in

2015 (National Bureau of Statistics of China, 2015). These numbers reveal that, generally, people in the US were more likely to attend higher education than the people in China. With respect to each national profile regarding educational attainment, parental educational levels between two school contexts appear equivalent as they reflect the domestic educational attainment trends.

## Research Design

This research design comprised a four-month field work in the Chinese kindergarten followed by a six-month field work in the US preschool center with the integration of ethnographic informed focal-child observations and video-stimulated recall teacher interviews (see Figure 3.3).



*Figure 3.3.* The research procedure between June 2016 and April 2017.

The research process in the two cultural contexts was equivalent. Equivalency in cross-cultural research is desirable rather than replicating a study from one cultural setting to another, with little sensitivity to potential cultural differences (Adler, 1983; Nasif, Al-Daeaj, Ebrahimi, & Thibodeaux, 1991). With the consideration of diverse factors (e.g., geography, time differences, and cultural values and beliefs), some adjustments were needed in order to better represent the cultural norms in China and the US. The procedure comprised three major stages in each context that included: (a) reconnaissance (Wolcott, 1999), (b) video-recorded focal-child observations, and (c) semi-structured teacher interviews. Three major stages were completed in the Chinese kindergarten first, and then they were equivalently conducted in the US preschool center. In other words, while the general stages were similar between the Chinese kindergarten and US preschool center, appropriate adjustments needed to be made to respond to the different play contexts and timelines that reflected each cultural, pedagogical norms, and physical setting characteristics. For example, unlike in the US preschool in which children often engaged in water play in their classrooms, Chinese children's water play was arranged on an adjacent, outdoor patio. This arrangement was made by the kindergarten director in consideration for children's safety and health. The director explained that if children had water play in the classroom, there was a potential risk for children to slip on the wet floor. Besides the concern for children's safety, there were no pedagogical beliefs that informed this decision. Therefore, Chinese children's water play in the outdoors was observed with the consideration of equivalent observations that occurred inside US preschool classrooms.

In this study, video-recorded focal-child observation was the major approach for data collection. Video is often viewed as a powerful research tool to investigate cultural aspects of people's everyday lives, and it is an "efficient way of telling a story (a picture is worth a

thousand words) and its utility as a data-recording tool (providing opportunities for multiple coding, slowing down action, etc.)” (Tobin & Hsueh, 2014, p. 90). Through sharing ethnographic studies in Chinese, Japanese, and US preschools (e.g., Tobin, Wu, & Davidson, 1989), Tobin and Hsueh advocated that the video could also be a pleasurable, aesthetic, and attractive method for both the researcher and the researched (e.g., teachers and children) (p. 90 – 91). Hence, specific research procedures in Stages I, II, IV, and V are explained in this study, and only the data from Stage II (Chinese children) & V (US children) are analyzed.

**Stage I: Reconnaissance.** In the initial phase of this project, the researcher spent two months in the Chinese kindergarten conducting a reconnaissance. In an unfamiliar research context, the act of reconnaissance allows the researcher to be on a course to understand the kindergarten context, children and teachers in that context, and their daily routines and program. This phase also allowed the researcher to build a trusting relationship with children and teachers before the beginning of data collection (Wolcott, 1999). Further, the researcher regularly made herself present in the classrooms with video cameras not only for her to be comfortable with video recording but also to familiarize children, teachers and parents with the presence of the camera.

**Stage II: Video-recorded focal-child observations.** All observations took place in children’s classrooms except for the observation of their water play which occurred in outdoor patio. Except for this water play, children’s outdoor play as well as their snack time, toilet time, nap time, and teacher-directed activities were not recorded.

Focal-child observations progressed across 23 school days from August to September 2016. Four Chinese children were video recorded per day for 15 minutes (on average), each, until 60-minutes of recording per child was obtained. The sequence of observing children was

determined based on their alphabetical order of their first names. The first four focal children were videoed for 15 minutes each day when they played with peers. For instance, when a focal child started playing with materials next to his/her peers, the researcher video recorded. Across four or more days, the sequence of videoing four children was rotated. For instance, if Jack (pseudonyms are used for all participants) was observed first on the first day, he was observed second on the second day. If Lily was observed last on the first day, she was observed first on the second day. There were four conditions in which observations could not be accomplished. These included (a) focal children's absences from school, (b) no engagement in play with peers or no play time on some school days, (c) national holidays that required the school to be closed, and (d) the researcher's illness on a particular day. Due to these conditions, the observational sequence was adjusted in order to be flexible to record a variety of children's experiences and behaviors at different points in time.

During the observations, there were particular situations when the researcher started and stopped video recording. Video recording started when a focal child (a) entered a play area, (b) engaged in free play with one or more peers in the same play area, (c) engaged in free play with peers even when a teacher joined them to observe or provide only minimal instruction, and (d) when a child moved from one play area to another. On the other hand, video recording stopped when focal children (a) moved into a structured setting (e.g., teacher-directed instructions or large group activities), (b) played alone in one play area for more than one minute, (c) approached a teacher and asked to be involved in a teacher directed activity (e.g., read a book, teacher lead circle time, etc.), and (d) were involved in snack, toileting, napping, or outdoor free play.

**Stage IV: Reconnaissance.** Equivalent to the procedure in Stage I, the researcher spent around one month conducting a reconnaissance in the US preschool center beginning in November 2016. The researcher had previous experiences conducting child observations and teacher interviews in this context; hence, the process of reconnaissance in the US preschool did not take as long as the process in the Chinese kindergarten (four months).

**Stage V: Video-recorded focal-child observations.** The procedure of observing US focal children was equivalent to the procedures in Stage II (i.e., observational time for each focal child, the sequence of observation, four conditions for no observations, and situations of starting and stopping the video recording). The only differences were (a) the duration of the entire observations and (b) the exclusion of the reading/book area. Focal-child observations in the US preschool spanned 19 school days from December 2016 to March 2017. Because the total number of US children was fewer than the Chinese numbers, the entire observational period in the US preschool was shorter than the period in the Chinese kindergarten. In classrooms, children were free to choose particular play areas that they wanted to go to, and one was the reading area. Based on the experience of reconnaissance in their classrooms, children in this area did not engage in much play but rather asked teachers to read books with them. Hence, focal children's behaviors were not video recorded when they were in the reading area.

### **Data Sources**

Across the six stages of the research design, focal children's first 60-minutes of video footage served as the primary data source, supplemented with the researcher's field notes and research journals entries.

**Focal-child video records.** Originally, each focal child was observed until 60-minutes of recording for each child was completed. During observations, other child participants often

appeared in the video recording as they played with the focal child. This resulted in those children having a total recorded range of time from 60- to 150-minute long. For this study's purpose, 16 focal children's first 60-minute footage was used for the analysis. Hence, a total of 960-minutes of children's video footage is the primary data source for this study.

**Field notes.** In the process of reconnaissance and focal child observations, field notes were recorded in a notebook first and then copied and typed into the researcher's personal computer. There were 57 records of field notes in total, and each note included (1) descriptive, (2) methodological, and (3) analytic notes (Bernard, 2006). The descriptive notes comprised the comments regarding particular aspects of the physical settings (e.g., the number of people in a classroom and class routines). The methodological aspects included participants' reactivity to the observer, challenges of observing, the time and reason for stopping an observation, and ethical dilemmas. The analytic notes included daily impressions or assumptions that emerged during and after each observation and follow-up questions that needed to be investigated (Lincoln & Guba, 1985). These field notes were treated as secondary data to supplement explanations of what potential factors or situations may have contributed to children's variations in the incidence of play and cooperative problem solving.

**Research journal entries.** Across the process of each reconnaissance, focal-child observations, and teacher interviews, 74 research journal entries were recorded in a word document that was stored on researcher's personal computer. The journal entries included the researcher's "presuppositions, choices, experiences, and actions during the research process" (Mruck & Breuer, 2003, p. 3). Particularly, the journal entries allowed the researcher to record a) the events she experienced throughout the process, b) her feelings and thoughts from the events, and c) reflections on her evolving subjectivity (Lincoln & Guba, 1985). Researchers often bring



their subjectivities to a research field site consciously and unconsciously, which may influence the quality of their investigation (Peshkin, 1988). One's subjectivity is "an amalgam of the persuasions that stem from the circumstances of one's class, statuses, and values interacting with particulars of one's object of investigation" (p. 116). Rather than trying to ignore the subjectivity, constantly being engaged in critical self-reflexivity helps the researcher acknowledge and attempt to account for her subjectivity as it relates to the potential impact on her research field and data collection process (Crossman, 2014).

### **The Role of Researcher**

In this study, the researcher's subjectivity (researcher identity and educational background) reflects on the research preparation, cross-cultural methodological decisions, and the role of participant observations. Being an individual who is a Korean ethnic with Chinese nationality, the researcher experienced dual cultures throughout her first 23 years of life, immersed in both Korean and Chinese cultures. She was born in a traditional Korean family that is different from the families in South or North Korea since her family members could speak and write both Korean and Chinese, fluently. She received a Korean-centered education from kindergarten to high school. Usually, 98% of teachers in schools were Korean ethnic, and they taught and interacted with children in Korea. For most of her generation, they learned Chinese as a second language and English or Japanese as a third language. When she was in elementary school, she chose English as her third language. Besides school experiences, living in a hybrid community including both Korean and Han (known as Native Chinese) ethnic allowed her to become exposed to Chinese culture such as their language, customs, music, movies, clothing, food, etc. Living and growing up in a dual cultural context provided her an environment in which she could learn and experience similarities and differences between two cultures' values and

practices. Pondering her living and learning experiences has prompted her to believe in the vital role of cultural contexts in children's learning and development.

Most recently, in the Department of Child and Family Studies, she conceptualized her current study while enrolled in her advisor's cross-cultural methods in early education course. During the course, she had an opportunity to work with a Turkish research partner, and they had a similar research interest focused on preschool children's cognitive development. Through multiple discussions, they designed a cross-cultural study, *Preschool Children's Problem Solving Skills in Different School Contexts: Turkey and the U. S.* Also, the researcher planned to conduct the study in 2016. However, she had to change her initial research site from a Turkish to a Chinese kindergarten, instead, due to the unstable political context in Turkey. Nonetheless, the experience of working with a partner from another country was most valuable, and the researcher had a better understanding of Turkish culture and how to conduct a cross-cultural study with a Turkish research partner.

Based on her dual cultural living and exposure to a cross-cultural research experience, the researcher was uniquely prepared to conduct this cross-cultural study. Particularly, she was poised to (a) be sensitive to the similarities and differences between Chinese and US cultures, (b) be able to interact with insiders in each culture, and (c) be able to take both insider and outsider's perspectives to understand the phenomenon of young children's cooperative problem solving.

**The role of participant observer.** In this study, the researcher assumed the role of a participant observer. The researcher conducted participant observations through being present in everyday classroom contexts that promoted the researcher's "awareness and curiosity about the interactions taking place around" the researcher (Glesne & Peshkin, 1991, p. 54). While observing and videoing focal children, the researcher viewed herself as an observer in the

classroom. She was regularly present in the classroom and became familiar with the classroom context with minimal disturbance to children's daily activities. In this study, she not only observed children's play and cooperative problem solving behaviors but also attempted to uncover the influences of different cultural contexts by situating herself in the contexts and interacting with teachers directly. Being a participant observer allowed the researcher to (1) observe and video children's behaviors that were hard to see by outsiders, (2) interact with teachers to better understand their cultural and pedagogical beliefs, (3) better understand classroom contexts, and (4) become sensitive to the "natives' culture" as she worked to analyze and interpret the data (Guest, Namey, & Mitchell, 2013, p. 79).

### **Data Analysis**

The process of data analysis comprised four phases that included (a) developing a coding system, (b) coding children's behaviors in their videos, (c) quantitatively analyzing the behaviors using the Principal Component Analyses (PCA), and measures of Multivariate Analysis of Variance (MANOVA) and Analysis of Variance (ANOVA), and (d) qualitatively analyzing the records of field notes and research journals using the qualitative content analysis (Hsieh & Shannon, 2005).

**Phase I: The development of the coding system.** The coding system of children's play and cooperative problem solving was developed through (a) referencing Smilansky's (1968) classification of play, Pellegrini's (1987) definition of rough-and-tumble play, and Ramani's (2012) framework of coding children's cooperative problem solving, (b) using these references as a guide to micro-analyze seven children's 60-minute footage (see Appendix C), (c) reframing the codes that were more relevant to focal children's behaviors, situated in this study contexts,

and (d) developing a coding book and coding sheet to analyze children's types of play and cooperative problem solving.

**Types of play.** Smilansky's (1968) and Pellegrini's (1987) research guided the researcher to differentiate each type of play from others and identify the play in seven children's footage. Among the seven, four were Chinese and three were US. These children were selected for the micro-analysis due to their high level of engagement in play as well as cooperative problem solving, and their frequent engagements were also reflected in the researcher's field notes. Through the micro-analysis of children's footage, the codes of children's types of play were developed (see Table 3.4)

Table 3.4

*The Descriptions of Types of Play*

Types of Play	Definition	Examples
Functional Play <sup>1</sup>	A child mainly shows his/her physical movements with/without objects in no goal-oriented way.	<ul style="list-style-type: none"> <li>• A child jumps (while holding papers/blocks/others).</li> <li>• A child runs (while holding papers/blocks/others).</li> </ul>
Constructive Play <sup>1</sup>	A child uses objects to organize/make something or draw something in a goal-oriented way.	<ul style="list-style-type: none"> <li>• A child is building a house with blocks.</li> <li>• A child is drawing a flower.</li> </ul>
Fantasy Play <sup>1</sup>	A child engages in role-play or make-believe play.	<ul style="list-style-type: none"> <li>• A child pretends he/she is a dad/mom.</li> <li>• A child pretends a block as a sword.</li> </ul>
Games with Rules <sup>1</sup>	A child plays games with peers following implicit or negotiated rules.	<ul style="list-style-type: none"> <li>• A child talks with a peer game rules before or during play.</li> </ul>
Rough-and-Tumble Play <sup>2</sup>	A child engages in play fighting or chasing/fleeing that are playful and nonaggressive.	<ul style="list-style-type: none"> <li>• A child wrestles/tumbles with a peer without hurting each other.</li> <li>• A child chases/flees a peer.</li> <li>• A child pushes a peer with a mattress, and they laugh/smile.</li> </ul>

*Note.* <sup>1</sup>The descriptions of the Functional Play, Constructive Play, Fantasy Play, and Games with Rules were adapted from Smilansky's work (1968), and <sup>2</sup>the description of Rough-and-Tumble Play was adapted from Pellegrini's work (1987).

***Cooperative problem solving.*** Ramani's (2012) framework of cooperative problem solving informed the researcher's identification of particular behaviors of cooperative problem solving during play. With this framework, the researcher micro-analyzed seven children's footage and developed her own coding system. The rationale for using her framework includes (a) same age range of child participants (four- and five-year-olds) and (b) similar research focus that studied children's cooperative problem solving in a playful, child-directed activity in an experimental setting. In her study, Ramani distinguished children's cooperative problem solving into two macro-level behaviors – cooperative behaviors and communication that included a certain number of micro-level behaviors (see Table 3.5). Further, Ramani (2012) created five composites with an integration of the micro-level behaviors, that included (a) cooperative interaction (asking questions, explanations, attention directing, and physical demonstration), (b) joint communication (suggestions, narration, and agreements), (c) shared task responsibility (coordinated action, negotiation, and dividing labor), (d) observational learning (observation and imitation), and (e) unproductive behavior and communication (controlling, disagreements, and verbalization to experimenter).

Through the micro-analysis of children's footage, the researcher developed her own coding system that was used for the final coding for this study (see Table 3.6).

The description of types of play as well as cooperative problem solving were used to create a coding book (see Appendix D) and check-mark coding sheet (see Appendix E) for the second phase of the study.

Table 3.5

*Ramani's Framework of Cooperative Problem Solving*

Macro-Level Behaviors	Micro-Level Behaviors	Descriptions
Cooperative Behaviors	Demonstration	Children's physical movements that show how to do something
	Imitation	Children look at their peer(s) and model the same action while working on a task
	Controlling	Children "physically controls or blocks peer's action"
	Coordinated Action	The amount of time that children spend on coordinating an activity or assisting a "peer through physical movements"
	Observation	The amount of time that children spend in observing peers without simultaneous physical movements.
Communication	Attention Directing	Children "direct peer's attention or tells peer what to do (e.g., "Look," while pointing to a block or "Don't do it that way")"
	Asking Questions	Children ask a "peer a task-related question"
	Dividing Labor	Children divide "work or assign complementary roles (e.g., child assigns a peer to build rooms while the child builds walls)"
	Explanations	Children "explain [their] own actions (e.g., "I need to build the walls higher to keep out the witch")"
	Narration	Children describe "what something is or what is happening (e.g., [As] holding a block, children announce, "here's the door")"
	Negotiation	Children discuss about "problem solving strategy or aspect of a task that ends with mutual agreement.
	Suggestions	Children give a "suggestion or an idea that involves the possibility of accomplishing task-related goals or changing (starting/stopping) a state (e.g., "Let's make the door here")"
	Agreements	Children make "statement of acceptance or agreement in response to peer's action, statement, or question"
	Disagreement	Children make "statement of opposition, protest, or retaliation in response to peer's action, statement, or question"
	Verbalization to Experimenter	Children direct "help-seeking statements, questions, or gestures to teacher"

*Note.* Each description of the behavior was obtained from Ramani (2012) study.

Table 3.6

*The Descriptions of Children's Cooperative Problem Solving Behaviors*

Behaviors	Descriptions
Physical Demonstration	Child's physical movements that show how to do something.
Imitation	<p>A child looks at their peers and models the same action while working on a task. A child looks at peers' constructions/buildings and makes the same ones.</p> <p>A child models the same words after peers have said.</p> <p>A child follows a pattern as peers have said.</p>
Constraint	<p>A child physically controls or blocks peer's actions.</p> <p>A child verbally controls peer's actions.</p> <p>A child shouts at a peer to stop peer's behaviors.</p> <p>A child compels a peer to protect his/her toys in his/her absence.</p>
Coordinated Action	A child coordinates an activity or assists a peer through physical movements (e.g. hands-on supports or assists).
Observation	A child observes peers without simultaneous physical movements.
Direct Attention	<p>A child directs peer's attention by pointing at/showing/picking up something.</p> <p>A child directs peer's attention by calling peer's name or saying something.</p> <p>A child grabs peer's attention by making a funny/silly sound.</p>
Divide Labor	A child divides works for a peer and him/her.
Assign Roles	A child assigns different roles to children such as mom, dad, baby, etc.
Ask Question	<p>A child asks a peer a question that she/he does not have answers.</p> <p>A child asks a peer a question that she/he has answers.</p>
Explanation	<p>A child explains the reasons for his/her actions. A child explains why he/she is doing/thinking in a particular way.</p> <p>A child assumes something may have happened.</p> <p>A child explains a peer how to do something.</p> <p>A child responds to peer's open-ended questions.</p> <p>A child explains a rule to a peer what or how he/she should do or act in a particular way.</p>
Narration	<p>A child describes what something is or what is happening with/without verbal exchanges.</p> <p>A child describes his/her previous experiences.</p> <p>A child describes peers' actions/materials/works.</p> <p>A child describes her desire/need.</p>
Discuss Strategies	A child discusses problem solving strategy or aspect of a task that ends with mutual agreement.

Table 3.6 Continued

Behaviors	Descriptions
Provide Remedy	A child provides a remedy for resolving a problem/conflict.
Persuasive Suggestion*	A child works to convince a peer to do something. A child gives a suggestion or offers an idea to peers that involves the possibility of accomplishing task-related goals or changing (starting/stopping) a state.
Agreement*	A child makes gestures/motions as an acceptance or agreement in response peer's action, statement, or question. A child makes a statement of acceptance or agreement in response peer's action, statement, or fixed question.
Disagreement*	A child makes a gesture/motion as an opposition, protest, or retaliation in response to peer's action, statement, or question. A child makes a statement of opposition, protest, or retaliation in response to peer's action, statement, or question
Verbalize to Teacher	A child directs help-seeking statements and asks questions.

*Note.* \* means that the description of the behavior references Ramani's (2012) work.

**Phase II: The procedure of coding.** Before actual coding, practice coding was conducted from April to June 2017 in order to measure inter-observer reliability. The media play software, QuickTime Player was used to play and stop children's footage. With the random selection of a child (Huck) among the Chinese children, his last 15-minutes of footage was selected from his 150-minute long video. Two observers (including the researcher) who fluently spoke Chinese practiced coding. Each observer observed a 15-second footage and then paused and marked the observed behaviors for 10 seconds. If the same behavior occurred multiple times in one 15-second interval, it was marked once as a one-time occurrence. While practicing coding, observers were allowed to rewind the footage. This process of coding continued until Huck's 15-minute footage was completed. The observers practiced coding, and they achieved between 88% and 100% agreements on all codes as well as 85% Cohen's kappa on average. Similarly, William was randomly selected from the US children, and his last 15-minutes of footage was selected from his 109-minute long video. Two observers (including the researcher)



who fluently spoke English practiced coding, and they achieved between 77% and 100% agreements on all codes as well as 71.43% Cohen's kappa in average. The kappa of 85% was in the "very good" range of reliability, between 81% and 100%, and the kappa of 71% was in the "good" range, between 61% and 80% (Altman, 1999; Cohen, 1960; Landis & Koch, 1977). Therefore, the observers initiated actual coding.

The researcher was the only observer who completed coding of all 16 children's footage. This process was similar to the process of practice coding, and it continued from June to September 2017. For each child's 60-minute footage, the researcher watched a 15-second footage and then paused and coded for 10 seconds. She maintained this process until all coding was completed. The researcher took a break after each 15-minute block of coding in order to decrease bias caused by fatigue.

Besides the researcher, one observer in China coded approximately 20% of Chinese children's footage (1 hour and 30 minutes), and another observer in the US coded close to 9% of US children's footage (42 minutes). These footages were randomly selected by the researcher using the Random Formula function in the Microsoft Excel, and each child had their own randomly selected possibilities. These possibilities were sorted from highest to lowest values, and two children in each group with lowest values of possibility were chosen. The observers followed a similar procedure of coding as the researcher, whereas the only difference was that they were allowed to rewind the footage due to their unfamiliarity with child participants. This decision was also made with the consideration of the quality of audio. The children were not required to wear external microphones on their bodies, and when there was loud noise around them, observers often had a hard time recognizing the focal child's voice as well as their conversations with peers. Children's verbal interactions are one of the important foci of coding;

thus, observers were permitted to rewind the footage when they could not clearly hear children's words or sentences. The percentages of agreement on coding Chinese children's footages were calculated, and the agreement on each code ranged from 88% to 100% with an average of 83% Cohen's kappa. On the other hand, the percentages of agreement on coding US children's footages were also calculated, and the agreement on each code ranged from 85 % to 100% with an average of 86% Cohen's kappa.

**Phase III: Quantitative analysis.** Descriptive analysis, Principal Component Analysis (PCA), and measures of MANOVAs as well as ANOVAs were conducted using the statistical analysis software, SPSS 24.

**Descriptive analysis.** The means and standard deviations as well as correlations for the types of play were analyzed with only the means and standard deviations for cooperative problem solving behaviors. The mean and standard deviation of durations for each type of play between the two cultures are presented (see Table 3.7)

There were similar and different patterns in engagement in particular types of play. Neither Chinese nor US children engaged in games with rules; hence, this type of play was excluded from further analysis. Chinese children often engaged in constructive play ( $M = 59.969$ ,  $SD = .088$ ) with little engagement in fantasy play ( $M = .031$ ,  $SD = .088$ ); they did not engage in functional play or rough-and-tumble play. For the US children, they also often engaged in constructive play ( $M = 43.516$ ,  $SD = 16.905$ ) with occasional engagements in fantasy play ( $M = 16.141$ ,  $SD = 16.879$ ), functional play ( $M = .188$ ,  $SD = .40$ ), and rough-and-tumble play ( $M = .156$ ,  $SD = .174$ ).

Table 3.7

*Descriptive Analysis of Children's Types of Play*

Nation		N	Mean	Std. Deviation	Min	Max
China	Functional Play	8	0	0	0	0
	Constructive Play		59.969	.088	59.750	60.000
	Fantasy Play		.031	.088	0	.250
	RT Play		0	0	0	0
	Game with Rules		0	0	0	0
US	Functional Play	8	.188	.401	0	1.125
	Constructive Play		43.516	16.905	13.750	60.000
	Fantasy Play		16.141	16.879	0	46.000
	RT Play		.156	.174	0	.375
	Game with Rules		0	0	0	0

*Note.* The mean represents the average minutes that children engaged in each type of play. RT represents Rough-and-Tumble play.

Pearson correlation was used to analyze the correlations of types of play. The correlations among functional play, fantasy play, and rough-and-tumble play were smaller than .90.

However, the correlation between fantasy play and constructive play was significantly greater than .90 ( $r = -.94, p < .01$ ), which would be an issue of multicollinearity for MANOVA, requiring a separate analysis with ANOVA for constructive play (see Table 3.8).

The children in two cultures showed various behaviors of cooperative problem solving, except one, dividing labor (see Figure 3.4); hence, dividing labor was excluded from further analysis.

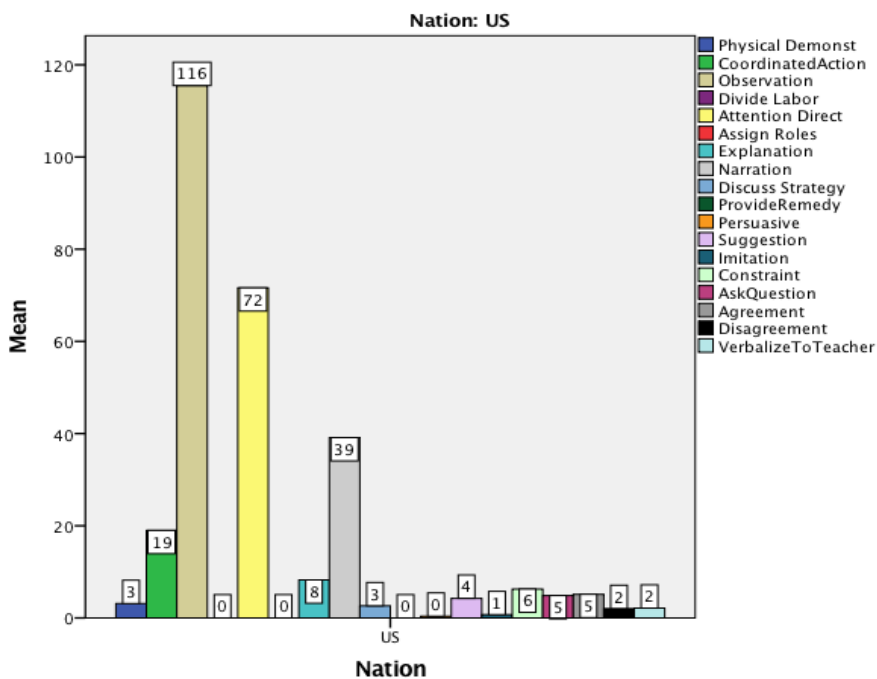
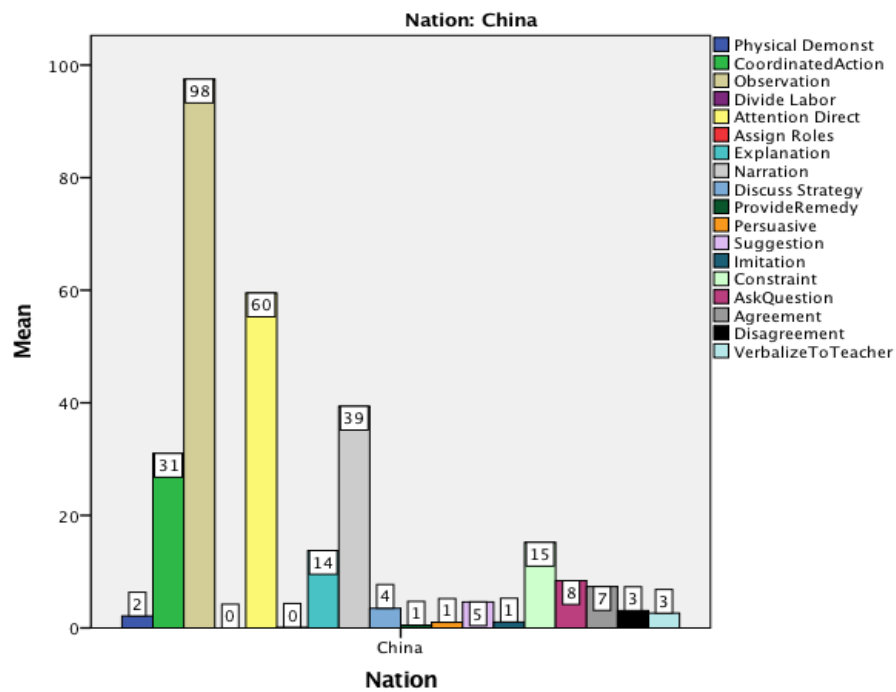
Table 3.8

*Correlations between Four Types of Play*

	Functional Play	Constructive Play	Fantasy Play	RT Play
Functional Play	1			
Constructive Play	-.03	1		
Fantasy Play	.19	-.94**	1	
RT Play	.66**	-.71**	.77**	1

*Note.* \*\* Correlation is significant at the 0.01 level (2-tailed). RT play represents rough-and-tumble play.

**Principal component analysis.** Besides the descriptive analysis, the PCA was conducted as an explorative analysis to group similar behaviors of cooperative problem solving into dimensions, and then descriptive analysis was used to examine the means and standard deviations as well as correlations for the accumulated variables of cooperative problem solving. Often, PCA requires large sample sizes for a reliable result. Although this study sample size is small, PCA was conducted for an analysis with a caution of interpreting the results. The PCA was run on 17 observed behaviors that measured cooperative problem solving on 16 children. Kaiser-Meyer-Olkin (KMO) and Bartlett's Test were applied in order to test sampling adequacy. In other words, to test whether it was appropriate to run a PCA on the data. However, SPSS could not provide the value of KMO or the Bartlett test, which might be caused by some of the eigenvalues of the correlation matrix that were non-positive. Further, inspection of the correlation matrix showed that all behaviors had at least one correlation coefficient greater than .30, which means all variables could be maintained for the PCA.



*Figure 3.4.* Children's mean frequencies of cooperative problem solving behaviors in China and the US.

The PCA revealed five components that had eigenvalues greater than one and which explained 32.93%, 18.70%, 11.28%, 10.96%, and 7.67% of the total variance, respectively. Visual inspection of the scree plot indicated that six components should be retained (Cattell, 1966). In addition, a five-component solution met the interpretability criterion (see Table 3.9).

Table 3.9

*Principal Component Analysis (PCA) of Children's Cooperative Problem Solving Behaviors*

Cooperative Problem Solving Behaviors	Components				
	1	2	3	4	5
Physical Demonstration		.940			
Coordinated Action		.465		.694	
Observation	.543	.413	-.460		
Direct Attention		.749			
Assign Roles	.974				
Explanation			.772		
Narration		.820	.428		
Discuss Strategies		.737	.401		
Provide Remedy	.974				
Persuasive	.933				
Suggestion					.508
Imitation	.888				
Constraint			.445	.770	
Ask Question			.918		
Agreement				.739	
Disagreement			.445		-.672
Verbalize to Teacher					.848

*Note.* Rotation Method: Varimax with Kaiser Normalization.

With respect to the PCA result, the researcher further grouped the behaviors into six components when (a) cumulative proportions of variance were greater than .40 and (b) the accumulation of variables were logical with theoretical grounds of cooperative problem solving.

Specifically, *planning* – the first component consisted of assigning roles, providing remedy, persuasive, imitation, and observation; *mentoring* – the second component consisted of physical demonstration, directing attention, narration, and discussing strategies; *debating* – the third component consisted of explanation, asking questions, and disagreement; *joint interaction* – the fourth component consisted of coordinated action, constraint, and agreement; and *suggestion* was treated as the fifth and *verbalize to teacher* was the sixth component (see Table 3.10).

Table 3.10

*The Components of Cooperative Problem Solving*

Components of Cooperative Problem Solving	Behaviors
Plan	Assign roles, Provide remedies, Persuasive, Imitation, and Observation
Mentor	Physical demonstration, Direct attention, Narration, and Discuss strategies
Debate	Explanation, Ask questions, and Disagreement
Joint Interaction	Coordinated action, Constraint, and Agreement
Suggest	Offer an idea
Verbalize to Teacher	Seeks help and clarification from teachers

With these components, the means and standard deviations were calculated for each group of culture contexts (see Table 3.11).

Table 3.11

*Descriptive Analysis of Components of Cooperative Problem Solving*

Nation		N	Mean	Std. Deviation	Min	Max
China	Plan	8	43.308	16.885	20.020	67.64
	Mentor		29.082	10.420	12.480	41.09
	Debate		6.210	4.758	.410	13.180
	Joint Interaction		13.807	6.621	4.17	27.14
	Suggestion		4.630	4.689	0	15.000
	Verbalize to Teacher		2.630	3.739	0	10.000
US	Plan	8	51.534	10.830	34.360	70.500
	Mentor		33.846	12.353	15.670	52.800
	Debate		3.781	2.311	0.070	7.060
	Joint Interaction		8.574	4.939	2.010	16.840
	Suggestion		4.250	3.770	1.000	12.000
	Verbalize to Teacher		2.130	2.232	0	6.000

Chinese children often used planning ( $M = 43.308$ ,  $SD = 16.885$ ), mentoring ( $M = 29.082$ ,  $SD = 10.420$ ), and joint interaction ( $M = 13.807$ ,  $SD = 6.621$ ) when they cooperated with peers with a few uses of debating ( $M = 6.210$ ,  $SD = 4.758$ ), suggestion ( $M = 4.630$ ,  $SD = 4.689$ ), and verbalization to teacher ( $M = 2.630$ ,  $SD = 3.739$ ). For the US children, they often used planning ( $M = 51.534$ ,  $SD = 10.830$ ) and mentoring ( $M = 33.846$ ,  $SD = 12.353$ ) with a few uses of joint interaction ( $M = 8.574$ ,  $SD = 4.939$ ), suggestion ( $M = 4.250$ ,  $SD = 3.770$ ), debating ( $M = 3.781$ ,  $SD = 2.311$ ), and verbalization to teacher ( $M = 2.130$ ,  $SD = 2.232$ ).

The correlations among the components of cooperative problem solving were smaller than .90 as assessed by Pearson correlation, and there was no evidence of multicollinearity. Only



the correlation between plan and mentor was statistically significant ( $r = .528, p < .05$ ) (see Table 3.12).

Table 3.12  
*Correlations between Six Components of Cooperative Problem Solving*

	Plan	Mentor	Debate	Joint Interaction	Suggestion	Verbalize to Teacher
Plan	1					
Mentor	.528*	1				
Debate	.047	.345	1			
Joint Interaction	.269	.461	.295	1		
Suggestion	.172	.124	.276	.338	1	
Verbalize to Teacher	-.155	-.026	.049	.003	.176	1

*Note.* \* Correlation is significant at the 0.05 level (2-tailed).

However, the correlation between joint interaction and verbalize to teacher was weak ( $r = .003, p > .05$ ); hence, verbalize to teacher was analyzed separately. Therefore, five components – planning, mentoring, debating, joint interaction, and suggestion were analyzed with MANOVA, and sixth component – verbalization to teacher was analyzed with ANOVA.

**MANOVA and ANOVA.** There was a linear relationship between the dependent variables, as assessed by a scatterplot. However, there was evidence of multicollinearity, as assessed by Pearson correlation ( $|r| > 0.9$ ), which was associated with the variable – constructive play. Hence, constructive play was analyzed separately from other variables with the ANOVA. There was no evidence of multicollinearity among the independent variables ( $|r| < 0.9$ ). The

correlation between joint interaction and verbalization to teacher was weak; hence, verbalize to teacher was also analyzed separately from other variables with the ANOVA.

There were four univariate outliers in the data, as assessed by inspection of a boxplot, and each of two outliers appeared in each group (China and the US). These outliers were not caused by data entry errors or measurement errors but rather were genuinely unusual values. In this study, the outliers were maintained for further analysis. There were no multivariate outliers in the data, as assessed by Mahalanobis distance ( $p > .05$ ).

The observed variables (functional and rough-and-tumble play) for the Chinese and US children as well as variables (constructive play and fantasy play) for the Chinese children were not normally distributed as assessed by Shapiro-Wilks' test ( $p < .05$ ) except the variables (constructive and fantasy play) for the US children. One variable (suggestion) for the children in the two cultures as well as a variable (verbalization to teachers) for the Chinese children were not normally distributed as assessed by Shapiro-Wilks' test ( $p < .05$ ) while other variables were normally distributed for the children in the two cultures.

The homogeneity of covariance matrices could not be assessed by Box's M test because there were fewer than two nonsingular cell covariance matrices. The assumption of homogeneity of variances was violated that was assessed by Levene's Test of Homogeneity of Variance ( $p < .05$ ); particularly, the variables (functional play, rough-and-tumble play, planning, and debating) did not show homogeneity of variances.

Although some assumptions of MANOVA and ANOVA were violated, they were still used for the analysis with regard to that MANOVA and ANOVA are considered to be fairly "robust" to deviations from normality with respect to Type I error (Bray & Maxwell, 1985). Overall, measures of MANOVAs and ANOVAs were conducted in order to investigate the

differences in the incidence of play types and the components of cooperative problem solving associated with the factors of nation, gender, and age.

**Phase IV: Qualitative analysis.** Researcher's field notes and research journal entries were analyzed using the qualitative content analysis in order to situate the quantitative results into the classroom context. This analysis was conducted using the qualitative analysis software, NVivo 11. The qualitative content analysis is often viewed as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes" (Hsieh & Shannon, 2005). As Downe-Wamboldt (1992) described, the purpose of the content analysis is "to provide knowledge and understanding of the phenomenon under study" (p. 314).

**Coding.** The procedure of coding included (a) open coding and (b) code "winnowing" (Creswell, 1997). During the open coding, research journal entries and field notes were read word by word and reread multiple times until the researcher achieved a sense of the whole (Tesch, 1990). While reading, the researcher coded a sentence or paragraph that reflected an idea or concept as one category until all contents were coded thoroughly. Meanwhile, the researcher took memos in NVivo, including "short phrases, ideas, or key concepts that occurred" to her (Creswell, 1997, p. 144). Particularly, five categories were identified, and they were defined in the memo:

*Research Decision:* The researcher described the decisions regarding (a) when to start and stop observing and videoing children (e.g., clean-up time, quiz time, and lunch time), (b) whom to observe and video, (c) an issue that occurred during observations (e.g., technology problem and researcher's illness), and (d) the schedules of teacher interviews.

*Researcher Subjectivity:* The researcher expressed her (a) dilemma or concerns whether to intervene or help children when they have physical fights, (b) frustration during observations, (c) questions that emerged during observations, (d) role of the researcher (e.g., observer), (e) perceptions regarding teachers' decision-making in the classroom (e.g., how teachers interacted with children), and (d) impressions regarding children's play and cooperative problem solving.

*Classroom Environment:* The researcher recorded children's (a) engagement in different types of play, (b) play materials, (c) play schedule, and (c) class curricula.

*Role of Teachers:* Teachers decided (a) to or not to become involved in children's play or cooperative problem solving when children had conflicts, (b) to organize teacher-directed activities, (c) to assign particular children to play or work together (e.g., compete by gender), and (d) to provide emotional support.

*Image of the Child:* The teachers believed that (a) children were capable of doing something, (b) children needed to develop particular skills or knowledge within a particular age period, and (c) there were gender differences in play or cooperative problem solving.

During code winnowing, two categories remained for further analysis including (a) image of the child and (b) classroom environments. Compared to others, these categories provided exhaustive details about (a) how children engaged in cooperative problem solving and play, and (b) in what kind of play contexts children were exposed. These details provided a contextual understanding of the variations of children's engagement in play and cooperative problem solving in each culture.

***Trustworthiness.*** Trustworthiness of study findings was established followed the criteria suggested by Guba and Lincoln (1982) to assess research quality and rigor. Particularly, the secondary data presented in this study are drawn from a 10-month field work in Chinese and US research sites. This long-term study provided an authentic perspective that impacted researcher decisions regarding “what is salient to the study, relevant to the purpose of the study, and of interest for focus” (Creswell, 1997, p. 201). It is supported that working with participants every day for long periods of time provides the research “validity and vitality” (Fetterman, 1989, p. 46).

During the open-coding, coding-recoding was conducted in order to identify and saturate categories that emerged from the secondary data. Identified categories were compared across data sources (researcher field notes and research journal entries) in order to “corroborate evidence from different sources to shed light on a theme or perspective” (Creswell, 1997, p. 202). Further, an “outside” researcher reviewed the research questions, methodology, data analysis, and interpretation of findings to ask questions or express disagreements (1997). The researcher met with the “outsider” periodically (once/twice a week) in order to discuss any emerging disagreements and achieve a mutual agreement. A description of qualitative findings was generated later by excerpting written entries from the researcher’s field notes and journal entries.

## **Results**

The results include two parts that are quantitative and qualitative. The quantitative part examines the (a) significant differences in engagement in four types of play that were influenced by children’s nation, gender, and age, and (b) significant variations in engagement of components of cooperative problem solving that were influenced by children’s nation, gender,

and age. The qualitative part presents contextual understandings of the quantitative results, and the findings of qualitative analysis include (a) image of the child and (b) classroom environments.

### **The Results of Quantitative Analyses**

**Differences in play between Chinese and US children.** The MANOVA was run with three independent variables – nation (China or US), gender (boy or girl), and age (four- or five-year-olds) – and three dependent variables – functional play, fantasy play, and rough-and-tumble play. There was no statistically significant interaction effect (nation  $\times$  gender  $\times$  age) on the combined dependent variables of functional play, fantasy play, and rough-and-tumble play ( $F(12, 16) = 1.329, p = .292$ , Wilks'  $\Lambda = .163$  partial  $\eta^2 = .454$ ). Also, there was no statistically significant interaction effect (nation  $\times$  gender  $\times$  age) for functional play ( $F(4, 8) = .927, p = .494$ , partial  $\eta^2 = .317$ ), fantasy play ( $F(4, 8) = 2.634, p = .114$ , partial  $\eta^2 = .568$ ), and rough-and-tumble play ( $F(4, 8) = 1.048, p = .440$ , partial  $\eta^2 = .344$ ).

There was a statistically significant main effect of nation on the combined dependent variables (functional, fantasy, and rough-and-tumble play) ( $F(3, 6) = 5.134, p = .043$ , Wilks'  $\Lambda = .280$ , partial  $\eta^2 = .720$ ), with no significant main effects of gender ( $F(3, 6) = 4.464, p = .057$ , Wilks'  $\Lambda = .309$ , partial  $\eta^2 = .691$ ) or age ( $F(3, 6) = .787, p = .543$ , Wilks'  $\Lambda = .718$ , partial  $\eta^2 = .282$ ). Regarding the functional play, there was no statistically significant difference between nation, gender, or age. The means of engagement in functional play were zero minutes ( $SE = .165$ ) for Chinese four-year-old boys and zero minutes ( $SE = .203$ ) for Chinese four-year-old girls; and .500 minutes ( $SE = .165$ ) for US four-year-old boys and zero minutes ( $SE = .165$ ) for US four-year-old girls. Also, the means of engagement in functional play were zero minutes ( $SE = .286$ ) for Chinese five-year-old boys and zero minutes ( $SE = .203$ ) for Chinese five-year-old

girls; and zero minutes ( $SE = .286$ ) for US five-year-old boys and zero minutes ( $SE = .286$ ) for US five-year-old girls.

For fantasy play, there was a statistically significant difference between Chinese five-year-old girls and US five-year-old girls ( $F(1, 8) = 15.721, p = .004$ , partial  $\eta^2 = .663$ ), but not for five-year-old boys ( $F(1, 8) = .000, p = 1.000$ , partial  $\eta^2 = .000$ ). Tukey pairwise comparison was conducted for the five-year-old girls. The means of engagement in fantasy play were 46 minutes ( $SE = 9.473$ ) for US girls, but zero minutes ( $SE = 6.698$ ) for Chinese girls, and there was a statistically significant difference of 46 minutes, 95%CI [19.246, 72.754],  $p = .002$ . In other words, the US five-year-old girls engaged in more fantasy play than Chinese five-year-old girls.

There was a statistically significant difference between Chinese four-year-old boys and US four-year-old boys for rough-and-tumble play ( $F(1, 8) = 5.538, p = .046$ , partial  $\eta^2 = .409$ ), but not for four-year-old girls ( $F(1, 8) = .492, p = .503$ , partial  $\eta^2 = .058$ ). Tukey pairwise comparison was conducted for four-year-old boys. The means of engagement in rough-and-tumble play were .250 minutes ( $SE = .075$ ) for US boys, but zero minutes ( $SE = .075$ ) for Chinese boys, and there was a statistically significant difference of .250 minutes, 95%CI [.005, .495],  $p = .046$ . In other words, in the US four-year-old boys engaged in more rough-and-tumble play than the Chinese four-year-old boys.

Separate analysis of variances (ANOVAs) were conducted on constructive play. There was no statistically significant three-way interaction between nation, gender, and age on children's constructive play ( $F(1, 8) = 3.337, p = .105$ ), whereas there was a statistically significant interaction between nation and gender on children's constructive play ( $F(1, 8) = 6.188, p = .038$ ). The simple main effect of nation on constructive play for girls was statistically significant ( $F(1, 8) = 19.095, p = .002$ ), but not for boys ( $F(1, 8) = .464, p = .515$ ). All pairwise

comparisons were made for females with a Bonferroni adjustment. The means of engagement in constructive play was 59.938 minutes ( $SE = 4.794$ ) for Chinese girls and 27.938 minutes ( $SE = 5.536$ ) for US girls, and there was a statistically significant difference of 32 minutes, 95%CI [15.113, 48.887],  $p = .002$ . In other words, Chinese girls significantly spent more time on constructive play than the US girls. Further, the main effect of gender on constructive play for US children was statistically significant ( $F(1, 8) = 11.657, p = .009$ ), but not for Chinese children ( $F(1, 8) = .000, p = .993$ ). The pairwise comparisons were made for US children with a Bonferroni adjustment. The means of engagement in constructive play were 54.667 minutes ( $SE = 5.536$ ) for boys and 27.938 minutes ( $SE = 5.536$ ) for girls, and there was a statistically significant difference of 26.729 minutes, 95%CI [8.676, 44.782],  $p = .009$ . Hence, US boys significantly engaged in more constructive play than the US girls.

**Differences of cooperative problem solving between Chinese and US children.** The MANOVA was run with three independent variables – nation, gender, and age – and five dependent variables – planning, mentoring, debating, joint interaction, and suggestion. There was no statistically significant interaction effect between nation, gender, and age on the combined dependent variables (planning, mentoring, debating, joint interaction, and suggestion) ( $F(20, 14) = 1.655, p = .167$ , Wilks'  $\Lambda = .019$ , partial  $\eta^2 = .631$ ). Also, there was no statistically significant interaction effect between nation, gender, and age for the uses of planning ( $F(4, 8) = .141, p = .962$ , partial  $\eta^2 = .066$ ), mentoring ( $F(4, 8) = .650, p = .643$ , partial  $\eta^2 = .245$ ), debating ( $F(4, 8) = .1790, p = .224$ , partial  $\eta^2 = .472$ ), joint interaction ( $F(4, 8) = .1260, p = .361$ , partial  $\eta^2 = .387$ ), or suggestion ( $F(4, 8) = .239, p = .909$ , partial  $\eta^2 = .107$ ) when children cooperated with peers.



There were statistically significant main effects of nation ( $F(5, 4) = 25.336, p = .004$ , Wilks'  $\Lambda = .031$ , partial  $\eta^2 = .969$ ) and gender ( $F(5, 4) = 32.383, p = .002$ , Wilks'  $\Lambda = .024$ , partial  $\eta^2 = .976$ ) on the combined dependent variables (planning, mentoring, debating, joint interaction, and suggestion), with no significant main effect of age ( $F(5, 4) = 2.778, p = .172$ , Wilks'  $\Lambda = .224$ , partial  $\eta^2 = .776$ ). Particularly, there was a statistically significant difference between Chinese four-year-old girls and US four-year-old girls for the uses of debating ( $F(1, 8) = 8.125, p = .021$ , partial  $\eta^2 = .504$ ), but not for four-year-old boys ( $F(1, 8) = .000, p = 1.000$ , partial  $\eta^2 = .000$ ). Tukey pairwise comparison was conducted for four-year-old girls. The mean uses of debating were 11.943 ( $SE = 1.779$ ) for Chinese girls, and 5.398 ( $SE = 1.452$ ) for US girls, and there was a statistically significant difference of 6.545, 95%CI [1.250, 11.840],  $p = .021$ . In other words, Chinese four-year-old girls used more debating than the US four-year-old girls during their cooperation.

There was a statistically significant difference between US four-year-old boys and US four-year-old girls for the uses of mentoring ( $F(1, 8) = 6.157, p = .038$ , partial  $\eta^2 = .435$ ), but not for Chinese children who were four-year-old ( $F(1, 8) = .598, p = .462$ , partial  $\eta^2 = .070$ ). Tukey pairwise comparison was conducted for US children aged four. The mean uses of mentoring were 44.455 ( $SE = 4.902$ ) for US boys, and 27.253 ( $SE = 4.902$ ) for US girls, and there was a statistically significant difference of 17.201, 95%CI [1.215, 33.187],  $p = .038$ . In other words, US four-year-old boys used more mentoring than the US four-year-old girls during their cooperation.

There were no statistically significant differences between nation for the uses of planning ( $F(1, 8) = .737, p = .415$ , partial  $\eta^2 = .084$ ), joint interaction ( $F(1, 8) = 1.588, p = .243$ , partial  $\eta^2 = .166$ ), or suggestions ( $F(1, 8) = .046, p = .836$ , partial  $\eta^2 = .006$ ). There were no statistically

significant differences between gender for planning ( $F(1, 8) = .603, p = .460$ , partial  $\eta^2 = .070$ ), joint interaction ( $F(1, 8) = .438, p = .527$ , partial  $\eta^2 = .052$ ), or suggestions ( $F(1, 8) = 1.150, p = .315$ , partial  $\eta^2 = .126$ ).

Separate analysis of variances (ANOVAs) was conducted on verbalization to teacher. There was no statistically significant three-way interaction between nation, gender, and age on children's use of verbalization to teacher ( $F(1, 8) = .050, p = .828$ ); there were no statistically significant interactions between nation and gender ( $F(1, 8) = 1.609, p = .240$ ), between nation and age ( $F(1, 8) = 2.946, p = .124$ ), or between gender and age ( $F(1, 8) = 1.144, p = .316$ ). Also, the main effects of nation ( $F(1, 8) = .139, p = .719$ ), gender ( $F(1, 8) = .179, p = .684$ ), and age ( $F(1, 8) = .387, p = .551$ ) on children's uses of verbalization to teacher were not statistically significant.

### **The Findings of Qualitative Analysis**

Field notes and research journal entries were analyzed using the qualitative content analysis. Findings regarding (a) teachers' image of the child and (b) teachers' arrangements of classroom environments emerged. Each finding reflects cultural similarities and differences in (a) teachers' beliefs about children's age and gender differences in children's engagement in play and cooperative problem solving, and (b) teachers' pedagogical decisions regarding play space, play materials, and play schedule.

**Image of the child.** Teachers in both cultures believed that children were capable of solving problems with peers cooperatively. Particularly, teachers believed that although older children might solve problems more quickly than younger children, it did not mean that age was the major factor that influenced children's cooperative problem solving. For instance, Melanie

(China) believed that besides age, children's personalities and social abilities could influence children's cooperative problem solving:

Melanie believes that children's personality influences their participation in play as well as age and social abilities. As children get older, they may show more cooperative intentions and behaviors compared with when they were young (research journal entry, September 29, 2016).

For Reagan (US), she believed that children's experiences of practicing cooperative problem solving were more likely to influence children's cooperative problem solving abilities:

Reagan believes that older children often solve problems more quickly than the younger, but it might be because they have more experience of solving a problem, or they have different personalities. She does not believe that the age difference is the major factor that influences children's problem solving skills [...] Children who have siblings have more experience of practicing cooperative problem solving at home. These children have a lot of practice from home while listening to other people's ideas and doing things together (research journal entry, February 20, 2017).

Further, teachers in both cultures did believe that there was a gender difference in children's engagement in cooperative problem solving and play. For instance, Bella (China) believed that when children played with same gender peers, they worked in a more collective way:

Bella believes that there is a gender difference in the way of choosing particular types of play. Children work more collectively when they play with same-gender peers than when they play with mixed-gender peer dyads and groups (research journal entry, September 22, 2016).

Similarly, Annabelle (US) believed that there was a gender difference in how children interact with each other, and she described that girls in her classroom spend more time engaged in fantasy play:

Annabelle believes that there is a gender difference in how children interact with each other. She found that girls could be a lot more verbal and harsh with their words to their friends to try to get their ways than [with] boys. Girls sometimes tried to manipulate their friends' behaviors a little bit [...] In her class, lots of girls are really into imaginary play. She wants girls to play with blocks as well, and she will decorate the block area in order to entice them (research journal entry, February 27, 2017).

Teachers' beliefs regarding children's abilities to solve problems with peers in both cultures reflected a similar character. Although teachers in both cultures did not believe that age was the major factor influencing children's development cooperative problem solving, they did believe that there were gender differences in engagement in types of play as well as cooperative problem solving.

**Classroom environments.** Classroom environments in two cultures were different in terms of (a) play space, (b) play materials, and (c) play schedules. Particularly, US classrooms included larger play spaces consisting of various play areas for children than the Chinese classrooms. As recorded in the field notes and research journal entries, Bella (China) and Melanie (China) acknowledged that they had a lack of space for children's variety of play:

Bella thinks that there is limited space in the classroom to allow her to design some activities (research journal entry, September 28, 2016).

[...] Melanie admits that her classroom is too small to organize a theme activity (research journal entry, September 28, 2016).

Often, children in Bella's classroom sat at a big table, separated by gender. Bella and an assistant teacher sat at each table in order to intervene when there was a conflict among the children:

In Bella's classroom, children sat separately based on their gender. For instance, boys sat at one table, and girls sat another table [...] (field note, August 22, 2016).

Compared with previous observations, children in another classroom sat on the floor and played toys. For the children in Bella's classroom, they sat at big tables and played blocks. Bella gave children a few toys for their play. Bella and an assistant teacher also sat at children's table and watched children's play. If there was a conflict among the children, they intervened (research journal entry, August 30, 2016).

On the other hand, children in Melanie's and Hazel's classroom had their own table and chair, and they often played with toys at their own table:

[...] Melanie's and Hazel's classroom context is different from other classrooms, and it has no round table for children to sit together. The children in other classrooms often sit at one or two big tables and play together, and this arrangement may promote children to cooperate with peers more. However, each child in Melanie's and Hazel's classroom has their own table and chair, and the classroom context is similar to Chinese traditional classroom contexts that include tables, chairs, and one blackboard. The size of the classroom is small for 23 children [...] (research journal entry, September 7, 2016)

For the US teachers, they provided various play areas in their classrooms (e.g., dramatic play, block, and writing areas). For instance, each classroom included approximately 12 play areas for children's free play:

During the interview, Annabelle said there were 12 play areas in the classroom including writing, ramp, block, imaginary play, light, loft, fine motor, art, book, puzzles and games, wire, and art easel areas (research journal entry, February 27, 2017).

During the interview, Savannah said that her classroom included block, light table, multipurpose table, floor book, carpet, sand table, water table, musical instrument, puzzles, center table (for clay or wirework) and easel areas. Play materials included such as cardboard boxes and tubes, small tires and corks, props, fabric, etc. (research journal entry, April 21, 2017).

Although US teachers provided a variety of play areas for children's interests and needs, their decisions regarding how much space children could use in a particular play time were also identified. For instance, Reagan separated her classroom into three work centers in order to help support children's focus on their play or work:

During the interview, Reagan explained that she broke the classroom down into three work centers. She believes that having a limited number of choices allows children to focus on more what they are doing and less bump into people or furniture. Each work center included four or six play areas. Also, she created a museum area since children were interested in the wire, and they could display their works in that area [....] Work center one included art, writing, sand, and light areas. Work center two included different

kinds of fine motor and puzzle areas. Work center three included dramatic play, block, and book areas (research journal entry, February 20, 2017).

For Annabella, she did not often limit children to choose particular play areas unless some children did not have equal opportunities to engage in a particular type of play:

During the interview, Annabelle mentioned that the loft space could often include four people. When there are five or more children in that space, it impacts children's play. She did not have a set limit on time with the exception of if other children really want to play there and do not have another space to do imaginary play. If someone has been there for a while, she might give a suggestion. However, if children think they can work out, she will not intervene (research journal entry, February 27, 2017).

Compared to the Chinese teachers, the US teachers provided more play materials for children. Chinese teachers often provided constructive play materials (e.g., blocks) during children's free play:

During the interview, Bella mentioned that she preferred jigsaw puzzles to stimulate children's intelligence and attention, and she thought that there was a lack of toys in the kindergarten (research journal entry, September 28, 2016).

During the interview, Melanie described that she often provided blocks, drawing tasks, water, sand, or plants to stimulate children to cooperate with others (research journal entry, September 28, 2016).

Further, the children in Melanie's and Hazel's classroom were often given a box of toys to share, and Melanie believed that this decision promoted children's cooperative problem solving:

During the interview, Melanie described that she intentionally provides two children with one box of toys in order to stimulate them to solve problems cooperatively (research journal entry, September 30, 2016).

For the US teachers, they provided a variety of play materials for children based on children's interests and needs:

During the interview, Annabelle described that she provided materials based on children's interests and needs such as fine motor materials (e.g., Legos) and imaginary play materials (e.g., fabric). [...] She found that the block area needed a lot of space because children did a lot of big building and big play. The writing table had two chairs, and it gave a nice spot for just a couple people to be. A cozy area included big pillows on the floor with library books, and it did not necessarily need to be a very large space (research journal entry, February 27, 2017).

During the interview, Savannah mentioned that she tried to provide more open-ended materials to prompt children to think creatively. She tended to stay away from commercialized-type materials. She provided a variety of materials for children but without overloading the classroom. The frequency of changing materials was based on how frequently children use them. When children are not interested in a particular material, she might provide some provocations before she takes it away (research journal entry, April 27, 2017).

Regarding the play schedule, the US teachers provided more play time than the Chinese teachers. Often, the children in Chinese classrooms had a tight class schedule, and they usually had one hour free play time in the morning:



Children in the Chinese kindergarten took courses like language, reading, math, dancing, taekwondo, piano, music, drawing, and art, which might cause them only have one hour free play time in the morning normally (research journal entry, August 22, 2016).

[...] When the researcher arrived at the kindergarten, children were playing basketball, and then had a snack. After the snack time, they were dancing. After dancing, children were playing blocks. Three boys left the classroom to take taekwondo course, and six children stayed in Bella's classroom and were playing blocks. The children sat at one table, and two assistant teachers gave children a few toys (field note, August 31, 2016).

As Melanie (China) explained, her class curriculum was designed based on elementary school curricula:

During the interview, Melanie said that the curriculum and class schedule in her classroom were designed based on a consideration of the area elementary schools' curricula (research journal entry, September 30, 2016).

On the other than, US teachers often provided more free play hours for children:

During the interview, Reagan described her main goal for children was that they do more intentional planning and then stick with their choice and follow it through. Children could choose one work center in the mornings around nine, and they could play there for one hour and twenty minutes. In the afternoons, they could choose again which work center they want to be [...] (research journal entry, February 20, 2017).

Particularly for Savannah (US), providing more free play time in the morning also allowed her to support children's transition to from home to school:

During her interview, Savannah explained that when children first arrived at school at 7:40, they were allowed to play in any areas. This free play continued until 9:15, sometimes even 9:30. This period also allowed teachers to be able to support children and their transition to school. Children had snack and story time, and then they could go outside and then came inside to have group meeting time of the day. After the group meeting, children usually go work with the teachers in small groups on project work, and then remaining children are free to make selections within the areas of the classroom (research journal entry, April 21, 2017).

Teachers' decisions on classroom settings in two cultures reflect a variation not only across cultures but also within each culture. Often, US teachers provided more (a) play space, (b) play materials, and (c) extended play schedules for children than the Chinese teachers. Within each culture, teachers' decisions regarding play settings reflected their beliefs about children's needs and interests as well as how to support their successful transition to elementary school.

In summary, there were national and gender differences in the engagement of types of play as well as cooperative problem solving, whereas there were no identified age differences. Between the two cultures, US four-year-old boys engaged in more rough-and-tumble play than Chinese four-year-old boys. Also, the US five-year-old girls engaged in more fantasy play than the Chinese five-year-old girls. With no age differences, Chinese girls, in particular, spent more time engaged in constructive play than the US girls. Within the US cultural context, boys significantly engaged in more constructive play than the girls without any age difference. However, no gender or age differences were identified within the Chinese cultural context. There were no national, gender, or age differences in the engagement of functional play. Regarding children's cooperative problem solving, there were some cultural differences. For the four-year-

old, Chinese girls used more debating than the US girls during their cooperation. For the five-year-olds, no national or gender differences were identified for the uses of debating. There were gender differences in the uses of mentoring but there were no national or age differences. Within the US cultural context, four-year-old boys used more mentoring than the four-year-old girls during their cooperation. However, no gender or age differences were identified within the Chinese cultural context. Further, there were no national, gender, or age differences in the uses of planning, joint interaction, suggestion, or verbalization to teacher.

Besides these findings, teachers in both cultures believed that child age was not the major factor influencing children's development of cooperative problem solving. However, they did believe that there were gender differences regarding preferences of a particular type of play and engagement in cooperative problem solving. Regarding the classroom environments, US classrooms included far more play areas and diversity of play materials as well as more play time (approximately double) than in the Chinese classrooms.

### **Discussion**

The study findings support that there were variations of the incidence of play across the two cultural contexts as well as within each culture, across gender, but no age differences were found. The most dramatic difference between the children's play across cultures occurred in constructive and fantasy play. In a few cases, these differences have been referenced in earlier research (e.g., Benjamin, 1932; Eisenberg, Murray, & Hite, 1981; Fagot, 1974). Yet, in other cases, this study identified some new considerations in the study of preschool children's play in two cultural contexts. Further, differences in two of the components of cooperative problem solving (i.e., mentoring and debating) were identified across the cultures as well as within the cultures and across gender, yet no age differences were found.

Often, the US children engaged in more types of play than the Chinese children. For instance, the Chinese children only engaged in two types of play (constructive play and fantasy play), whereas the US children engaged in four types of play (functional play, constructive play, fantasy play, and rough-and-tumble play). Particularly, between the two cultures, Chinese girls spent more time in constructive play than the US girls with no age or gender differences identified. Within the cultures, US boys significantly engaged in more constructive play than the US girls with no discernable age differences. For the Chinese children, they did not show any gender or age differences in constructive play. Although researchers found that boys often engaged in more constructive play than girls (Benjamin, 1932; Eisenberg, Murray, & Hite, 1981; Fagot, 1974; Farrell, 1957; Fein, Johnson, Kosson, Stork, & Wasserman, 1975; Honzik, 1951; Sutton-Smith, 1979a, 1979b; Tauber, 1979; Tizard, Philips, & Plewis, 1976), this finding was partially proved in this study, particularly for the US children but not for the Chinese children.

This variation was probably due to the play materials and play space that were arranged by teachers in each cultural context. Different from the US children, the Chinese children often engaged in constructive play, influenced by the Chinese teachers' decisions to provide more constructive toys during children's free play time. Each classroom in the two cultures was different. Based on the records of journal entries, the US classrooms included different play areas (e.g., block, dramatic play, art, sand, and fine motor puzzle areas and writing table) for children's free play, and children had the freedom to play with a variety of play materials. Different from the US classrooms, the Chinese classrooms had big tables or small tables for children. The Chinese children were often provided with constructive materials by their teachers (e.g., blocks, sand, water, and puzzles) during their free play times. Hence, teachers' decisions about play materials and play spaces might contribute to the situations that both Chinese boys and girls

spent equivalent amounts of time on constructive play, and that Chinese girls engaged in more constructive play than the US girls, who had more choices to engage in other types of play (e.g., fantasy play).

Previous research suggests that girls often engaged in more fantasy play than boys (Benjamin, 1932; Eisenberg, Murray, & Hite, 1981; Fagot, 1974; Farrell, 1957; Fein, Johnson, Kosson, Stork, & Wasserman, 1975; Honzik, 1951; Sutton-Smith, 1979a, 1979b; Tauber, 1979; Tizard, Philps, & Plewis, 1976). However, the findings from this study are not consistent with this suggestion, and only the cultural variation was identified. Particularly, there were cultural variations in the engagement of fantasy play with no gender or age differences, and there were no gender or age differences within the cultures. Between the two cultures, US five-year-old girls engaged in more fantasy play than the Chinese five-year-old girls. The researcher's field notes reflected a phenomenon that only one Chinese four-year-old girl engaged in fantasy play with no Chinese boys' engagement in this form of play. It is important to note that the Chinese children did not have a dramatic play area as did the US children. This fact might explain the cultural variation for the incidence of girls' engagement in fantasy play.

Regarding children's cooperative problem solving during play, there were variations across cultures as well as within each culture. It was found that Chinese four-year-old girls used more debating (explanation, asking questions, and disagreement) than the US four-year-old girls during play. Within the US cultural context, four-year-old boys used more mentoring (physical demonstration, directing attention, narration, and discussing strategies) than the four-year-old girls during their cooperation. Although other components of cooperative problem solving (planning, joint interaction, suggestion, and verbalization to teacher) were not identified for cultural, gender, or age differences, children did use these components during their play. These

findings suggest the positive impact of play on children's cooperative problem solving. As Piaget (1951) and Vygotsky (1978) believed, play can be a context for children's constructive knowledge through their exploration with different types of play materials as well as the development of problem solving skills with peers through their social interactions. Through engaging in different types of play (functional, constructive, fantasy, and rough-and-tumble play), children not only learn various skills of cooperative problem solving (e.g., explanation, discussing strategies, and planning), but also have opportunities to practice these skills with peers and apply emerging skills for their future problem situations. As Vygotsky (1978) noted, intersubjectivity can be achieved by children through negotiations with others and the self-regulation of their own ideas and behaviors in order to solve a shared problem. The experiences of cooperative problem solving with peers in this study suggests children do share their thoughts, understand peers' different perspectives, and solve problems through regulating their needs and behaviors during play.

### **Limitations**

The interpretation of this study's findings should be considered with caution due to the small sample size and low quality of audio in a few the children's video footage, due to using general versus body microphones. This study sample size was small, and generalization and replication of this research should be prudent with deliberations of the similar characteristics of populations, classroom contexts, geographies, time, and cultures. Further, some children's verbal interactions with peers were challenging to code by observers due to the intermittently, high volume of noise in classrooms. Nonetheless, the percentages of agreements between observers were in the acceptable ranges with less impact on study findings.

## **Implications for Future Research and Practice**

Even though the study findings were based on a small sample size, there are expectations for the study to contribute to the field of early childhood education (ECE) by providing (a) a description of preschool children's cooperative problem solving across two cultures, (b) new knowledge related to the influence of cultural contexts on children's cooperative problem solving, (c) an innovative methodology of ethnographic informed observations for studying children's cooperative problem solving in their everyday classroom contexts, and (d) implications for teachers' and educators' development of culturally responsive teaching, curricula, and use of classroom space for the improvement of children's learning. Moreover, it is anticipated that the methodology and findings will benefit not only the field of early care and education but also public education in which teachers are increasingly challenged to draw upon a deep understanding of a range of children's cultural heritages, identities, and ways of learning with others. More research is needed in the field of young children's cooperative problem solving during play in cross-cultural and everyday classroom settings, and more studies related to the role of teachers for supporting children's cooperative problem solving during play are also needed.

## References

- Adler, N. J. (1983). A typology of management studies involving culture. *Journal of International Business Studies*, 14, 29-47.
- Aldis, O. (1975). *Play fighting*. New York, NY: Academic Press.
- Altman, D. G. (1999). *Practical statistics for medical research*. New York, NY: Chapman & Hall/CRC press.
- Ames, G., & Murray, F. (1982). When two wrongs make a right: Promoting cognitive change by social conflict. *Developmental Psychology*, 18(6), 894–897. doi: 10.1037/0012-1649.18.6.894
- Anderson, G. T. (2000). *Sequential bridging in the natural play of preschool children: Examining the role of parallel play*. Department of Marriage, Family, and Human Development Program. Bell & Howell Information and Learning, Brigham Young University. Ph.D.
- Ashley, J., & Tomasello, M. (1998). Cooperative problem solving and teaching in preschoolers. *Social Development*, 7(2), 143–163.
- Ausch, L. (1994). Gender comparisons of young children's social interaction in cooperative play activity. *Sex Roles*, 31(3-4), 225-239.
- Azmitia, M. (1988). Peer interaction and problem solving: When are two heads better than one? *Child Development*, 59, 87-96.
- Azmitia, M. (1996). Peer interactive minds: Developmental, theoretical, and methodological issues. In P. B. Baltes & U. M. Staudinger (Eds.), *Interactive minds life-span perspectives on the social foundations of cognition* (pp. 133-162). New York, NY: Cambridge University Press.



- Azmitia, M., & Hesser, J. (1993). Why siblings are important agents of cognitive development: A comparison of siblings and peers. *Child Development, 64*, 430-444.
- Azmitia, M., & Montgomery, R. (1993). Friendship, transactive dialogues, and the development of scientific reasoning. *Social Development, 2*(3), 202–221. doi: 10.1111/j.1467-9507.1993.tb00014.x
- Azmitia, M., & Perlmutter, M. (1989). Social influences on children's cognition: State of the art and future directions. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 22, pp. 89-144). San Diego, CA: Academic Press.
- Banks, J. A. (1993). The canon debate, knowledge construction, and multicultural education. *Educational Researcher, 22*(5), 4-14.
- Barnes, K. E. (1971). Preschool play norms: A replication. *Developmental Psychology, 5*(1), 99-103.
- Barbu, S., Cabanes, G., & Le Maner-Idrissi, G. (2011). Boys and girls on the playground: Sex differences in social development are not stable across early childhood. *PLoS ONE, 6*(1), 1-7. doi: 10.1371/journal.pone.0016407
- Bay-Hinitz, A. K., Peterson, R. F., & Quilitch, H. R. (1994). Cooperative games: A way to modify aggressive and cooperative behaviors in young children. *Journal of Applied Behavior Analysis, 27*(3), 435-446.
- Benjamin, H. (1932). Age and sex differences in toy preference of young children. *Journal of Genetic Psychology, 41*, 417-429.
- Berenbaum, S. A., Martin, C. L., & Ruble, D. N. (2008). Gender development. In W. Damon & R. Lerner (Eds.), *Advanced child and adolescent development* (pp. 647–696). New York, NY: Wiley.

- Bernard, H. R. (2006). Field notes: How to take them, code them, manage them. In H. R. Bernard (Ed.), *Research methods in anthropology: Qualitative and quantitative approaches* (4<sup>th</sup> ed., pp. 387-412). Lanham, MD: AltaMira Press.
- Bjorklund, D. F., & Pellegrini, A. D. (2002). *Homo Ludens: The importance of play*. Washington, DC: Sheridan Books/American Psychological Association.
- Björk-Willén, P. (2007). Participation in multilingual preschool play: Shadowing and crossing as interactional resources. *Journal of Pragmatics*, 39(12), 2133–2158. doi: 10.1016/j.pragma.2007.05.010
- Blaye, A., Light, P., Joiner, R., & Sheldon, S. (1991). Collaboration as a facilitator of planning and problem solving on a computer-based task. *British Journal of Developmental Psychology*, 9, 471–483.
- Blurton-Jones, N. (1972). Characteristics of ethological studies of human behavior. In N. Blurton-Jones (Ed.), *Ethological studies of child behavior* (pp. 3-33). London, UK: Cambridge University Press.
- Blurton-Jones, N. (1976). Rough-and-tumble play among nursery school children. In J. Bruner, A. Jolly, & K. Sylva (Eds.), *Play: Its role in development and evolution* (pp. 352-363). New York, NY: Basic Books.
- Blurton-Jones, N., & Konner, M. (1973). Sex differences in behavior of London and Bushman children. In R. Michaels & J. Crook (Eds.), *Comparative ecology and the behavior of primates* (pp. 690-750). London, UK: Academic.
- Bray, J. H., & Maxwell, S. E. (1985). *Multivariate analysis of variance*. Thousand Oaks, CA: Sage.

- Brindley, C., Clarke, P., Hutt, C., Robinson, I., & Wethli, E. (1973). Sex differences in the activities of social interactions of nursery school children. In R. P. Michael & J. H. Crook (Eds.), *Comparative ecology and the behavior of primates* (n.a.). London, UK: Academic.
- Brownell, C. A., & Carriger, M. (1990). Changes in cooperation and self-other differentiation during the second year of life. *Child Development*, 61(4), 1164–1174. doi: 10.1111/j.1467-8624.1990.tb02850.x
- Brownell, C. A., Ramani, G. B., & Zerwas, S. (2006). Becoming a social partner with peers: Cooperation and social understanding in one- and two-year-olds. *Child Development*, 77(4), 803–821. doi: 10.1111/j.1467-8624.2006.00904.x
- Bruner, J. S. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University.
- Burghardt, G. M. (2005). *The genesis of animal play: Testing the limits*. Cambridge, MS: MIT Press.
- Cannella, G. S. (1992). Gender composition and conflict in dyadic sociocognitive interaction: Effects of spatial learning in young children. *Journal of Experimental Education*, 61(1), 29-41. doi: 10.1080/00220973.1992.9943847
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245-276.
- Caulfield, M. J. (2002). *The influence of war play theme on cooperation and affective meaning in preschoolers' pretend play*. Early Childhood/Elementary Education. Proquest Information and Learning, The State University of New Jersey. Ph.D.
- Chen, E. S. L., & Rao, N. (2011). Gender socialization in Chinese kindergartens: Teachers' contributions. *Sex Roles*, 64, 103-116. doi: 10.1007/s11199-010-9873-4

- Chen, S. E. (2006). *Constructing gender in Hong Kong kindergartens*. University of Hong Kong, Pokfulam, Hong Kong. Ph.D. Retrieved from [http://dx.doi.org/10.5353/th\\_b3684893](http://dx.doi.org/10.5353/th_b3684893)
- Chen, X., Chen, H., Li, D., & Wang, L. (2009). Early childhood behavioral inhibition and social and school adjustment in Chinese children: A 5-year longitudinal study. *Child Development, 80*(6), 1692-1704.
- Chen, Z. (2003). Worth one thousand words: Children's use of pictures in analogical problem solving. *Journal of Cognition and Development, 4*(4), 415-434. doi: 10.1207/S15327647JCD0404\_02
- Cheyne, J. A., & Rubin, K. H. (1983). Playful precursors of problem-solving in preschoolers. *Developmental Psychology, 19*(4), 577-584. doi: 10.1037/0012-1649.19.4.577
- Cohen J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*(1), 37-46. doi: 10.1177/001316446002000104
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York, NY: Academic Press.
- Cole, M. (1975). An ethnographic psychology of cognition. In R. W. Brislin, S. Bochner, & W. J. Lonner (Eds.), *Cross-cultural perspectives on learning* (pp. 157-175). New York, NY: Wiley.
- Cole, M., Hood, L., & McDermott, R. P. (1978). Concepts of ecological validity: Their differing implications for comparative cognitive research. *The Quarterly Newsletter of the Institute for Comparative Human Development, 2*, 34-47.
- Creswell, J. W. (1997). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.

- Crossman, A. (2014). *What is participant observation research? An Introduction to an important qualitative research method*. Retrieved from <http://sociology.about.com/od/Research/a/Participant-Observation.htm>
- Cuffaro, H. K. (1995). *Experimenting with the world: John Dewey and the early childhood classroom*. New York, NY: Teachers College Press.
- Damon, W., & Killen, M. (1982). Peer interaction and the process of change in children's moral reasoning. *Merrill-Palmer Quarterly*, 28(3), 347–367.
- Dewey, J. (1902). *The child and the curriculum*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1938/1963). *Experience and education*. New York, NY: Collier Books.
- Dewey, J. (1907). *The school and society: Being three lectures*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1958). *Art as experience*. New York, NY: G. P. Putnam's Sons, Capricorn Books.
- Dewey, J. (1997). *Experience and education*. New York, NY: Touchstone.
- Doise, W., & Mugny, G. (1984). *The social development of the intellect*. Oxford, UK: Pergamon.
- Downe-Wamboldt, B. (1992). Content analysis: Method, applications, and issues. *Health Care for Women International*, 13, 313-321.
- Duran, R. T., & Gauvain, M. (1993). The role of age versus expertise in peer collaboration during joint planning. *Journal of Experimental Child Psychology*, 55, 227-242.
- Dyer, S., & Moneta, G. B. (2006). Frequency of parallel, associative, and cooperative play in British children of different socioeconomic status. *Social Behavior and Personality*, 34(5), 587-592.

- Eckerman, C. O., & Didow, S. M. (1996). Nonverbal imitation and toddlers' mastery of verbal means of achieving coordinated action. *Developmental Psychology*, 32(1), 141-152. doi: 10.1037/0012-1649.32.1.141
- Eckerman, C. O., & Peterman, K. (2001). Peers and infant social/communicative development. In G. Bremner & A. Fogel (Eds.), *Blackwell handbook of infant development: Handbooks of developmental psychology* (pp. 326 – 350). Malden, MA: Blackwell Publishers.
- Eifermann, R. R. (1971). Social play in childhood. In R. E. Herron & B. Sutton-Smith (Eds.), *Child's play*. New York, NY: Wiley.
- Eisenberg, N., Murray, E., & Hite, T. (1982). Children's reasoning regarding sex-typed toy choices. *Child Development*, 53, 81-86.
- Erickson, E. H. (1940). Studies in the interpretation of play: Clinical observations of play disruption in young children. *Genetic Psychology Monographs*, 22, 557-671.
- Erickson, E. H. (1941). Further explorations in play construction: Three special variables in their relation to sex and anxiety. *Psychological Bulletin*, 38, 748.
- Erickson, E. H. (1950). *Childhood and society*. New York, NY: Norton.
- Erickson, E. H. (1951). Sex differences in the play configurations of American pre-adolescents. *American Journal of Orthopsychiatry*, 21, 667-692.
- Erickson, E. H. (1958). Play interviews for four year old hospitalized children. *Monographs for the Society for Research in Child Development*, 23(3), 1-77.
- Erickson, E. H. (1963). *Childhood and society*. New York, NY: Norton.
- Erickson, E. H. (1977). *Toys and reasons*. New York, NY: Norton.
- Fabes, R. A., Martin, C. L., & Hanish, L. D. (2003). Young children's play qualities in same-, other-, and mixed-sex peer groups. *Child Development*, 74, 921–932. doi:10.1111/1467-

8624.00576.

Fagot, B. I. (1974). Sex differences in toddlers' behavior and parental reaction. *Developmental Psychology, 10*, 554-558.

Farran, D. C., & Son-Yarbrough, W. (2001). Title I funded preschools as a developmental context for children's play and verbal behaviors. *Early Childhood Research Quarterly, 16*, 245-262.

Farrell, M. (1957). Sex differences in block play in early childhood education. *Journal of Educational Research, 51*, 279-284.

Fawcett, L. M., & Garton, A. F. (2005). The effect of peer collaboration on children's problem-solving ability. *British Journal of Educational Psychology, 75*(2), 157-169. doi: 10.1348/000709904X23411

Fein, G. G., Johnson, D., Kosson, N., Stork, L., & Wasserman, L. (1975). Stereotypes and preferences in the toy choices of 20-month-old boys and girls. *Developmental Psychology, 11*, 527-528.

Fetterman, D. M. (1989). *Ethnography: Step by step*. Newbury Park, CA: Sage.

Freud, A. (1964). *Psychoanalytic treatment of children*. New York, NY: Schocken.

Freud, S. (1955). Analysis of phobia in a five year old boy. In J. Strackey (Ed.), *The standard edition of the complete works of Sigmund Freud* (Vol. X). London, UK: Hogarth.

Freud, S. (1959). Creative writers and daydreaming. In J. Strackey (Ed.), *The standard edition of the complete works of Sigmund Freud* (Vol. IX). London, UK: Hogarth.

Freud, S. (1960). Jokes and their relation to the unconscious. In J. Strackey (Ed.), *The standard edition of the complete works of Sigmund Freud* (Vol. VIII). London, UK: Hogarth.

Freud, S. (1961). *Beyond the pleasure principle*. New York, NY: Norton.

- Frost, J. L., Wortham, S. C., & Reifel, S. (2008). *Play and child development*. Upper Saddle River, NJ: Pearson Education.
- Garvey, C. (1990). *Play*. Cambridge, MA: Harvard University Press.
- Garvey, C. (1991). *Play* (2nd ed.). London, UK: Fontana.
- Gladwin, T. (1970). *East is a big bird*. Cambridge, MA: Belknap Press.
- Glesne, C., & Peshkin, A. (1991). *Becoming qualitative researchers: An introduction*. White Plains, NY: Longman.
- Goble, P., Martin, C. L., Hanish, L. D., & Fabes, R. A. (2012). Children's gender-typed activity choices across preschool social contexts. *Sex Roles*, 67, 435-451. doi: 10.1007/s11199-012-0176-9
- Golbeck, S. L. (1998). Peer collaboration and children's representation of the horizontal surface of liquid. *Journal of Applied Developmental Psychology*, 19(4), 571-592. doi: 10.1016/S0193-3973(99)80056-2
- Goncu, A., & Vadeboncoeur, J. A. (2016). Returning to play: The critical location of play in children's sociocultural lives. In S. Douglas & L. Stirling (Eds.), *Children's play, pretense, and story: Studies in culture, context, and autism spectrum disorder* (pp. 294-313). New York, NY: Routledge.
- Grinder, E. L. (1994). *The influence of toy sex-type on preschoolers' social pretend and interactive behavior in same- and mixed-sex dyads*. Curriculum and Instruction. Bell & Howell Information Company, The Pennsylvania State University. Ph.D.
- Groos, K. (1901). *The play of man*. New York, NY: Appleton.



- Guba, E. G., & Lincoln, Y. S. (1982). *Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches*. San Francisco, CA: Jossey-Bass.
- Guest, G., Namey, E. E., & Mitchell, M. L. (2013). *Collecting qualitative data: A field manual for applied research*. Thousand Oaks, CA: Sage.
- Hall, G. S. (1920). *Youth*. New York, NY: Appleton.
- Hamann, K., Warneken, F., & Tomasello, M. (2012). Children's developing commitments to joint goals. *Child Development*, 83(1), 137-145. doi: 10.1111/j.1467-8624.2011.01695.x
- Haywood, G., Rothenberg, M., & Beasley, R. (1974). Children's play and urban playground environments: A comparison of traditional, contemporary, and adventure types. *Environment and Behavior*, 6, 131-168.
- Heath, S. B. (1983). *Ways with words: Language, life and work in communities and classrooms*. New York, NY: Cambridge University Press.
- Heidemann, S., & Hewitt, D. (2010). *Play: The pathway from theory to practice*. St. Paul, MN: Redleaf Press.
- Hetherington, E. M., Cox, M., & Cox, R. (1979). Play and social interaction in children following divorce. *Journal of Social Issues*, 35, 26-49.
- Honzik, M. P. (1951). Sex differences in the occurrence of materials in the play constructions of preadolescents. *Child Development*, 22, 15-35.
- Howes, C. & Matheson, C. C. (1992). Sequences in the development of competent play with peers: Social and social pretend play. *Developmental Psychology*, 28, 961-974.
- Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288. doi: 10.1177/1049732305276687

- Humphreys, A., & Smith, P. K. (1984). Rough-and-tumble in preschool and playground. In P. Smith (Ed.), *Play in animals and humans* (pp. 241-270). London, UK: Blackwell.
- Johnson, J. E., & Ershler, J. (September 1980). *Developmental changes in imaginative play and cognitive ability of preschoolers*. American Psychological Association, Montreal, Canada.
- Johnson-Pynn, J. S., & Nisbet, V. S. (2002). Preschoolers effectively tutor novice classmates in a block construction task. *Child Study Journal*, 32(4), 241-255.
- Kim, Y. A. (2001). Peer relationships and play behaviors of children in three different sized classes over a four-month period. *Early Child Development and Care*, 167(1), 89-102.  
Doi: 10.1080/0300443011670108
- Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development*, 72(4), 1091-1111.
- Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology*, 25(3), 343-354. Doi: 10.1037/0012-1649.25.3.343
- Kruger, A. C. (1992). The effect of peer and adult-child transactive discussions on moral reasoning. *Merrill-Palmer Quarterly*, 38(2), 191-211.
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometric*, 33, 159-174.
- Lave, J. (1988). *Cognition in practice*. New York, NY: Cambridge University Press.
- LeJeune, C. W. (1994). *The effects of participation in competitive and cooperative games on the free-play behavior of preschoolers*. Clinical Psychology. A Bell & Howell Information Company, University of Nevada. Ph.D.

- Li, Y., Zhang, L., & Dai, B. (2000). Experimental researches on the developmental levels of children's cooperative strategy. *Psychological Science (China)*, 23(4), 425-429.
- Li, Y. (1998). *儿童发展心理学*. [Child developmental psychology] Tianjin, China: Tianjin Technology Translation.
- Liebenau, K. L. (1993). *The impact of toy type on girls' subsequent aggressive, cooperative, and nurturant behaviors*. Psychology. A Bell & Howell Information Company, California School of Professional Psychology (Fresno Campus). Ph.D.
- Light, P., & Glachan, M. (1985). Facilitation of individual problem solving through peer interaction. *Educational Psychology*, 5(3-4), 217-225. doi: 10.1080/0144341850050305
- Lim, S. E., & Honig, A. S. (1997). Singapore preschoolers' play in relation to social class, sex and setting. *Early Child Development and Care*, 135(1), 35-39.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage.
- Logue, M. E., & Harvey, H. (2009). Preschool teachers' views of active play. *Journal of Research in Childhood Education*, 24(1), 32-49.
- Lu, W. (2010). An investigation of interactions between pretend play and peer conflict from the perspective of metacommunication and frame theory. *Bulletin of Educational Psychology*, 41(3), 657-683.
- Macnaughton, G. (1997). Feminist praxis and the gaze in the early childhood curriculum. *Gender & Education*, 9(3), 317-326.
- Madsen, M. C., & Shapira, A. (1970). Cooperative and competitive behavior of urban Afro-American, Anglo-American, Mexican-American, and Mexican village children. *Developmental Psychology*, 3, 16-20.

- Martin, K. J. (2000). "Oh, I have story": Narrative as a teacher's classroom model. *Teaching & Teachers Education*, 16(3), 349-363.
- Merino, N. M. (2009). *Parallel relations of pretend play, social competence, and theory of mind development in preschool aged children*. ProQuest LLC, University of California Santa Barbara. Ph.D.
- Moll, L. (1990). *Vygotsky and education: Instructional implications and applications of sociohistorical psychology*. New York, NY: Cambridge University Press.
- Montessori, M. (1948/2007). *From childhood to adolescence: Including Erdkinder and the function of the university*. Amsterdam, Netherlands: Montessori-Person.
- Moyles, J. R. (1989). *Just playing? The role and status of play in early childhood education*. Milton Keynes, UK: Open University Press.
- Mruck, K., & Breuer, F. (2003). Subjectivity and reflexivity in qualitative research: A new FQS issues. *Historical Social Research/Historische Sozialforschung*, 28(3), 189-212.
- Musatti, T., Verba, M., & Mayer, S. (June, 1994). *Peers and the zone of proximal development*. The ISSBD XIIth Biennial Meeting, Amsterdam, Netherland.
- Nasif, E. G., Al-Daeaj, H., Ebrahimi, B., & Thibodeaux, M. S. (1991). Methodological problems in cross-cultural research: An updated review. *Management International Review*, 31(1), 79-91.
- National Bureau of Statistics of China (2015). *Annual report of education*. Retrieved from <http://data.stats.gov.cn/easyquery.htm?cn=C01>
- Oettingen, G. (1985). The influence of the kindergarten teacher on sex differences in behavior. *International Journal of Behavioral Development*, 8, 3-13.  
doi:10.1177/016502548500800102.

- Paley, V. G. (1993). *You can't say you can't play*. Cambridge, MA: Harvard University Press.
- Paley, V. G. (2004). *A child's work: The important of fantasy play*. Chicago, IL: The University of Chicago Press.
- Parten, M. B. (1932). Social play among preschool children. *The Journal of Abnormal and Social Psychology*, 28(2), 136-147. doi: 10.1037/h0073939
- Patrick, G. T. (1916). *The psychology of relaxation*. Boston, MA: Houghton-Mifflin.
- Pellegrini, A. D. (1984). The social-cognitive ecology of preschool classrooms. *International Journal of Behavioral Development*, 7, 321-332.
- Pellegrini, A. D. (1987). Rough-and-tumble play: Developmental and educational significance. *Educational Psychologist*, 22(1), 23-43.
- Pellegrini, A. D. (2009). *The role of play in human development*. New York, NY: Oxford University Press.
- Pellegrini, A. D., & Gustafson, K. (2005). Boys' and girls' uses of objects for exploration, play, and tools in early childhood. In A. D. Pellegrini & P. K. Smith (Eds.), *The nature of play: Great apes and humans* (pp. 113–138). New York, NY: Guilford Press.
- Peshkin, A. (1988). In search of subjectivity – one's own. *Educational Researcher*, 17(7), 17-21.
- Petrovic-Soco, B. (2014). Symbolic play of children at an early age. *Croatian Journal of Education*, 16(1), 235-151.
- Piaget, J. (1932). *The moral judgment of the child*. New York, NY: The Free Press.
- Piaget, J. (1950). *Psychology of intelligence*. New York, NY: Harcourt, Brace, & Company.
- Piaget, J. (1951). *Play, dreams and imitation in childhood*. London, UK: Heinemann.
- Piaget, J. (1983). Piaget's theory. In W. Kessen (Ed.), *Handbook of child psychology: History, theory, and methods* (pp. 103–128). New York, NY: Wiley.

- Piaget, J., & Inhelder, B. (1962). *The psychology of the child*. New York, NY: Basic Books.
- Phelps, E., & Damon, W. (1989). Problem solving with equals: Peer collaboration as a context for learning mathematics and spatial concepts. *Journal of Educational Psychology*, 81(4), 639–646. doi: 10.1037/0022-0663.81.4.639
- Ramani, G. B. (2012). Influence of a playful, child-directed context on preschool children's peer cooperation. *Merrill-Palmer Quarterly*, 58(2), 159-190
- Ramani, G. B., & Brownell, C. A. (2014). Preschoolers' cooperative problem solving: Integrating play and problem solving. *Journal of Early Childhood Research*, 12(1), 92-108. doi: 10.1177/1476718X13498337
- Ramani, G. B., Brownell, C. A., & Campbell, S. A. (2010). Positive and negative peer interaction in 3- and 4-year-olds in relation to regulation and dysregulation. *Journal of Genetic Psychology*, 171(3), 218-250. doi: 10.1080/00221320903300353
- Read, M. A. (1996). *The impact of space and color in the physical environment on children's cooperative behavior*. A Bell & Howell Information Company, Oregon State University. Ph.D.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, P. D. Rio, & A. Alvarez, *Sociocultural studies of mind* (pp. 139-164). New York, NY: Cambridge University Press.
- Rogoff, B. (2003). *The cultural nature of human development*. New York, NY: Oxford University Press.

- Rogoff, B., & Morelli, G. (1997). Perspectives on children's development from cultural psychology. In M. Gauvain & M. Colre (Eds.), *Readings on the development of children* (2<sup>nd</sup> ed., pp. 10 – 18). New York, NY: W. H. Freeman.
- Roopnarine, J. L., Ahmeduzzaman, M., Donnely, S., Gill, P., Mennis, A., Arky, L., Dingler, K., McLaughlin, M., & Talukder, E. (1992). Social-cognitive play behaviors and playmate preferences in same-age and mixed-age classrooms over a 6-month period. *American Educational Research Journal*, 29(4), 757-776.
- Rubin, K. H. (1977). Play behaviors of young children. *Young Children*, 32(6), 16-24.
- Rubin, K. H., Fein, G., & Vandenberg, B. (1983). Play. In E. M. Hetherington (Ed.), *Handbook of child psychology: Socialization, personality and social development* (Vol. 4, pp. 693-774). New York, NY: Wiley.
- Rubin, K. H., Maioni, T. L., & Hornung, M. (1976). Free play behaviors in middle- and lower-class preschoolers: Parten and Piaget revisited. *Child Development*, 47(2), 414-419.
- Rubin, K. H., Watson, K. S., & Jambor, T. W. (1978). Free-play behaviors in preschool and kindergarten children. *Child Development*, 49(2), 534–536. doi: 10.2307/1128725
- Ruble, D. N., Martin, C. L., & Berenbaum, S. A. (2006). Gender development. In N. Eisenberg, W. Damon, & R. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (6th ed., Vol. 3., pp. 858-932). Hoboken, NJ: Wiley.
- Schiller, F. (1795/ 1967). *On the aesthetic education of man in a series of letters*. Oxford, UK: Clarendon Press.
- Schulz, L. E., & Bonawitz, E. B. (2007). Serious fun: Preschoolers engage in more exploratory play when evidence is confounded. *Developmental Psychology*, 43(4), 1045–1050. doi: 10.1037/0012-1649.43.4.1045

- Scribner, S. (1976). Situating the experiment in cross-cultural research. In K. F. Riegel & J. A. Meacham (Eds.), *The developing individual in a changing world* (Vol. 1, pp. 310-321). Chicago, IL: Aldine.
- Shapira, A., & Madsen, M. C. (1969). Cooperative and competitive behavior of kibbutz and urban children in Israel. *Child Development*, 40, 609-617.
- Siegler, R. S., & Jenkins, E. A. (1989). *How children discover new strategies*. Hillsdale, NJ: Erlbaum.
- Smilansky, S. (1968). *Sociodramatic play on disadvantaged preschool children*. New York, NY: John Wiley & Sons.
- Smith, P. K. (1973). Temporal clusters and individual differences in the behavior of preschool children. In R. Michaels & J. Crook (Eds.), *Comparative ecology and the behavior of primates* (pp. 752-798). London, UK: Academic.
- Smith, P. K. (2005). Play: Types and functions in human development. In B. J. Ellis & D. F. Bjorklund (Eds.), *Origins of the social mind: Evolutionary psychology and child development* (pp. 271-291). New York, NY: Guilford Press.
- Smith, P. K., & Connolly, K. (1980). *The ecology of preschool behaviour*. London, UK: Cambridge University Press.
- Smith, P. K., & Hagan, T. (1980). Effects of deprivation on exercise play in nursery school children. *Animal Behaviour*, 28, 922-928.
- Spencer, H. (1873). *Principles of psychology* (Vol. 2, 3rd ed.). New York, NY: Appleton.
- Sponseller, D. B., & Jaworski, A. P. (April 1979). *Social and cognitive complexity in young children's play*. American Educational Research Association, San Francisco, CA.



- Steenbeek, H., van der Aalsvoort, D., & van Geert, P. (2014). Collaborative play in young children as a complex dynamic system: Revealing gender related differences. *Nonlinear Dynamics, Psychology, and Life Sciences*, 18(3), 251-276.
- Stewart, V. (2012). *A world-class education: Learning from international models of excellence and innovation*. Alexandria, VA: ASCD.
- Storli, R., & Sandseter E. B. H. (2015). Preschool teachers' perceptions of children's rough-and-tumble play (R&T) in indoor and outdoor environments. *Early Child Development and Care*, 185(11-12), 1995-2009. doi: 10.1080/03004430.2015.1028394
- Sutton-Smith, B. (1979a). *Play and learning*. New York, NY: Gardner Press.
- Sutton-Smith, B. (1979b). The play of girls. In C. B. Kopp & M. Kirkpatrick (Eds.), *Becoming female: Perspectives on development*. New York, NY: Plenum.
- Sylva, K., Bruner, J. S., & Genova, P. (1976). The role of play in the problem-solving of children 3–5 years old. In J. S. Bruner, A. Jolly, & K. Sylva (Eds.), *Play-its role in development and evolution* (pp. 244-257). New York, NY: Basic Books.
- Tauber, M. A. (1979). Parental socialization techniques and sex differences in children's play. *Child Development*, 50, 225-234.
- Teasley, S. (1995). The role of talk in children's peer collaborations. *Development Psychology*, 31(2), 207–220. doi: 10.1037/0012-1649.31.2.207
- Tesch, R. (1990). *Qualitative research: Analysis types and software tools*. Bristol, PA: Falmer.
- Tizard, B., Philps, J., & Plewis, I. (1976). Play in preschool centres-I. Play measures and their relation to age, sex, and IQ. *Journal of Child Psychology and Psychiatry*, 17, 251-264.

- Tobin, J., & Hsueh, Y. (2014). The poetics and pleasures of video ethnography of education. In R. Goldman, R. Pea, & B. Barron (Eds.), *Video research in the learning sciences*, (pp.77-92). New York, NY: Routledge.
- Tobin, J., Wu, D., & Davidson, D. (1989). *Preschool in three cultures*. New Haven, CT: Yale University Press.
- Tomasello, M. (2009). *Why we cooperate*. Cambridge, MA: MIT Press.
- Tomes, R. E. (1995). Teacher presence and child gender influences on children's activity preferences in preschool settings. *Child Study Journal*, 25, 123–140.
- Tudge, J., Winterhoff, P. A., & Hogan, D. M. (1996). The cognitive consequences of collaborative problem solving with and without feedback. *Child Development*, 67(6), 2892–2909. doi: 10.1111/j.1467-8624.1996.tb01894.x
- US Census Bureau. (2015). *Educational attainment of the population 18 years and over, by age, sex, race, and Hispanic origin: 2015*. Retrieved from <https://www.census.gov/data/tables/2015/demo/education-attainment/p20-578.html>
- Vandenburg, B. (1980). Play, problem-solving and creativity. In K. H. Rubin (Ed.), *Children's play new directions for child development* (pp. 49-68). San Francisco, CA: Jossey-Bass.
- Van Hoorn, J., Nourot, P. M., Scales, B., & Alward, K. R. (2011). *Play at the center of the curriculum* (5th ed.). Boston, MA: Pearson.
- Verba, M. (1993). Cooperative formats in pretend play among young children. *Cognition and Instruction*, 11(3-4), 265-280.
- Verba, M. (1994). Beginnings of collaboration in peer interaction. *Human Development*, 37, 125-139.

- Verba, M. (1998) Tutoring interactions between young children: How symmetry can modify asymmetrical interactions. *International Journal of Behavioral Development*, 22(1), 195–216.
- Vriens-van Hoogdalem, A. G., de Haan, D. M. P., & Boom, J. (2015). The role of language ability in young children's cooperation during play and collaborative interactions. *Early Child Development and Care*, 186(9), 1491-1504.
- Vygotsky, L. S. (1933/1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Walker, L. (1983). Sources of cognitive conflict for stage transition in moral development. *Developmental Psychology*, 19(1), 103–110. doi: 10.1037/0012-1649.19.1.103
- Warneken, F., Chen, F., & Tomasello, M. (2006). Cooperative activities in young children and chimpanzees. *Child Development*, 77(3), 640-663. doi: 10.1111/j.1467-8624.2006.00895.x
- Whiting, B., & Edwards, C. (1973). A cross-cultural analysis of sex-differences in the behavior of children age three through 11. *Journal of Social Psychology*, 91, 171-188.
- Wolcott, H. F. (1999). *Ethnography: A way of seeing*. Lanham, MD: AltaMira Press.
- Yang, L., Zou, X., & Bergen, D. (1995). The development of social and cognitive complexity in preschoolers' play: A cross cultural comparison. *Acta Psychologica Sinica*, 27(1), 84-90.
- Yarrow, F., & Topping, K. (2001). Collaborative writing: The effect of metacognitive prompting and structured peer interaction. *British Journal of Educational Psychology*, 71(2), 261–282. doi: 10.1348/000709901158514

- Yu, X. (2007). 幼儿同伴合作行为研究. [*Studying preschool children's peer cooperation*] Early Childhood Education. Shanxi Normal University. M.Ed. Retrieved from <https://wenku.baidu.com/view/047015d076eeaeaad1f33094.html>
- Yu, L., Winter, S., & Xie, D. (2010). The child play behavior and activity questionnaire: A parent-report measure of childhood gender-related behavior in China. *Archives of Sexual Behavior*, 39, 807–815. doi:10.1007/s10508-008-9403-4.
- Wang, X., & Lam, C. B. (2017). An exploratory case study of an American-style, play-based curriculum in China. *Journal of Research in Childhood Education*, 31(1), 28-39. doi: 10.1080/02568543.2016.1243175

## Appendix C

### Example of Micro-Analysis Children's 60-Minute Footages

#### Focal Children's Profiles

##### *Lily*

##### Types of Play (59mins 57secs)

Water Play 1: 00:00:00 – 00:08:14 (8 mins 14 secs)

N = 3 G

00:00:15 – 00:00:18 Explanation: She described her bottle was full with water.

00:00:26 – 00:00:27 Explanation: She described her bottle was full with water.

00:01:03 – 00:01:05 Explanation: She described one boy had a locust.

00:01:15 – 00:01:16 Suggestion: She asked Lauren to if Lauren wanted her to fill water.

00:01:16 – 00:01:20 Coordinated Action Durations: 14 secs for helping Lauren to fill her box with water.

00:01:28 – 00:01:34 Attention Directing & Explanation: She pointed at Lauren's box and explained the box was leaking.

00:01:42 – 00:01:43 Explanation: She said she needed to add more water.

00:02:02 – 00:02:03 Explanation: She described her bottle was full as well when Lauren told her box was full with water.

00:02:06 – 00:02:08 Ask Questions & Attention Directing: She said, "look" while holding her bottle and asked Lauren whether she could see water in her bottle.

00:02:09 – 00:02:16 Agreements: When Lauren suggested to put a locust into Lily's bottle, Lily agreed. Lily called one boy to bring his locus.

00:02:19 – 00:02:22 Observation Durations: She looked at one girl when the girl called one boy and asked him to put the locus in water.

00:02:24 – 00:02:28 Verbal Controlling: She asked the boy to put his locus in her bottle.

00:02:49 – 00:02:51 She said, "I finally get the bottle cap/"

00:02:52 – 00:02:53 Controlling: She took away her bottle when the boy came and tried to put his locus in her bottle.

00:02:54 – 00:02:56 Suggestion: She suggested to put the locus in another bottle after filled with water. However, the boy disagreed.

00:03:00 – 00:03:09 Observation Durations: She was looking at the boy when the boy explained that the locus could not live in water.

00:03:14 – 00:03:17 Explanation: She explained that a bottle was dropped since she could not hold it.

## **Appendix D**

### **Coding Book**

#### **Coding Instruction**

##### **Practice Coding**

1. Fill out information including a) Focal Child Name, b) Date, and c) Coder's Name on the Coding Sheet.
  2. Watch a 15-second footage, and then pause and code in 10 seconds. Keep this process until complete all coding.
  3. Mark codes/sub-codes you have seen in the 10-second footage using the symbol (✓).
  4. Write Types of Play with alphabetic characters (A, B, C, D, & E) you have observed.
  5. Write the numbers of Children & Teachers you have observed.
  6. If you're ambiguous to code focal child's particular behaviors, mark with the symbol (?).
  7. After you complete coding the first 15-minute footage, you could pause or rewind the footage to clear about your previous ambiguous codes/behaviors. If you still feel ambiguous, please mark with the symbol (\*) and then discuss it with the other coder for clarification.
  8. Do not code behaviors you could not observe. If you only see a child's back image, do not assume the child was looking at something unless you see his/her face and eyes in the footage.
  9. Do not code children's behaviors when they were looking at things outside of their current play area.
- 

##### **Coding**

1. Fill out information including a) Focal Child Name, b) Date, and c) Coder's Name on the Coding Sheet.
2. Watch a 15-second footage, and then pause and code in 10 seconds. Keep this process until complete all coding.
3. Mark codes/sub-codes you have seen in the 10-second footage using the symbol (✓).
4. Write Types of Play with alphabetic characters (A, B, C, D, & E) you have observed.
5. Write the numbers of Children & Teachers you have observed.
6. After you complete coding the first 15-minute footage, you could pause to take a break. After the break, you can keep coding another 15-minute footage. Continue this process until you finish coding the focal child's 60-minute footage.
7. After you complete coding the first 15-minute footage, you could pause or rewind the footage to clear about your previous ambiguous codes/behaviors. If you still feel ambiguous, please do not code the behaviors.
8. Do not code behaviors you could not observe. If you only see a child's back image, do not assume the child was looking at something unless you see his/her face and eyes in the footage.
9. Do not code children's behaviors when they were looking at things outside of their current play area.

## **Types of Play**

### **A. Functional Play<sup>1</sup>**

1. A child mainly shows his/her physical movements with/without objects in **no** goal-oriented way.
  - A child jumps (while holding papers/blocks/others).
  - A child runs (while holding papers/blocks/others).

### **B. Rough-and-Tumble Play (interactive-dramatic)<sup>2</sup>**

1. A child engages in play fighting or chasing/fleeing that are playful and nonaggressive.
  - A child wrestles/tumbles with a peer without hurting each other.
  - A child chases/flees a peer.
  - A child pushes a peer with a mattress, and they laugh/smile.

### **C. Constructive Play<sup>1</sup>**

1. A child uses objects to organize/make something or draw something in a goal-oriented way.
  - A child is building a house with blocks.
  - A child is drawing a flower.

### **D. Fantasy Play<sup>1</sup>**

1. A child engages in role-play or make-believe play.
  - A child pretends he/she is a dad/mom.
  - A child pretends a block as a sword.

### **E. Game with Rules<sup>1</sup>**

1. A child plays games with peers following implicit or negotiated rules.
  - A child talks with a peer game rules before or during play.

<sup>1</sup>The descriptions of the Functional Play, Constructive Play, Fantasy Play, and Game with Rules were adapted from Smilansky's work (1968), and <sup>2</sup>the description of the Rough-and-Tumble Play was adapted from Pellegrini's work (1987).

## **Cooperative Problem Solving**

### **Cooperative Behaviors**

#### **Physical Demonstration**

1. Child's physical movements that show how to do something.
  - A child shows how to do something.
  - A child shows a "right" material/model to a peer to build something.

- A child points at a direction or area to show a peer how/where to put materials on.

## **Imitation**

### ***A. Physical Imitation***

1. A child looks at their peers and models the same action while working on a task.
2. A child looks at peers' constructions/buildings and makes the same ones.

### ***B. Verbal Imitation***

1. A child models the same words after peers have said.
  - When a peer says "no," a child says "no" as well.
2. A child follows a pattern as peers have said.
  - A peer says, "You crushed me into X" and a child says, "You crushed me into Y."

## **Controlling**

### ***A. Physical Controlling***

1. A child physically controls or blocks peer's actions.
  - A child removes something that belongs to peer's (for stopping peer's behaviors).
  - A child grabs back his/her materials when a peer has taken it or tried to take it.
  - A child pulls his/her hands away when a peer tries to take materials from the hands.
  - A child holds materials around arms and protects them from others.
  - A child grabs/takes peers' materials without peer's permission.
  - A child removes things that his/her playmates put on his/her construction.
  - A child pushes/breaks/destroys peer's building/construction that a peer has built.
  - A child puts something on peer's play materials, which a peer doesn't want.

### ***B. Verbal Controlling***

1. A child verbally controls peer's actions.
  - A child shouts at a peer to stop peer's behaviors.
  - A child lets a peer protect his/her toys from others in a direct way.
  - Say, "it's mine" when a peer tries to grab child's materials in order to stop peer's grabbing actions.
  - Say, "nobody can take it."
  - Say, "give it to me."
  - Say, "don't let it go."
  - Say, "don't go faster than I do."
  - Say, "I'm not talking to you. You gotta go back to your play area."
  - Say, "My turn."

## **Coordinated Action**

1. A child coordinates an activity or assists a peer through physical movements (e.g. hands-on supports or assists).
  - A child helps a peer to fill up waters in peer's box.
  - A child completes an action/a goal or makes/builds something with a peer together with/without planning.
  - A child helps a peer to look for play materials with/without peer's request.



- A child gives her materials to a peer when a peer asks for them.
- A child grabs materials from a peer and gives them to his/her playmate.
- A child helps a peer fix broken materials.

### **Observation**

1. A child observes peers without simultaneous physical movements.
  - A child looks at peers (their behaviors or play materials) without building/making something.
  - A child looks at peers (their behaviors or play materials) while touching his/her own play materials.
  - A child looks at peers (their behaviors or play materials) without talking.

### **Attention Directing**

1. A child directs peer's attention by pointing at/showing/picking up something.
  - Say "Look" while pointing at/holding/picking up something.
  - A child brings something in front of peers to let them see.
2. A child directs peer's attention by calling peer's name or saying something.
  - Say, "XX, we gotta make this."
  - Say, "Look at me/you."
  - Say, "Watch this."
  - Say, "Watch out."
  - Say, "Look at what I'm making."
3. A child grabs peer's attention by making a funny/silly sound.

### **Dividing Labor**

1. A child divides works for a peer and him/her.
  - A child assigns a peer to build rooms while the child builds walls.

### **Assigning Roles**

1. A child assigns different roles to children such as mom, dad, baby, etc.

## **Communication Behaviors**

### **Asking Questions**

#### ***A. Asking Unknown Questions***

1. A child asks a peer a question that she/he does not have answers.
  - Ask, "Who put this in here?" since he/she doesn't know an answer.
  - Ask, "Who wants this?"
  - Ask, "Who can build a house like mine?" (while holding his/her own construction)
  - Ask, "Whose material is this?"
  - Ask, "Where is the block?"
  - Ask, "Is it a car?"
  - Ask, "Can I use/have/borrow your materials?"

#### ***B. Asking Known Questions***

1. A child asks a peer a question that she/he has answers.
  - Ask, "Can you see the water in [my] bottle?"
  - Ask, "Where is it?" after she/he has hidden it.
  - Ask, "Didn't you see that I just make one?" when a peer asks a child to make a thing as the peer has made.

### **Explanations**

1. A child explains the reasons for his/her actions. A child explains why he/she is doing/thinking in a particular way.
  - Say, "I dropped something because I could not hold it."
  - Say, "I shouldn't give you my snack today since you don't share with me."
  - Say, "I need this for building that."
2. A child assumes something may have happened.
  - Say, "Others may put something in here."
3. A child explains a peer how to do something.
4. A child responds to peer's open-ended questions.
  - Say, "This is yours" when a peer asked, "where is my toy?"
5. A child explains a rule to a peer what or how he/she should do or act in a particular way.

### **Narration**

1. A child describes what something is or what is happening with/without verbal exchanges.
  - A child puts a block on his/her construction and says, "There is a tail."
  - Say, "The Sandglass can eat."
  - Say, "My bottle is full with water."
  - Say, "I need to add more water."
  - Say, "Me too/I have a same one" when a child has made similar constructions as the peer's.
  - Say, "I'll make something."
  - Say, "I've not completed yet."
  - Say, "You're not my friend anymore."
  - Say, "Got it."
2. A child describes his/her previous experiences.
  - A child describes his/her experiences of doing/watching/making something.
3. A child describes peers' actions/materials/works.
  - Say, "The boy has something."
  - Say, "The water in [your] box is leaking."
  - Say, "The bottle cap is gone."
4. A child describes her desire/need.
  - Say, "I only want/need this."
  - Say, "I don't have a lot."
  - Say, "We don't need these."

## **Negotiation**

### ***A. Discussing Strategies***

1. A child discusses problem solving strategy or aspect of a task that ends with mutual agreement.
  - Say, "I gave you my materials yesterday, so can you give me yours?"
  - Say, "I'll bring you snacks tomorrow, so can I have your materials?"
  - Say, "This is the king of the star, okay?"

### ***B. Providing Remedy***

1. A child provides a remedy for resolving a problem/conflict.
  - When a peer was upset for child's words or behaviors, a child says, "I'll bring snacks for you tomorrow."

### ***C. Being Coercive***

1. A child coerces/be coercive toward a peer for something.
  - Say, "You know that I can destroy your construction, right?"

## **Suggestions**

1. A child gives a suggestion or an idea to peers that involves the possibility of accomplishing task-related goals or changing (starting/stopping) a state.
  - Ask, "how about playing the SpongeBob Game?"
  - Ask, "how about we compare which one is taller?"
  - Ask, "Would you like me to fill water for you?"
  - Say, "I have a good idea" while showing his actions to a peer.
  - Say, "Maybe we can break it down."
  - Say, "We can make a jail."
  - Say, "Let me help you."
  - Say, "Try this."
  - Say, "We gotta make a castle."

## **Agreements**

### ***A. Physical Agreements***

1. A child makes gestures/motions as an acceptance or agreement in response peer's action, statement, or question
  - When a peer suggests going another area, a child moves/walks/runs toward that area.
  - When a peer shows his construction for showing how it is amazing, a child claps/smiles/nods.
  - When a peer puts a material on child's construction, the child accepts it without removing it.

### ***B. Verbal Agreements***

1. A child makes a statement of acceptance or agreement in response peer's action, statement, or fixed question.

- When one peer suggests putting something in a child's bottle, the child says "yes."
- When one peer shows his construction a child, the child says, "wow."
- When one peer asks a child, "do you want this?" the child says, "yes."

## **Disagreement**

### **A. Physical Disagreements**

1. A child makes a gesture/motion as an opposition, protest, or retaliation in response to peer's action, statement, or question.
  - A child shakes his/her head in response to peer's statement, questions, suggestion, behaviors.

### **B. Verbal Disagreements**

1. A child makes a statement of opposition, protest, or retaliation in response to peer's action, statement, or question.
  - Say, "Who would drive reversely?" when a peer drives a motorcycle reversely.
  - Say, "Who said that I cannot make it? I made it, see?"
  - Say, "Yours is different with my building. You should put this piece on this side."
  - Say, "No, it's not."
  - Say, "I don't need that" when a peer gives a child play materials.
  - Say, "It doesn't look like something" when a peer has said it's something.
  - Say, "You're making it wrong."
  - Say, "You're not going to make/complete that."
  - Say, "Not happening."

## **Verbalization to Teacher**

1. A child directs help-seeking statements, questions, or gestures to a teacher.

*Note.* Codes were adapted from Ramani's work (2012).

## **References**

- Pellegrini, A. D. (1987). Rough-and-tumble play: Developmental and educational significance. *Educational Psychologist*, 22(1), 23-43. doi: 10.1207/s15326985ep2201\_2
- Smilansky, S. (1968). *Sociodramatic play on disadvantaged preschool children*. New York, NY: John Wiley & Sons.
- Ramani, G. B. (2012). Influence of a playful, child-directed context on preschool children's peer cooperation. *Merrill-Palmer Quarterly*, 58(2), 159-190.

## Appendix E

### Example of Coding Sheet

[illegible]

**Chapter 4. Understanding Chinese and US Preschool Teachers' Beliefs about Supporting  
Children's Cooperative Problem Solving during Play**

## **Abstract**

There is a theoretical foundation to support the vital role of teachers in their guidance and scaffolding of preschool-aged children's development of cooperative problem solving (Vygotsky, 1978). The goal of this cross-cultural study was to investigate the role of teachers in preschool children's cooperative problem solving in China and the US. The data are drawn from a larger study that comprised a 10-month ethnographic informed by focal-child observations of children's cooperative problem solving in everyday classroom environments. Here, data are presented generated from the children's teachers' (three in China and three in the US) semi-structured interviews using a video-stimulated recall approach, and (b) researcher's field notes and journal entries (secondary data source). Data were triangulated and analyzed using the constant comparative analysis method. Findings regarding (a) teachers' image of the child, (b) the role of teachers, and (c) teachers' decisions related to the creation of their classroom environments emerged. Each finding reflects not only cultural differences but also similarities among the teachers by situating their beliefs and practices in their cultures. These findings are expected to contribute to the field of early childhood education in which teachers continue to face challenges to develop culturally responsive teaching and curricula for children from diverse cultural backgrounds.

## **Introduction**

Sociocultural theory advocates that play can be a context for children to construct their knowledge through an exploration of different types of play materials and to develop cooperative problem solving skills with advanced peers or experts (e.g., teachers) through social interactions (Vygotsky, 1978). Particularly, teachers' decisions on the selection of play materials and provision of supports and guidance to children often impact children's emergent development of

knowledge and skills that are beyond their “current” levels of development. Hence, teachers play a vital role in children’s learning and development, and cooperative problem solving, in particular.

This cross-cultural research study provides findings related to the role of teachers in children’s everyday play and cooperative problem solving in a preschool center in China and one in the US. The effects of teachers’ beliefs and pedagogical decision-making on children’s cooperative problem solving and play have yet to be investigated in these two cultures (e.g., Tobin, Hsueh, & Karasawa, 2009). Therefore, there is value in providing cross-cultural perspectives of teachers in the field of early childhood education as one way to contribute to the development of culturally responsive teaching and to better understand the relationships of teachers’ beliefs to their practices related to their attempts to support four- and five-year-old children’s cooperative problem solving during play. Further, as there have been no cross-cultural studies of teachers practice related to children’s cooperative problem solving during play in everyday classroom experiences, it was a secondary goal of this study to create and describe a cross-cultural methodology designed to investigate teachers’ beliefs about their roles and pedagogical decisions.

## **Literature Review**

### **Theoretical Underpinnings**

The understanding of teachers’ beliefs about children’s learning and development of cooperative problem solving is grounded in sociocultural theory. Key tenets of Vygotsky’s sociocultural theory places import on the positive impact of social interaction on children’s development, generally, and their cooperative problem solving abilities, in particular (1978). Leontiev, a prominent student of Vygotsky, viewed social interaction as a “process of reciprocal



transformations between subject and object poles” (1981, p. 46). Through social interactions, children often internalize learned skills from experts, and others, from which they draw upon to solve future problems. This knowledge is not only related to children’s actual skill set but also the context in which their new abilities are learned. When children feel stuck in a process of solving a problem, for example, more experienced learners’ suggestions or prompts often enable children to contemplate and discuss multiple ways of problem solving as they begin to put their plans into actions. In this example, the child carries forth both the knowledge learned and the exchange between herself and her teacher so that her future attempts are guided by discreet and situational knowledge (memories). When children demonstrate their emerging capabilities to solve a problem, teachers have the opportunity to decrease or alter the degree their guidance, providing children more autonomy to challenge themselves and recognize their potentials. This adjustment of support, that includes when and how to intervene, is often referred to as scaffolding, which is related to teachers’ perceptions of children’s zones of proximal development (ZPDs). The ZPD is defined as the “distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86).

In order to better support children’s learning and development, teachers’ practice includes their participation in children’s everyday learning experiences, situated within their particular learning contexts. Wood, Bruner, and Ross (1976) define this practice as *scaffolding* because it is a “process that enables a child or novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts” (p. 90). Scaffolding is often viewed as an effective way of supporting children’s learning within their ZPDs (Vygotsky, 1978). Teachers’

typically utilize tools, materials and language as part of their scaffolding practice (Berk & Winsler, 1995; Bodrova & Leong, 1996/2007; Vygotsky, 1933). Barbara Rogoff, a Neo-Vygotskian scholar, has termed this type of support *guided participation* with an emphasis on the mutual involvement of people and their social partners through communication and coordination in socioculturally structured, collective activity (Rogoff, 1990; Rogoff & Gardner, 1984). This process includes not only children's observations of problem solving strategies but also their "hands-on involvement" in the process (Rogoff, 1995, p. 142).

### **The Role of Teachers**

The role of teachers in children's learning and development is critical since their creation of contexts for learning (Cabell, DeCoster, LoCasale-Crouch, Hamre, & Pianta, 2013; Dewey, 1899-1997; Martin, 2000) has been shown to vary from one culture to another (Moran, Bove, Brookshire, Braga, & Mantovani, 2017; Tobin, Hsueh, & Karasawa, 2009). Children's varied experiences inform their unique ways of learning, which requires teachers to be flexible and to continually modify their teaching approaches based on children's "individualities" (e.g., interests, development status, needs, learning styles, and personalities) (Dewey, 1938/1963/1997; Jung & Recchia, 2013, p. 837; Stone, 2012). Understanding children's individualities enables teachers to guide children's learning by assuming multiple roles such as observer, partner, listener, facilitator, or supporter to better promote children (Jung, 2013). For example, if a child needs more guidance and assistance, teachers may take on the role of a facilitator; if a child needs to exercise more control or autonomy, teachers may act as a partner or listener. All of these actions are part of scaffolding and include the ability of a teacher to calibrate her decisions and practice based on her understandings of children's needs and her beliefs about her role in children's learning (Wood, Bruner, & Ross, 1976).

Teachers' decision-making on how to support children's development of cooperative problem solving reflects their beliefs about their sense of themselves (e.g., the role of teachers) and image of the child (Bandura, 1986; Nespor, 1987; Tolman, 1951; Trivette, Dunst, Hamby, & Meter, 2012). As Beijaard, Meijer, and Verloop (2004) described, teachers' identities are viewed as an evolving process of "integration of the personal and the professional sides of becoming and being a teacher" (p. 113) and "perceptions of their roles or relevant features of their profession" (p. 118). For instance, teachers' professional beliefs come from their educational and professional training, and the personal beliefs emerge from their childhood experiences and classroom teaching experiences (Charlesworth, Hart, Burts, Mosley, & Fleege, 1993; McMullen, 1997; Spodek, 1988). It has been suggested that factors including teachers' years of teaching experiences, educational levels, location of their school in which they teach, and class size can influence their beliefs about child-centered teaching. For instance, Wang, Elicker, McMullen, and Mao (2008) conducted a cross-cultural study in China and the US to investigate preschool teachers' beliefs about early childhood curricula. They found that urban Chinese teachers with higher levels of professional training, education, or/and instruction with small class sizes (fewer than 50 children) were more likely to endorse child-centered beliefs. For the US teachers, only the factor of high educational level, influenced their child-centered beliefs. Further, Hu, Fan, Yang, and Neitzel (2017) found that Chinese teachers with more than 11 years of teaching or/and higher degrees were more likely to have child-centered beliefs, whereas teachers' academic majors or certifications could not predict their beliefs.

Teachers' beliefs influenced by personal and professional experiences mirror their unique way of classroom practices (Pajares, 1992; Vartuli, 1999; Wang, Elicker, McMullen, & Mao, 2008; Williams, 1996). Teachers, who appreciate a child-centered education approach, are often

more likely to instruct and organize activities by considering children's interests, ideas, and perceptions, whereas teachers, who value teacher-centered education, are more likely to design structured group activities and expect children to follow teachers' lead (Cornelius-White, 2007; Stipek & Byler, 2004; Stipek, 2004). It has been suggested that Chinese teachers often embrace teacher-centered beliefs which reflect their teaching practices (Hu, 2011; Rao, Ng, & Pearson, 2010). Even though teachers create child-centered learning environments for children, they have been found to limit children's choice of engaging various types of play and how they interact with play materials (Hu, Fan, Yang, & Neitzel, 2017). For instance, Liu, Yang, Tu, and Pan (2012) found that around 22 out of the 36 urban preschools provided 30 – 45 minutes of indoor play for children, whereas only 12 out of 72 rural preschools provided indoor play.

Teachers' decision-making in the classroom also links to their "image of the child" (Edwards, Gandini, & Forman, 1992). Particularly, teachers' image of the child is associated with their decision-making regarding "when or whether to create the space, time, and opportunity" for children's cooperative problem solving (Moran & Jin, 2016). If teachers perceives a child as competent, their "stance shifts toward nurturers of children's questions and ideas and bridge builders between what children know and are coming to know" (p. 2). This process often requires teachers to engage in emergent listening that entails "open[ing] up the possibility of new ways of knowing and new ways of being, both for those who listen and those who are listened to" (Davies, 2014, p. 21). Similarly, Carlina Rinaldi (2005) has written extensively about teachers' "pedagogical listening." From this perspective, it is important for teachers to move beyond listening for sounds, words, and meanings and include "listening to thought – ideas and theories, questions and answers of children and adults" without a preconceived view about what is right or appropriate (p. 12). Such practice is characterized by

the ways in which teachers engage with and attend to children, the ways in which teachers listen to children with intent and respect, and the ways in which teachers acknowledge children's words.

John Dewey's perspectives (1899 -1997), reflected in the contemporary writings of Harriet Cuffaro (1995), focused on the importance of key elements of classroom contexts on children's learning and development, that includes the creation of classroom settings, consideration of class schedules and use of time, and the provision of a range of materials. These elements reflect teachers' pedagogical and cultural beliefs (Cuffaro, 1995). Teachers' values regarding the role of play, and cooperative problem solving in particular, often influence the ways in which they create or modify classroom settings (e.g., provide a large space for children's play or cooperative problem solving). Further, teachers' beliefs about what is meaningful and significant for children to do during their preschool day also reflects on their provision of uninterrupted time for children. Such uninterrupted time often allows children the opportunity to engage in learning more deeply, often required for cooperative problem solving as they experiment and reflect on their thinking and actions (Cuffaro, 1995; Dewey, 1938/1963/1997). Additionally, teachers' beliefs about what children need to engage in learning experiences that actualize their potentials links to their decisions on what tools and materials they provide children in classrooms (Cuffaro, 1995; Dewey, 1902, 1938/1963/1997). For example, offering a wide range of open-ended materials (versus materials with single functions) encourages children to engage in a range of play episodes that develop a variety of skills and competencies including language development, problem solving, and social interactions (Pellegrini & Gustafson, 2005). Notably, it has been suggested that there are cultural differences in the expectations about what are appropriate play materials for children at different age periods (Sim, Hutchins, & Taylor,

1997). For example, compared to US preschools, Chinese kindergartens often have fewer toys and objects. This difference was associated with Chinese teachers' beliefs and emphases about the value of interpersonal stimulation, rather than child-object stimulation (Dollar, 1988).

### **The Role of Culture**

Decisions made by teachers are influenced by cultural and pedagogical beliefs and vary across diverse settings (Bruner, 1996; Edwards, Gandini, & Forman, 1992; Moran, Bove, Brookshire, Braga, & Mantovani, 2017; Tobin, Hsueh, & Karasawa, 2009). Particularly living in this period of rapid globalization, teachers' pedagogical beliefs are not only influenced by their own culture but also other cultures. As Tobin, Hsueh, and Karasawa (2009) delineated in their latest version of *Preschool in Three Cultures: Japan, China and the United States*, both Chinese and US early childhood educational goals and practices have shifted since 2005. In 1985 and 2005, teachers' beliefs and practices between two cultures were different. Chinese teachers emphasized control and regimentation, whereas the US teachers focused more on play and choice (p. 232). Twenty years later, the educational goals in China and the US have shifted. Chinese teachers are more focused on more "child-initiation and creativity" than at the turn of this century, whereas the US emphasis has moved away from child-centered practices toward more emphasis on "academic outcomes and teachers' role in instruction" (p. 232). As Tobin, Hsueh, and Karasawa explain:

[...] the fact that US preschools have become more academic and Chinese preschools more play oriented suggests not that they are converging toward a common end point but instead that they may be passing like two ships in the night. (p. 232)

Preschool systems in each culture vary due to their unique trajectory of evolution influenced by historical backgrounds, stage of economic development, politics, and globalization

(Tobin, Hsueh, & Karasawa, 2009). Globalization influences everyone, everywhere, but not at the same time or in the same way (2009). Particularly, the US and China have their unparalleled history of evolution that impacts their contemporary approaches to early childhood education (ECE).

**US early childhood education (ECE).** Different from other Western countries, the US is relatively new in offering ECE as a federal and state practice, governed by policies at both levels (Neuman, 2015). The initial idea of ECE originated from selected European countries in the early 19th Century when more mothers started working outside of their homes. The idea came to the US during the period of the Industrial Revolution, and many infant schools were created in churches, factories, and private homes while parents were working (Kagan, 2009). Infant schools were built in order to allow mothers to work and children to be cared for (Infant Society of Boston, 1828), especially for infants who lived in poverty. In the late 19th and early 20th Centuries, nursery schools appeared, and primarily served children from affluent families (Kagan, 2009). During World War I, the Great Depression, and World War II, although federal policy established some childcare facilities, they dissolved after each crisis. In 1926, the National Association for the Education of Young Children (NAEYC) was created in the US for the purpose of improving the quality of education and developmental services for all young children's wellbeing. In 1965, the federally-funded early childhood program, Head Start, was created as part of the War on Poverty, and continues today serving 1,100,000 children ages birth to five (Head Start, 2015). Based on a report from the US Department of Health and Human Services in 2005, Head Start had a modest influence on children's language development; nonetheless, the 2010 report showed that the program had no overall cognitive, social, or emotional influences at the end of the first grade (Puma, Bell, Cook, & Heid, 2010). The effects

of early childhood programs are mixed due to limited national standards about what is meant by “quality caregiving and contexts” (e.g., the quality of curriculum and teacher).

More recently, US policy frameworks lack a systematic, synchronized approach to guiding early care and education across the states (Neuman, 2015). Usually, preschool education is categorized as public or federally-funded, family day care, and center-based programs, in which children aged 3 to 5 enroll. First, the federally-funded programs such as Head Start and the recent public pre-k program movement were created for young children from low-income families in order to improve their school-readiness while enhancing their social, emotional, and cognitive development (Head Start, 2016).

Second, family or home-based child care takes place at providers’ homes and is sometimes characterized by poor quality settings and less-educated care providers, that are hard to regulate by the government and may negatively influence children’s development (Neuman, 2015).

Last, center-based care is often valued for its high quality care and positive effect on children’s development. Center-based care can be associated with a university or business, that includes highly educated teachers or caregivers, innovative curriculum for improving children’s development, and learning materials and experiences that promote a wide range of experiences (Coley, Li-Grining, & Chase-Lansdale, 2006; Dowsett, Huston, Imes, & Gennetian, 2008; Fuller, Kagan, Loeb, & Chang, 2004; Maccoby & Lewis, 2003). Compared with other types of child care in the US, center-based care is the most costly, which results in a majority of enrolled children from middle- and high-class families. It has been found that children who receive high-quality, center-based care show strong cognitive development related to competencies in math and reading skills as compared to children enrolled in family day care and federally funded



programs (Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Votruba-Drzal, Coley, Koury, & Miller, 2013).

Beginning in the 1960s, US early childhood education moved into a new period of evolution. This trajectory has been influenced by (a) Piagetian theory since the 1970s, (b) the adoption of a pedagogical framework known as *Developmentally Appropriate Practice* in 1986, and (c) the Reggio Emilia Approach to Early Education beginning in the early 1990s (Bringuier, 1980; Edwards, Gandini, & Forman, 1992; Griffin, 2004; NAEYC, 2009), among others.

**Chinese early childhood education (ECE).** Similar to the US, China is also in the stage of evolving an ECE that is historically influenced by multiple countries. Since the loss in the Sino-Japanese War (1894 – 1895), the Qing dynasty has had a great interest in the modernization of Japan and started learning from Japan, for instance, copying ECE from Japan and requesting Japanese teachers to train or serve as nursemaids (Huo, Neuman, & Nanakida, 2015). However, with the eruption of the patriotism movement on May 4th, 1919, the ideology of learning from Japan was replaced by learning from Europe and America. Many scholars like John Dewey (1859 -1952), Bertrand Russell (1872 – 1970), and William H. Kilpatrick (1871 – 1965) were invited to give lectures on pedagogical ideas and practices. As China became politically resistant to America in the early 1950s, American pragmatic theory and child centrism were criticized and replaced by Soviet thoughts and notions that reflected collectivist education patterns and using direct instructions.

By the 1970s, China was in the stage of reforming and opening to the West. The pedagogical ideas and approaches such as Montessori methods and the Reggio Emily Approach became valued in China. While opening to Western pedagogical values, China also attempted to develop ECE policies that reflected its national and cultural status (e.g., Confucianism) (Huo,

Neuman, & Nanakida, 2015; Pang & Richey, 2007). On October 31st, 1981, the Ministry of Education published the Kindergarten Education Outline (Trial Draft) in order to systemize children's age of receiving ECE and constitutes the mission of ECE including educating children across the domains of health, cognition, morality, and physical development (Huo, Neuman, & Nanakida, 2015). In 1989, the National Education Commission announced Kindergarten Work Regulations (Trial) and the Management Ordinance of Kindergarten, and they were the guidelines for "General Provisions, Enrollment and Class Arrangement in Kindergarten, Healthcare in Kindergarten, Education in Kindergarten, Rooms and Facilities in Kindergarten, Staff in Kindergarten, Kindergarten Fund, Kindergarten Management, and Supplementary" (Huo, 2015, p. 11).

More recently, China continues to evolve ECE programs and initiatives. In September 2001, the Ministry of Education published Guidelines for Kindergarten Education (Trial) that focused on "General provisions, Education Content and Requirements, Organizing and Implementing, and Education Evaluation" (Huo, 2015, p. 11). In 2010, the Central People's Government announced the Compendium for China's Mid- and Long-Term Educational Development including the goals that (1) 95% of children should receive at least one year of preschool education, and (2) 75% of children should receive a three-year preschool education by 2020. In the same year, the State Council announced The State Council's Several Suggestions Regarding Developing Preschool Education, which emphasized the importance of quality of preschool education and of equality of receiving the education. Unlike the US, China does not have any national standards that are similar to the National Association for the Education of Young Children (NAEYC), which guides program preparation, professional development, and quality ratings. Although China does have standards (e.g., Guideline for Kindergarten

Curriculum) for guiding preschool management such as staff qualification, equipment, school settings, and curriculum, the interpretation of standards is different from province to province (Hu & Li, 2012).

Different from the US, a kindergarten is the main formal early childhood education in China, which serves children from 3 to 6 years of age. The majority of Chinese kindergartens are located in urban areas due to its economic development as compared to rural communities (Hu & Li, 2012). Kindergartens can be classified as public, community, and private schools. Public kindergartens mainly serve children whose parents work for the government, institutions, enterprises, or corporations affiliated with governments located in the urban areas. Community kindergartens mainly serve children who are urban residents in particular neighborhoods. Private kindergartens tend to serve children from mid- and high-income families across urban settings. Among them, the kindergartens that are run by education departments represent high-quality practices as compared to other types of center-based care (Cleveland, Forer, Hyatt, Japel, & Krashinsky, 2007; Hu & Szente, 2010; Pan, Liu, & Lau, 2010). Children from low-income families are less likely to receive formalized early childhood education since the cost is too expensive to afford these programs without government or community assistance (Hu & Li, 2012). Some of them may even attend unregistered kindergartens that are illegal.

The evolution of ECE in the US and China could be viewed as a shift of cultural values, beliefs, and strategies (Tobin, Hsueh, & Karasawa, 2009). Often, the national educational system assimilates the national community by decreasing nuances across the community resulting in a perception that there is a homogeneous whole – a shared vision without variation (Komulainen, 2001). Although a preschool may comply with national educational standards, preschool classrooms are unique contexts that embody local mores and practices that reflect variations in

cultural contexts. These variations are often reflected in the exchange and negotiation among teachers and children (Bruner, 1986, p. 132; Martin, 2000).

In summary, theoretical, pedagogical, and historical perspectives have provided a lens through which to study teachers' beliefs regarding children's everyday classrooms experiences. It has been recognized that cultural contexts influence teachers' decisions related to their practice that includes their creation of classroom settings. Sociocultural theory emphasizes the role of social interaction in learning through engagement in joint activity from which shared knowledge is co-construct. From this perspective, the scaffolding of children's learning by teachers and more experienced peers is critically important. Further, teachers' pedagogical decisions regarding classroom settings, use of time in the classroom, and provision of tools and materials influence children's learning and development. These decisions and practices often link to teachers' beliefs about how children learn and when teachers should intervene, for example. Therefore, there is a need in the field of early childhood education for cross-cultural studies that are designed to investigate teachers' beliefs about children's cooperative problem solving during play in their everyday classrooms.

### **Methodology**

The purpose of this study was to understand preschool teachers' beliefs about children's cooperative problem solving during play, cross-culturally. With this research purpose in mind, two research questions guided the methodology.

1. What are teachers' beliefs about their roles in supporting children's cooperative problem solving during play in US and Chinese preschools?
2. How do teachers support children's development of cooperative problem solving during play in two cultures?

In order to answer these questions, three teachers from one Chinese kindergarten and three teachers from one US preschool center were recruited. The Chinese kindergarten located in the Northeast region of China, and the US preschool center located in the Southeastern region. They were all in the urban areas. This study has the approval of the Institutional Review Board (IRB) that regulates all research activities involving human subjects on the University of Tennessee Knoxville campus. Since conducting research in private kindergarten in the Northeast region of China only requires the approval of kindergarten director, all research activities in China adhered to the protocol in the US. Pseudonyms are used for all participants and places.

### **Research Context**

The Chinese kindergarten is a private kindergarten located in the Northeast region of China. The kindergarten is allied with a private university that offers pedagogy courses for university students. The kindergarten seeks to provide child-centered education for children's learning and development, across three programs that serve toddlers, preschoolers, and kindergarten aged children ( $n = 50$ ). Among the programs, there are two classrooms that include children between four and five years of age ( $n = 40$ ). Chinese classrooms were differentiated based on children's age. For instance, four-year-old children had their own classroom, as did the five-year-old children. Most children were from middle socio-economic status (SES) families.

Similarly, the US preschool is a university laboratory school located in the Southeastern region of the US. This preschool is a site for researchers and students to study children's development and teaching practices of student teachers and professional teachers and serves primarily middle SES families. The preschool includes four programs for infants, toddlers, preschoolers, and kindergarten aged children ( $n = 115$ ). Across the ages, there is an infant classroom, two toddler classrooms, three preschool classrooms and one kindergarten. Children ( $n$

= 46) enrolled in the three, mixed age preschool classrooms, between the ages of three and five, and their teachers (n = 4), were eligible as participants.

### **Participants**

Originally, seven teachers participated in this study, that included four Chinese teachers and three US teachers. Among them, only six teachers who were professional or “demonstration” teachers responsible for teaching children between the ages of four and five were selected. The one Chinese teacher that was excluded primarily taught three-year-old children. This study of teacher practice is part of a large study focused on preschool-aged children’s cooperative problem solving. For the purposes of this chapter, only the data from the teachers were analyzed.

A teacher meeting in each preschool center was arranged by the researcher with support from each director. During the meetings, the researcher explained the study procedures and answered teachers’ questions and concerns. The teachers who matched the criteria were selected, that included (a) they were the demonstration/master teachers, (b) they taught four- and five-year-old children, (c) they engaged in similar classroom practices such as the selection of materials and preparation of curriculum, and (d) they consented to participate. All qualified teachers consented to participate in the study.

Among the six teacher participants, there were three Chinese teachers from two different classrooms, and three US teachers from three different classrooms (see Table 4.1).

Table 4.1

*Teachers' Demographic Information (n = 6)*

Country	Pseudonym	Age	Race/ Ethnicity	Educational Level	Years of Experience	Children's Age Range for Teaching
China	Melanie	43	Han	Undergraduate	23	2 – 6
	Hazel	26	Han	Junior College	4	3 – 5
	Bella	29	Han	Junior College	10	2 – 5
US	Annabelle	31	European-American	Master's	10	3 – 6
	Reagan	28	European-American	Bachelor's	5	2 – 5
	Savannah	45	European-American	Bachelor's	20+	3 – 5

The Chinese teachers were all female, ranging in age from 26 to 43 with an average of 11 years of teaching experience. One teacher graduated from a four-year institution, and the remaining two teachers graduated from three-year professional teaching college programs. All teachers identified themselves as Han ethnicity (native Chinese). The US teachers' ages ranged between 28 and 45, with an average of 11.7 years of teaching experiences. Two teachers held a Bachelor's degree and one a Master's degree. The three teachers identified themselves as European-American.

### **Procedures**

Each teacher was interviewed, individually, for a total of two hours that spanned two separate occasions. Using a semi-structured interview approach, each interview included two parts. The first part was a traditional semi-structured, question-answer format, and the second part included a video-stimulated recall component. The first part of the interview was audio-recorded, and the second part was both audio- and video-recorded. The use of a *semi-structured interview* format is “well suited for the exploration of the perceptions and opinions of

respondents regarding complex and sometimes sensitive issues and enables probing for more information and clarification of answers” (Barriball & While, 1994, p. 330). Unlike a structured interview approach in which there is no deviation from a priori questions, the semi-structured interview often provides opportunities for a researcher to follow up on the participants’ comments and not be limited to the questions created outside the interview.

Three Chinese teachers were interviewed in September 2016, following the end of two-month, focal-child observation that part of the larger study in their classrooms. This teacher interview phase was part of the larger study comprised six days. The teachers were interviewed in Chinese. Similarly, the US teachers, they were interviewed between February and May 2017, across five days, following the four-month, focal-child observations. They were interviewed in English. Due to the challenge of scheduling and changing interview times, the final interview was not conducted until May. During each interview, the researcher took brief notes. The schedules and locations of the interviews were arranged based on (a) teacher’s and researcher’s available time and (b) teachers’ preferences of time and location to meet and conduct interviews.

**Part 1.** In this part, teachers were asked relatively broad questions to help them feel at ease, followed by increasingly more targeted questions.

1. To help me better understand how you view children’s cooperative problem solving, please share some thoughts on children’s cooperative problem solving experiences in your classroom.
2. What do you believe influences your children’s engagement in cooperative problem solving? What knowledge and skills do your children develop as a result of participating in problem solving with others?
3. How do you view your role during children’s cooperative problem solving?



4. How do you create opportunities for children's cooperative problem solving during play in the classroom?
- a) How do you go about preparing the environment for children's cooperative problem solving?
  - b) What do you think about when you make these decisions?
  - c) What materials do you provide/do they frequently use?
  - d) What spaces do you provide?
  - e) What are some examples (for each area of the classroom)?
  - f) Do you ever ask children to work together on a problem? If so, what are your reasons for asking them to work with particular friends?

**Part 2.** In this part, one, 3+- minute video clip of a problem solving experience in which the teacher engaged with children was selected from the focal child classroom observation videos. Each teacher watched one clip selected by the researcher based on a set of criteria. The criteria included clips that (a) started when a teacher joins focal child's play with peers, 2) showed a teacher actively engaging in the focal child's play with peers (e.g., talking with children, providing materials, giving suggestions, scaffolding, etc.), 3) were high quality (visually clear and audible), and 4) showed a teacher interacting with a focal child as she engaged in cooperative problem solving.

*Video-stimulated recall* is "a process by which participants [are] shown a video of an interaction that they have taken part in and then prompted by the researcher to reflect on their role within it" (Hadfield & Haw, 2012, p. 55). The video-stimulated recall process often a) helps teachers recall and analyze their classroom practices and b) prompts them to reflect on their roles in that moment of teaching (Stevenson, 2015). To guide teachers' visualizations of their practice

and deeply scrutinize their cultural and pedagogical beliefs related to supporting children's cooperative problem solving, they were asked the following questions.

1. What stands out to you in this video clip? What more can you tell me?
2. I would like you to expand on your role in this clip by recalling what you were thinking during this time? Wondering? Planning?
3. I would like to know more about your interactions with the children. What influenced your interactions with children?
4. What determines when you become involved in children's cooperative problem solving experiences?
  - a) Does this clip represent what you typically do with children?
  - b) When do you give more/less support? Why?
5. What do you think is the best way children can learn to solve problems with others? What do you think influences your thinking about this?

At times, depending on the content of a teacher's response, the researcher posed additional questions that varied across the participants.

After each interview, the researcher wrote entries in her research journal about her "presuppositions, choices, experiences, and actions during the research process" (Mruck & Breuer, 2003, p. 3). The research journal entries allowed the researcher to record (a) the events she experienced throughout the process, (b) her feelings and thoughts from the events, and (c) reflections on her evolving subjectivity (Lincoln & Guba, 1985). Researchers often bring their subjectivities to the research field site consciously and unconsciously, which may influence their quality of their investigation (Peshkin, 1988). One's subjectivity is "an amalgam of the persuasions that stem from the circumstances of one's class, statuses, and values interacting with

particulars of one's object of investigation" (p. 116). Rather than trying to ignore her subjectivity, constantly being engaged in critical self-reflexivity helped the researcher acknowledge and attempt to account for her subjectivity as it relates to the potential impact on her research field and data collection process (Crossman, 2014). For instance, on December 2, 2016, the researcher wrote about her challenges during her classroom observations as:

I tried not to disturb children's play while videoing; however, I could not stop children from approaching me or asking me questions. Sometimes my verbal interaction with children was also recorded during the observation.

When William and Daniel engaged in symbolic play in the block area, they talked about their private parts, which I was not sure whether it was appropriate to video their verbal communication. However, I did not want to miss any of their cooperative problem solving and play, so I decided to keep videoing them.

### **Data Sources**

In this study, the primary sources of data included teachers' interview transcriptions, and the secondary data sources were the researcher's field notes ( $n = 57$ ) and research journal entries ( $m = 74$ ). Particularly, field notes were recorded after an observation in a notebook first and then copied and typed into the researcher's personal computer. Each field note included (1) descriptive, (2) methodological, and (3) analytic notes (Bernard, 2006). The descriptive notes comprised the comments regarding particular aspects of the physical settings (e.g., the number of people in a classroom and class routines). The methodological aspects included participants' reactivity to the observer, challenges of observing, the time and reason for stopping an observation, and ethical dilemmas. The analytic notes included daily impressions or assumptions that emerged during and after each observation and follow-up questions that needed to be

investigated (Lincoln & Guba, 1985). These field notes were treated as secondary data to supplement explanations of what potential factors or situations may have contributed to children's variations in the incidence of play and cooperative problem solving.

The content of the US teachers' interviews was transcribed verbatim in English by using VLC media player software (digital media player software). For the Chinese teachers, their interviews were transcribed verbatim in Chinese, first, and then translated into English. English transcriptions were used for the qualitative analysis.

### **Data Analysis**

Teachers' interview transcriptions (n = 6) were coded recursively with the qualitative analysis software, NVivo 11. The *constant comparative analysis method* was used to triangulate and compare the data (interview transcriptions, researcher field notes, and research journals) in order to engage in inquiry regarding teachers' beliefs and practices related to supporting children's cooperative problem solving during play and generating "a thick description" of these experiences (Geertz, 1973; Glaser & Strauss, 1967; Lincoln & Guba, 1985).

**Coding.** Data coding comprised two stages that included (a) open coding and (b) code "winnowing" (Creswell, 1997). During open coding, teachers' transcriptions were read and reread thoroughly in order to have a comprehensive understanding of the narratives. The researcher read transcriptions "in their entirety several times. Immersed [herself] in the details, trying to get a sense of the interview as a whole before breaking it into parts" (Agar, 1980, p. 103). While reading, the researcher wrote memos in NVivo, including "short phrases, ideas, or key concepts that occurred" to her (Creswell, 1997, p. 144). For instance, on October 27, 2017, the researcher recorded a memo as follows:

*Image of The Child:* Teachers believe what children are capable to do something, and what skills or knowledge are important for children to develop in particular age period.

*The Role of Teachers:* Teachers involved in children's play or cooperative problem solving when children have conflicts. Teachers decided not to be involved in children's play or cooperative problem solving. Teachers directed class activities. Teachers assigned particular children to play or work together (e.g., compete by gender). Teachers provided emotional support

*Classroom Settings:* Teachers provided class or play materials for children. Teachers created space or play areas for children. Teachers decided how long children could play.

*Curriculum:* Teachers taught lessons or courses (e.g., literacy, mathematics, art, music classes, etc.)

*Free Play:* Teachers described particular rules for free play.

Based on some of these concepts, the researcher created a figure to help her consider initial connections among the main concepts (see Figure 4.1).

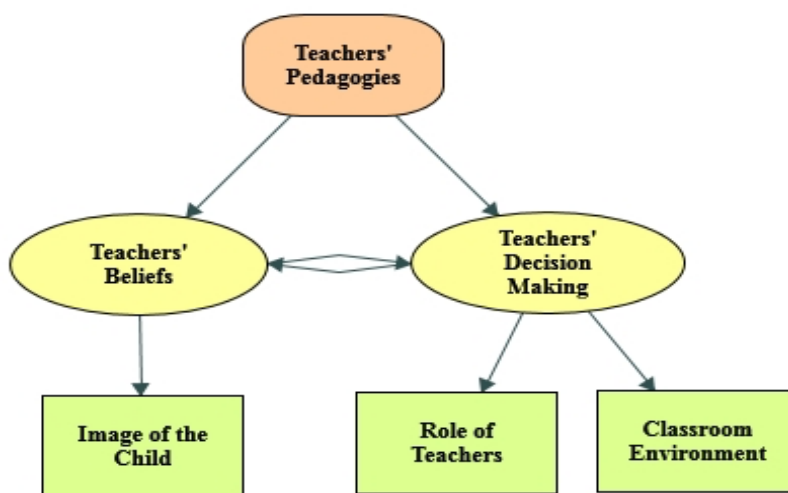


Figure 4.1. The concept map.

Particularly, the concepts including (a) image of the child, (b) role of teachers, and (c) classroom environments were frequently noticed by the researcher while reading and recording memos.

The researcher began the process of “breaking down, examining, comprising, conceptualizing, and categorizing data” (Strauss & Corbin, 1990, p. 61). Twenty-nine codes were initially identified through the first-round of coding, with the frequency of each code ranging from one to 184 (see Table 4.2).

During the stage of code winnowing, twenty-nine codes were collapsed into 22 categories after an integration of similar codes into categories. Among the codes, some of them were integrated due to their similar “metaphors.” For instance, the codes (the role of teachers, community, and competition between gender) were integrated and categorized as “the role of teachers” since they all reflected teachers’ decisions regarding how to teach children. Similarly, the codes (classroom environment, free play, dramatic play, and curriculum) were consolidated and categorized as “classroom environment” because they were associated with play settings, play schedules, and play materials. Following this process of integration, 22 codes were remained (see Table 4.3).

Table 4.2

*Identified Codes Across Six Teachers' Interviews Transcriptions (n = 6)*

Codes	Interview Sources	Code Frequencies
Image of Child	12	91
Classroom Environments	12	82
Role of Teachers	12	184
Cooperative Problem Solving	9	18
Free Play	8	19
Curriculum	6	22
Teaching Experiences	5	7
Personal Experiences	5	17
Teacher-Parent Relationship	4	14
Factors_Influence_Cooperative Problem Solving	4	13
Parents' Parenting	3	6
Self-Reflection	3	9
Dramatic Play	2	3
Gender Differences in Play	2	2
Professional Development	2	7
Grandparents' Parenting	2	7
Educational System	2	4
Children's Feeling toward Teachers	2	4
Gender Differences in Cooperative Problem Solving	2	2
Community	2	9
Competition between Gender	1	3
Sexual Education	1	6
Disagree One Child Policy	1	7
Not want to be videoed	1	4
Video-Stimulated Recall	1	4
Teacher Personality	1	1
Outdoor Play	1	1
Teacher Emotion	1	3
Mentor	1	2

Table 4.3

*Identified Categories Across Six Teachers' Interviews Transcriptions (n = 6)*

Categories	Codes
Image of Child	
Classroom Environments	Free play; Dramatic play; Curriculum
Role of Teachers	Community; Competition between Gender
Cooperative Problem Solving	Factors_Influence_Cooperative Problem Solving
Teaching Experiences	
Personal Experiences	
Teacher-Parent Relationship	
Parents' Parenting	
Self-Reflection	
Gender Differences	Gender Differences in Play; Gender Differences in Cooperative Problem Solving
Professional Development	
Grandparents' Parenting	
Educational System	
Children's Feeling toward Teachers	
Sexual Education	
Disagree One Child Policy	
Not want to be videoed	
Video-Stimulated Recall	
Teacher Personality	
Outdoor Play	
Teacher Emotion	
Mentor	

**Constant comparative analysis method.** Teacher interview transcriptions, researcher field notes, and research journal entries were compared using the constant comparative analysis method (Glaser & Strauss, 1967). This method was used to reduce the data through constant recoding and comparing incidents or data to other incidents or data. As Wolcott (1994)



suggested, not all information can be used, and some categories, ideas, or concepts may be discarded in a qualitative study. Among the 22 categories, only three were frequently, repeatedly occurring across all interview transcriptions, and they were also associated with the research questions which were created to guide the investigation of teachers' beliefs and decisions regarding supporting children's cooperative problem solving in their classrooms (Huberman & Miles, 1994). Therefore, three categories were ultimately created, including (a) image of the child, (b) role of teachers, and (c) classroom environments. Descriptions and examples of these categories are described below (see Table 4.4).

Table 4.4

*Descriptions and Examples of Three Categories*

Categories	Descriptions	Examples
Image of Child	It represents teachers' beliefs about children's abilities of cooperative problem solving and learning, and teachers' expectations on what children need to learn or develop in different age period.	"They have an ability to solve a problem during play"  "They're just now learning how to really interact with others."  "I think some children do cooperate with others and share toys during play, and some may be lenient and modest and consider other's feelings more."
Role of Teachers	It represents teachers' descriptions about how they view themselves in teaching and in the relationship with children, and their decision-making on when and how to step in or step back during children's cooperative problem solving and play.	"We'll try to guide them [...]"  "I try to listen to [...]" "Often we try to step in fairly quickly [...]" "[...] I think my role is to watch and listen."
Classroom Environments	It represents teachers' decisions and explanations on classroom arrangements, class materials, and class schedules for children.	"block area"; "light area"; "space" "open-ended materials"; "arranging toys by colors" "schedule"; "play more"

Particularly, teachers' individual perspectives regarding their image of the child, the role of teachers, and classroom environments were compared within and between the two cultures with supplemental evidence drawn from the researcher's field notes and journal entries.

**Trustworthiness.** Trustworthiness of study findings was established followed the criteria for assessing research quality and rigor that suggested by Guba and Lincoln (1982). Findings emerged from a range of procedures that included (a) a prolonged engagement in the research field, (b) coding and recoding, (c) triangulation of data, (d) peer examination through checking in with participants for clarification, when needed, and (e) the writing of thick descriptions of teachers' beliefs and practice (p. 30).

The data presented in this study drawn from a larger study that comprised of a 10-month field work in two research sites (China and the US). This long-term study provided an authentic perspective that influenced researcher's decisions on "what is salient to the study, relevant to the purpose of the study, and of interest for focus" (Creswell, 1997, p. 201). As Fetterman (1989) suggested, working with participants every day for long periods of time provides research "validity and vitality" (p. 46).

Coding-recoding occurred during the stage of open coding in order to identify and saturate codes that emerged from teacher transcriptions. Identified codes were compared across multiple data sources (interview transcriptions, researcher field notes, and research journal entries). This triangulation procedure involved "corroborating evidence from different sources to shed light on a theme or perspective" (Creswell, 1997, p. 202). Before finalizing the findings, an "outside" researcher reviewed the research questions, methodology, data analysis, and interpretation of findings to ask questions or express disagreements (1997). When there was a disagreement between the researcher and the "outsider," periodic discussions (once/twice a

week) were conducted until they achieved a mutual agreement. With mutual agreements, a thick description of findings was generated later by (a) quoting the participants' own words, (b) excerpting written entries from the researcher's field notes and journal entries, and (c) describing the research classroom contexts with images and field notes taken during weeks of observation.

## **Findings**

Data regarding teachers' beliefs about and decisions for supporting children's cooperative problem solving were analyzed. Findings regarding (a) teachers' image of the child, (b) the role of teachers, and (c) teachers' decisions related to their creation of classroom environments emerged. Each finding reflects differences and similarities across teachers by situating their beliefs and pedagogical practices within their particular cultures.

### **Image of the Child**

Although teachers' image of the child was broad-reaching, for the purpose of this study, two of the most salient aspects of the image of the child, included that of children's competency and autonomy. In particular, the similarities and differences among teachers' views in both cultures were identified that included (a) the competencies of children to solve problems with and without teachers' guidance and (b) the autonomy of children when making their own choices.

**Children's competencies.** Teachers in both cultures believed that children were capable to solve problems with others cooperatively, whereas their view toward their interaction with children varied. Chinese teachers often encouraged children to seek help or support from peers. This practice was informed by their beliefs that children could solve problems with peers without teachers' support. For example, when Hazel (China) treated children as an adult, she realized that children revealed their abilities to solve problems without a teacher's help:

[...] I feel that we need to treat children as an adult sometimes since they are an individual who has a unique idea. We don't need to treat them as a child always but rather view them as an adult. Children will grow up eventually and face various problem in the future. When we treat them as an adult, we see that they have an ability to do things that go beyond our expectations.

For Bella (China), she often asked children to seek help from their peers instead of from her, and by doing that, she found that children helped each other more:

Initially, a child may come to me for help. Later, he gradually knows that I won't solve a problem for him, so he will solve it with other children. [laugh] A child may say to another child that, "You just pushed me, and you need to apologize to me," and the child looks at him and says, "I'm sorry. It's an accident." [laugh] [...]

Although US teachers also expected children to solve problems with their peers without a heavy presence of teachers, they wanted to equip children with skills and language before that. This decision seemed linked to their beliefs that each child has her own developmental levels that required different levels of support. For example, Savannah (US) wanted children to experience different problems and develop skills to be problem solvers instead of always helping them solve their problems:

What our job is and what we hope that children gain through these experiences is that they develop the skills to be problem solvers on their own. So, teachers may have to intervene very heavily in some cases, but what we hope to see is growth and children taking next steps, so that the teacher can start removing himself or herself from the situation to allow children that opportunity to do that a little bit more. I won't even say independently because usually it's a negotiation with others but at least doing that

without the heavy presence of an adult facilitator. We want to help them understand and build a good solid foundation, so that they can build on that and that we can then start taking a step back – not because we’re not interested – not because we don’t want to be supportive but because it’s just a good skill for children to learn, because we all encounter problems every day, and so learning to be able to be good thinkers and problem solvers just help us navigate lives better.

Similarly, Annabelle (US) believed that the best way that children learn to solve problems was practicing. Through this process, children need guidance and support; however, she emphasized that it was also important for children to realize that they could solve problems on their own instead of depending on her to solve problems for them:

[...] I think one of the best ways that children can learn solve problems is [pause] practice. You know, they have to practice it, and they have to try it. And they do need to have guidance and support and they have to be okay, you know, realize it is okay to maybe need to try something again [...] I think it’s really important for children to realize they can do it on their own. Often times you’ll see children, like, turn to an adult consistently and be like, ‘Hey, I need your help. So and so, solve it for me.’ And they’re not actually solving it. They’re just acknowledging it is a problem and I don’t like it.

Whereas if a teacher steps in, that’s all they know is, ‘Oh, I gotta’ get a teacher. She can solve this for me.’

Although teachers in each culture perceived children were competent to solve problems cooperatively, they varied in the degree to which they strove to scaffold and prepare children to be ready to solve problems with peers. The Chinese teachers believed that children needed opportunities to practice working with peers instead of only relying on teachers, whereas the US

teachers provided more guide and support to equip children with skills and language, so that they could use and practice them when they worked or played with peers.

**Children's autonomy.** The teachers in two cultures reflected similar beliefs that children have autonomy to make independent choices and to decide whom they wanted to work or play with and what solutions they wanted to choose for solving a problem. For example, Bella (China) believed that children could choose to decide whom they wanted to work with or from whom they wanted to ask for help:

I would ask them to solve a problem together in the class, but I don't ask them to engage in cooperative problem solving. If they have a problem, they can choose to work together to solve it or ask others for help. It's their decision how they want to solve it.

Also, Hazel (China) provided children opportunities to take a risk and solve problems cooperatively with peers without her support:

Hazel: One day I saw a few children try to climb on the "monkey bars". Both Jame and Lucy wanted to try. They talked to each other and said, "How about we pile up these tires under the monkey bars?" They started piling up tires, and then they were able to stand on the tires and touch the monkey bars. You could see that they had fun while swinging on it. [laugh] I mean they are smart, and they could work together to solve a problem.

Interviewer: [laugh] They are very smart.

Hazel: Yes. They knew what tools they needed and how to use them to solve a problem.

Interviewer: Did you intervene them?

Hazel: I didn't stop them. If the tires were not stable, or if they might fall, I would support them without causing any injury. However, I did not think that situation was dangerous for the two, so I did not stop them but rather watched them. It's interesting to

see their behaviors. You could also see that they were having fun while swinging on the monkey bars. Jame is a little heavy, and when he swung on it, you could see a pole was shaking. [laugh] I didn't want children to feel like, 'Teachers will not allow us to do anything.'

Similarly, Savannah (US) wanted to ensure children exercised their power and autonomy to decide how they wanted to solve problems although their solutions might not be the ones she wanted:

[...] we also want to give them power and autonomy and being able to make independent choices. So sometimes the resolution to their conflicts may not actually be what I would have first thought of, but if it's something that they agree upon, and they feel like that they're both fine with the resolution, then if that's what they want to do, we want to empower them to be able to make those choices, and so we really encourage problem solving.

For Annabelle (US), she had a hard time not stepping in too much; however, when she encouraged children to solve problems on their own, she realized that they actually did not need a teacher's help:

I try to be more of a support or guide. It's not necessarily having to be there but being available. For example, we had two children who were trying to set up a long black track outside the other day, and both children had two different ideas. And I stepped back. I didn't stay, and I wanted to let them try to do that. But I kept my mouth shut, which was really hard. [laugh] You know. One of those moments where I was like, 'I need to bite my tongue and just let them try to solve it on their own.' And [pause] the both of boys turned to look at me at a couple of times, and I was like, 'You can do it. I'm right here if

you need me. But, you know, you can do it.’ They were able to talk to each other, and they didn’t need my help. But I was still there as a support if they felt like they were having a hard time. Or if they wanted or needed me there, they could have been like, ‘Hey, Annabelle, can you come help me?’ Whereas, you know, if I had stepped in and solved it for them, they would have missed out on trying to explain their ideas to each other and reaching a shared idea together.

Teachers in both cultures shared their different pedagogical approaches that revealed the ways they valued children’s autonomy. Sometimes, they also allowed children to take a risk because the teacher believed they had the ability to solve problems together without teachers’ support. Instead of viewing themselves as “the holders of knowledge,” teachers distanced themselves from children by providing “space” for children’s engagement in cooperative problem solving (Moran & Jin, 2016). This stepping back behavior characterized the teachers’ beliefs about their roles to protect and nurture children’s rights to “participate in the decisions about what and how they learn and with whom they learn” (p. 3).

### **Role of Teachers**

The teachers in both cultures expressed their various roles they assumed based on their perceptions of children’s needs and interests. They often stepped in fairly quickly when they perceived there was a danger emerging in children’s play. When there was no danger, their roles were often to watch and listen. Teachers reported that they typically guided and supported children (a) when they could not solve a problem or conflict with peers, (b) when children asked for teachers’ help, and (c) when they perceived that children needed additional help from an adult. However, the degree of teachers’ support varied between the two cultural contexts. In particular, the role of teachers was distinguished into (a) teachers’ perceptions about their



listening and physical proximity to children, and (b) teachers' emphasis on supporting children's shared understandings and shared responsibilities when confronting problems.

**Listening and physical proximity to children.** Teachers in two cultures perceived their role of listening during their interactions with children differently. The Chinese teachers perceived listening in ways of acting in an authoritative, dismissive, or compassionate way. For example, Bella (China) believed that children needed to be afraid of her while she was teaching, and this feeling was needed so that children would listen to her. Although she emphasized the teacher's authority in teaching, she also included her role as a friend during children's play:

Bella: If they are not afraid of me, they would not listen to me sometimes.

Interviewer: Not listen to you?

Bella: They won't listen to you. You can see a chaos when the nurse leads a lesson. I think we need to have teacher authority whenever it is needed. When I don't use the authority, I can play with them. Like me, the children enjoy taking pictures and often say, 'Bella, let's take a picture.' So, we also like being with each other. We also often play together [...] you can see children's reactions when they see me. They come to me and talk to me. I sometimes joke with them. I often joke with Lily and touch her short braid. [laugh] If children like you, they will show it. Also, I often bring snacks to them.

Normally, I don't use teacher's tone to interact with them. I think children know how to solve a problem. But they would be afraid of me.

Interviewer: Their fear toward you would let them follow some rules?

Bella: We must show teacher's authority while teaching.

Interviewer: Authority?

Bella: Yes, but it's not needed while playing.

For Melanie (China), she sometimes refused to listen to children when they came to her to express their “complaints”. Her reason for this action was associated with her belief that she did not want children to rely on her authority to solve their problems:

Melanie: Like the child, Alice, she used to have a strong ego and put her needs first before others’. She did not allow others to touch her and even manipulated others’ behaviors. During a period, she did not have any friends, so she came to me for help. For me, I think I could not help her solve this problem. I said, ‘I could not help you ask others to play with you. Only when you try to open your heart and like others, they will like you.’ Then, I talked to her about her issues like complaining and said, ‘You complained about everything that you didn’t like. How do you feel if someone comes to me and complains about you? When someone accidentally stepped on your foot, you screamed and shouted at them. How do you feel if someone screams at you? Do you like playing with someone who always complains about or screams at you?’ She said, ‘No, I don’t like.’ ‘So how would you do to make people like you? People want to play with others who like playing with them.’ After this communication, she knew better about her issues. If she came to me to complain about something, I often refused to listen and said, ‘You can solve it with others without me.’ You can see that she started complaining less. Even she complained about something, it’s because of the problem that she and others could not solve it.

Interviewer: Refused to listen?

Melanie: Yes. I refused to listen, and I won’t intervene. I told her that, ‘I cannot solve it, so try it yourself.’ I let her know that complaining cannot do anything and only she can solve it.

Interviewer: You wanted her to be more independent rather than always depending on you?

Melanie: Yes. Children don't need to always depend on teachers. I don't want children to rely on teachers' authority to solve a problem.

Although Bella (China) and Melanie (China) emphasized authoritative and dismissive listening, Hazel (China) did assume the role of a more compassionate listener when she was interacting with children:

When children feel upset, I take a role of the Sister Zhixin [Educational Psychologist] to listen to their worries. [laugh] When a child was upset, I asked her why. A child was upset because she did not like the socks she was wearing. I talked with the child and tried to understand why she did not like the socks, and it would be the way to solve her problem and make her happy again. Often, I take different roles based on children's needs. If you approach a child whenever he needs you, he will feel close to you and trust you more.

For the US teachers, they emphasized the role of listening in ways that not only encouraged children to learn to listen to each other but also situated themselves in a position that they could listen to children. For instance, Reagan (US) acknowledged the importance that children not only express their own ideas but also learn to listen to others':

Cause everybody has different experiences, and therefore, they have different things to bring, and so I think that's helping children figure out, you know, how to actually listen even if they're really excited about their own idea or they're really upset, you know, to be able to take in another person's words to hear their ideas or their perspective on a situation gives that child more information about what's happening or what they're

doing, or different ways to think about that something they're encountering, which just provides a whole other learning experience.

For Annabelle (US), she stepped in often when children did not listen to each other. She guided children's understandings regarding the verbal and emotional cues that their peers were trying to convey to them. Meanwhile, she also listened to children and worked to be aware of and hear both sides of the story from children:

A lot of it is like reading their verbal or emotional cues like their facial features will often give it away. You know, someone becomes really frustrated, and you know, their peer is not listening to them. I'm going to step in at that point and will be like, 'Hey, I can tell that so and so is really upset here. Their faces have a really big frown on it, and they're starting to become even more upset. I think we might need to stop and talk.' [...] I try also to listen to, you know, their words if I cannot see their faces for some reason, you know, they're talking in a corner or something, but I can hear them escalating and getting louder and louder, I'm probably gonna' walk over and be like, 'Hey, is everything okay?' you know. And just, you give them a moment and see what's going on. And usually at that point I'll step in and be like, 'Okay, well, why don't you tell your side, and you tell me your side? Then, we can figure out how to solve this instead of getting mad at each other.' That seems to decrease a lot of what could happen in our classroom.

Savannah (US) also valued the role of listening to children both when she is in close proximity to children or across the room from them. She listened for cues that children's voices started to elevate, yet she often did not intervene immediately because she wanted the children to continue to solve problems on their own. When the children were at a point of feeling stuck, she stepped in and scaffolded their attempts:

I think that one of the first things I do is really just try to be very aware of what's happening in the classroom without necessarily being in close proximity. So, for instance, I could be doing another job closing the blinds, getting prepared for nap time, or putting out the cots or assisting a child in a small group activity. But the keys that I listen for are when children's voices start to elevate. You can kind of tell that excited sound that they have, and so that always gets my attention. That doesn't mean that I'm gonna' mediate immediately and go over and intervene, but I usually pause and even try to not let the children know that I'm aware of what's happening because sometimes if they're noticing that I'm aware, they'll invite me into - into the process when really I want them to continue solving it on their own. Now, then there sometimes becomes a point where you realize that children are stuck in the situations, and so you may get a lot of 'yes, I do.' 'no, I don't.' 'yes, I do.' 'yes.' 'no.' 'yes. They're stuck. And so that's when usually a teacher will step in to scaffold that situation to say, "Tell me what's happening here."

Savannah's role of listening is also reflected in her support for children's conflict resolution when she is close physical proximity (see Figure 4.2).



*Figure 4.2.* Savannah's interactions with two boys for their conflict resolution.

In her approach, she asked both boys to sit next to each other. She was listening to their stories about what happened and what might cause their conflict by including both sides of the story.

Teachers' beliefs about how and when they listen, not only in regards to hearing children's voices but also in their engagement with children, their positioning of the degree to which they intervened reflected a diversity across the two cultural contexts. For example, Chinese teachers were more likely to emphasize authoritative, dismissive, and/or compassionate listening, whereas the US teachers were more likely to emphasize reciprocity of listening only during child-child interactions and during teacher-child interactions. For the US teachers, this reciprocity also allowed them to decide whether to provide to move in to physical proximity to listen and support children or to wait and see if the children could work things out for themselves.

**Shared understanding and shared responsibility.** Teachers in the two cultures valued evidenced a genuine interest in the development of shared understanding and shared responsibility when they viewed themselves as a member of their classroom and school communities. This idea of community not only allowed them to view a problem as an individual problem but also a joint problem that needed members of a group to work together in order to solve it. Although teachers in both sites presented described similar values related to how they viewed shared understanding and responsibility, they revealed differences across their pedagogy. Chinese teachers viewed the kindergarten as a collective environment, and they expected children to not only be aware of collectivism but also to develop this ideology. For example, Hazel (China) recognized that children in contemporary society were lacking a sense of collectivism because they seemed to reveal a strong level of self-consciousness. Although she

admitted that children needed their own self-consciousness, she also emphasized that children needed to have collectivism for their future development:

As many families have only one child now, children are lacking collectivism [and are] more self-consciousness. How to say it. It doesn't mean that it's bad that children have their own self-consciousness. But I think this kind of children may show low resilience to failure in the future since they would be easy to upset when they could not do whatever they want. They may lose interest in doing other things. I think children can have their own self-consciousness and do as they think. However, children may turn to selfish in some extreme situations, and their only concern [is] their own feelings and disregard others'. [...] we want children to have collectivism when they are in the kindergarten because we are in a collective environment [...]

Bella (China) also valued collectivism, and this value was reflected in her teaching practices when grouping children by gender, in order to compete with each other:

They also show the collectivity in the class when I separate them into two groups by the same gender and let them compete. They work with group members very well, and you can see their collectivity [...] They work together as a group and show a strong collectivity. During individual competitions, children may not perform as well as when they work as a group, and they may only care about themselves. When I say that, 'Some boys were not active, so all boys will not get a reward this time. You're a team' the boys would realize that they need to complete a task together if they want to get a reward. It's possible that some children don't know the meaning of collectivity.

On the other hand, the US teachers used a different approach to encourage children to achieve a shared understanding when problem solving. They viewed the classroom as a group and

community, and believed that a community was responsible for not only supporting each child to solve problems but also guiding children toward group work on problem solving. For example, Annabelle (US) believed that problem solving required lots of skills about how to negotiate with each other and how to reach a shared agreement. When she saw an issue of individual problem solving, she often asked other children to join group discussions and solve the problem together:

Well, there is a lot of figuring out how to negotiate with each other and turn-taking. There is just problem solving in general, you know, figuring out how can we reach a shared agreement on something. It's not an easy skill. Even adults have a hard time with that a lot of time. [laugh] Sharing is a big piece, too. All of it. Sometimes, you know, if it's an issue where they're trying to build something, you know, that might be a really good time to bring the rest of the group together and have everyone take a moment and talk about, 'Oh, how could we solve the problem of building this really tall tower that keeps knocking down?' Maybe we work on trying these ideas and, you know, learning to listen to others' thoughts and ideas and seeing if someone else's idea actually solves the problem whereas that one idea you had, didn't. I think there is also like the ability just to ask for help from other friends and not just adults is a big piece to it.

For Savannah (US), she also viewed her class as a community. She emphasized the value of developing a shared understanding and shared responsibility in this community by including children as a part of the problem solving process, instead of her controlling the process:

[...] but there are also times that I might just, in the moment, call a meeting for children. I think about situations outside where maybe – we have a lot of what we called loose parts that might be bricks and rocks and sticks, and things that are very open-ended materials that children can use for whatever purpose they see fit. But there are times



when you have a long-pointed stick, and you're pointing it at someone, or you're trying to hit their body with it, that teachers are gonna' need to intervene to keep everyone safe. And, so, let's say that there is a situation where I'm seeing a repeated behavior by multiple children over a period of time. It could be in that moment, I call a meeting and say, 'Hey, we're gonna' have a preschool meeting. Everybody come over for a minute.' And the meeting won't be designed to be a reprimand for children but a problem solving opportunity to say, 'We're community. We're group. This is a situation for all of us to be aware of. I'm recognizing a problem, and I'm gonna' need your help to resolve it,' and so instead of me saying, 'Here is the problem. Here is the demand, and here is the consequence if you do it again.' Because, that's me again taking control of the situation.

Although teachers in both cultures emphasized the importance of shared understanding and shared responsibility, their teaching approach revealed a difference. Chinese teachers were more likely to use teacher-directed activities (e.g., group competition) to emphasize children's development of collectivism, whereas US teachers were more likely to guide children toward group discussions to solve an individual or shared problem as members of the classroom community.

### **Classroom Environments**

The classroom environments in the China and the US preschools displayed their uniqueness in a variety of ways including (a) the classroom arrangements, (b) the provision of play materials, and (c) the engagement of children in continuity of play episodes.

**Classroom settings.** The arrangements of the classroom settings were different not only cross-culturally, but also within the cultures. Between the two cultures, US classrooms included a variety of play areas as opposed to the Chinese classrooms. Each of the US classrooms

included 11 to 12 play areas, such as writing space, ramps area, block area, book area, art area, imaginary play area, and light table experiences, whereas in the Chinese classrooms space was primarily comprised of tables and chairs for children's constructive play (e.g., plastic gear shape blocks, snowflake, tube connectors, and water play toys) and shelving.

Within each culture, classroom settings differed as well. In the Chinese kindergarten, Bella's classroom was different from Melanie's and Hazel's classroom. As Bella (China) described how the children in her classroom often played at two big tables, and they were often separated by gender:

[...] as I talked before, I separate them by the same gender. Boys and girls prefer different types of play. For girls, they may build a castle or prefer girls' toys, which is different to boys. Girls sometimes are even hard to involve in boys' play, so I let them play separately. I think it's also because I always do it this way, and it becomes a habit. Bella's decisions regarding the creation of gender specific groupings during free play were also noted in the researchers' observational notes and photographs (see Figure 4.3).



*Figure 4.3. The free play in Bella's classroom.*

Unlike in Bella's classroom, each child in Melanie's and Hazel's classrooms had individual desks and chairs. These classroom contexts were also consistent with the researcher's journal entries:

Melanie's and Hazel's classroom contexts are different to other classrooms, which has no roundtable for children to sit together. The children from Bella's classroom and middle class often sat around one or two table(s) and played together, in which more cooperation with each other occurred. However, each child in Melanie's and Hazel's classroom has their own tables and chairs, and this classroom context is similar to Chinese traditional classrooms including tables, chairs, and one blackboard (research journal entry, September 7, 2016).

Melanie (China) explained that this decision was based on her intentions toward less disturbance between children while writing whereas still maintaining their cooperation during play:

Interviewer: When I was in the middle classroom and Bella's classrooms, I saw children played either on the floor or at a big table, which is different from the children in your classroom. They only played at their own tables.

Melanie: Yes.

Interviewer: Would you talk about your ideas or beliefs regarding this decision?

Melanie: For the children in Bella's classroom, they often play around a big table and interact with peers. For the children in our class, two children could put their tables together, and they still have opportunities to interact with each other.

Interviewer: The opportunities for interacting with each other.

Melanie: The reason that our children have their own desks is to decrease the level of disturbing each other. When a child erases his writing, he may disturb another child's

writing who sits at the same table, since you can see that the table is shaking while he is erasing.

Interviewer: During free play or playing with blocks, if children put their desks together and play without your permission, you will?

Melanie: I won't stop.

As Melanie described, children often played with materials at their own tables, whereas they were still free to move around in the classroom to interact with peers. This phenomenon was recorded in during the researchers' classroom observations (see Figure 4.4)



*Figure 4.4.* Children's free play in Melanie's and Hazel's Classroom.

Further, Hazel (China) explained that this arrangement was also designed to support children's successful transition to elementary school:

Help children be familiar with elementary curricula. It's preparation for children.

Meanwhile, the children in this age need to learn something. Since we have a test-oriented educational system, we still need to equip our children with some skills to adapt to the system.

Compared with the Chinese classrooms, the US classrooms provided a variety of play areas, and the classroom settings were often associated with teachers' understandings of children's interests and needs. This phenomenon was reflected in the researcher's field notes:

William and Daniel played in the block area for 8 minutes, and I stopped videoing them when William left the area for snack [....] I found that Aiden was playing with one boy in the sand play area for 2 minutes and 30 seconds. When the assistant teacher called them to have toilet time, Aiden left the area. Hence, I stopped videoing him [....] I saw that Claire was working on her puzzle, and one boy approached her and wanted to make his puzzle, too. When Claire finished hers', she started helping the boy put puzzles together. They were having trouble and did not complete the task in the end since the boy left the puzzle area. I stopped videoing Claire after an 11-minute observation since only Claire was in the puzzle area. I began videoing Mason when he was at the light table with one boy. They played dinosaurs and engaged in symbolic play a lot. (field notes, December 5, 2016)

Although the US teachers provided various choices for children's play, each teacher's decision regarding how to arrange their classroom settings varied. For instance, different from the other classrooms, Reagan (US) divided her classroom into three learning centers to better support their ability to stay focused on what they were doing by limiting the number of play choices:

Well, so we've been messing with our environment since the beginning of fall because this group had a lot of struggles. You know, Adam needs a balance of open enough spaces that he's not just constantly bumping into things and people but also without any like a direct running path. And then, we have a couple of children who we're really working hard with them to sustain their engagement. They would be working in an area

for like two and half minutes and go somewhere else and go somewhere else and go somewhere else, and they just really weren't doing anything all day. So, we have messed with our arrangements a lot. And we also changed up. We used to be set up so the children could go anywhere, all morning long. But for our kids that were having a really hard time staying focused on anything, and for Adam, it just wasn't working. It wasn't supporting their needs. So, we broke the classroom down into three work centers. That's what we're calling them. And, so, with any work center there're really like four to six areas they can choose from. And what we found is that like for Adam, it gives him a smaller space to move about in, which makes him have to focus a little bit more about where he is, which has been really great for him – much less bumping into people, bumping into furniture, all of that. For our two that really struggled with engaging, one of them has made some really great strides having a limited number of choices.

For Anabelle (US), her classroom setting was associated with children's needs and interests:

For us, the loft was in place before we came into that classroom, but we have tried it and to like use the loft for different ways. For a while we tried it as a writing area, and they still did imaginary play stuff up there [laughing]. So for whatever reason, it seems to be a place that children naturally want as an imaginary play space and since we have, you know, that multi-level space where they can be up and down. It really impacts what they're doing a little differently, especially the new learning center in the east side, you know, where they don't have a loft.

The loft in Anabelle's classroom was captured in observations (see Figure 4.5).



*Figure 4.5. Anabelle's classroom setting.*

Each classroom setting was unique within and across cultures. Compared to the Chinese classrooms, the US classrooms comprised a wide range of play areas for children. Also, within the cultures, each classroom setting was somewhat different from the others. These differences appeared related to each teachers' beliefs that included (a) what children were interested in, (b), what children needed for their learning and development, and (c) what skills and knowledge was emphasized for their successful transition to the next level or elementary school.

**Play materials.** Similar to the US classrooms variety of play areas, US teachers provided more diverse play materials for children than did the Chinese teachers. Further, they were also more likely to periodically change replace materials than the Chinese teachers. Teachers' decisions regarding the type and variation of play materials reflected cultural differences. The Chinese teachers typically provided constructive play materials for their children; no dramatic play materials were provided. Although Melanie (China) expressed a need to design various play activities for children, she faced challenges due to the limited classroom space and teachers' experience with a wide range of materials:

You see that the children from Bella's classroom play more than the children in our classroom. We would like to let children play various activities, whereas we have

challenges to organize them such as dramatic play since we don't have enough classroom space for this kind of play, and we don't have many teachers who are equipped with skills to do it.

Further, the decision of limiting the number of play materials for children was also associated with teachers' intention to encourage children to share and cooperate with each other. For instance, Hazel (China) provided a box of toys for every two children in order to motivate them to "cherish materials" as well as engage in cooperative problem solving:

They used to play with one box of toys by themselves, but I realized that they did not cherish their toys. They felt they had lots of toys. Also, they didn't interact with peers often. I feel that children cherish toys more when they share. They interact with each other and ask permission to use toys. When neither of them has toys, I let them ask peers to borrow or exchange toys; let them understand give-and-take. So, I did not let each child have one box of toys.

For the US teachers, they provided a variety of types of play materials (e.g., constructive play, dramatic play, and open-ended materials) for children. As Savannah (US) described, she valued the positive impact of open-ended materials on children's creative thinking, and this value also influenced her provision of particular kinds of materials:

Really, we try to provide a lot of open-ended materials; so for instance, I talked a little bit about the loose parts. Trying to provide materials that really prompt children to think creatively, whereas it doesn't necessarily have to define the way to play with it. But I think it's also important, just the opposite, to sometimes have materials that really have an outcome, so for instance, the puzzle.



For Savannah (US), her selections of play materials were based not only on children's interests but her perceived understandings of children's needs:

I think that we plan according to what we notice children are interested in and what we think that they're telling us. So, for instance, when we are noticing that children are investigating birds, and so we start supporting a bird project in the classroom. We may find puzzles that have birds on them. We may realize they're looking out the window at birds, so we might provide binoculars. We may notice that they're curious about identifying birds, so we might hang a poster in the classroom that has a variety of bird images. So, we do provide materials based on what they're interested in. Sometimes we provide materials that we just know children at this age typically are interested in. So, whether they've told us, we really like to put small things together. We recognize children at this age like to construct with small things, and so we might just find small things to put in the classroom. Or that we feel like there might be a need, so for instance, if we have done an activity, and we're aware that children were having a difficulty using scissors, we might provide some prompts for children to participate in cutting activities in that area. So, we might put the scissors out on the table and provide magazines to tell children, 'you may cut out pictures from magazines,' or maybe some kind of tracing paper with shapes to say, 'you could cut out the shapes and glue them on the paper.' So, I think all three of those are ways that we select the materials.

Besides the number and variety of play materials, teachers in the two cultures also showed differences regarding how frequently they rotated play materials. US teachers reported that they changed materials more frequently than the Chinese teachers, by considering children's interests as well as children's frequent use of particular materials. The Chinese teachers often

changed play materials in the mid-term of the semester with new materials more likely to be similar than the previous ones to include opportunities for constructive play. This decision was associated with their understanding that children were interested in constructive play materials.

For example, Melanie (China) often changed play materials out periodically:

Interviewer: You mentioned earlier that play materials would be blocks, drawing, or other teaching tools. What materials do children use often?

Melanie: Blocks. Children play with water in the summer.

Interviewer: Depend on the weather?

Melanie: Yes. Children often like blocks a lot and never get tired of them.

Interviewer: Never.

Melanie: Never. But I will change play materials periodically. For instance, I will provide Mushroom Nail Flapper Puzzle toys.

Interviewer: What do you mean periodically?

Melanie: I will change play materials in the middle of a semester.

For the US teachers, they often changed materials more frequently. For example, Reagan (US) usually changed materials every two weeks based on her children's interests, whereas if children consistently engaged with a particular material, she would keep it in the classroom:

I mean it just depends on what we are seeing them interested in. For example, we had a matching game out for the last couple of weeks, but by like last two days of last week, nobody was using it. So, this morning I took that out and put out a new kind of manipulative that I haven't used in a while. We change materials out usually about every two weeks, but it just depends on what the children are doing. If they are still like

consistently using a material, then we leave it for longer; if they stop using it sooner, then we change it sooner.

Between the two cultural settings, the Chinese teachers more often selected play materials for children's free play to be used in pre-determined play spaces; whereas, the US teachers more often provided a wide range of materials for children's self-selected play in open classroom spaces. Often, Chinese teachers provided more constructive play materials, whereas the US teachers provided more varied materials such as constructive, dramatic, open-ended materials, etc. A second variation included the length of time teachers left materials in the classrooms with the Chinese teacher rotating materials every few months as opposed to the US teachers' rotations on a bi-weekly or more often basis.

**Continuity of play.** Teachers across the two cultures scheduled free play differently. Generally, Chinese teachers provided children around one-hour of unstructured play time a day inside their classrooms, whereas the US teachers provided at least two hours of play time in their classrooms. This difference was reflected in the researcher's journal entries.

The director [in the Chinese kindergarten] told me that children's play time is between 10:00 a.m. and 11:00 a.m. Children also play between 7:30 a.m. and 8:30 a.m. whereas in outside (research journal entry, July 4, 2016).

I arrived at the US preschool center at 9:29 a.m. and ended the observation at 10:30 a.m. in the Reagan's classroom [....] I arrived at the ELC at 3:29 p.m. and ended the observation at 4:30 p.m. in the Reagan's classroom. (research journal entry, December 6, 2016)

This difference was also shown when teachers talked about their arrangements of free play time. Often, the Chinese teachers provided less unstructured play time for children, especially for the

children in Melanie's and Hazel's classrooms. For instance, Melanie (China) described her class schedule as using the majority of time in teacher-directed activities, as this schedule modeled the curriculum of elementary school in order to prepare children's successful transition:

Melanie: You can see that each of our courses is about 30-minute long, and I will let children play on the outside after each course. However, there is a condition for their play. 'If you pass a quiz, you can play.' So, play could be a motivation for them to learn. It's not as I will never let children play if they do not pass a quiz. I still let them play, but I use the play as a motivation to push them a little bit to work hard.

Interviewer: So, each course is about 30-minutes long?

Melanie: 30 minutes.

Interviewer: How about the break?

Melanie: It's about 10 minutes.

Interviewer: 10 minutes.

Melanie: Yes.

Interviewer: Both indoor and outdoor play are 10-minutes long?

Melanie: Yes.

Interviewer: How did you decide this period?

Melanie: We model the schedule of an elementary school. In elementary schools, they have a 40-minute course followed by a 10-minute break.

Hazel (China) expressed that children in her classroom had a tight class schedule, and children's free play time was often used to examine their homework:

We check children's homework and see whether they have completed it or not. We have a tight class schedule, so we use the play time to examine children's learning progress.

Less free play time in Melanie's and Hazel's classroom was consistent with researcher's journal entries:

Since there is a limited time of free play, I was trying to video all scenes that children engage in during constructive play and symbolic play that may stimulate children's cooperative problem solving. Children in the Chinese kindergarten took courses such as language, reading, math, dancing, taekwondo, piano, music, drawing, and art, which may cause them only to have one hour free play time in the morning, normally. I need to observe 30 children and each child for 60 minutes. This limited time left me no choice but to observe children's free play whenever possible. (research journal entry, August 22, 2016)

For US teachers, they provided more unstructured play time for their children. For instance, Savannah's decision regarding play time was associated with her intention to provide a good home-school transition for children; children in her classroom often could freely choose what they wanted to play:

When they first arrive at school at 7:40, children are allowed to just – all the areas are open and available, and children can go to what area they choose. So typically, from about 7:40 until around 9:15, sometimes even 9:30, it's really more of a – that's the larger open play period of the day [...] And so typically, most children are dropped off before 9:30. So from 7:30 to 9:30, play may take a little bit more time depending on when we start our morning snack. That's a very open play period. And, so, children will circulate – since that's a two-hour block almost, children will circulate to many areas in the classroom. free to make selections within the areas of the classroom.

Teachers' decisions on how long children could engage in free play in each cultural context reflected not only their beliefs about the role of play in children's development and engagement in cooperative problem solving but also their unique pedagogical perspectives. For the Chinese teachers, their decisions were informed by the looming elementary school demands and their need to prepare children, academically, for their transition to elementary school. Whereas, the US teachers, were more focused on what seemed appropriate for the children at a particular time, not focusing on transitions to new school contexts. Further, the US teachers also made judgements based on children's developmental capabilities.

In summary, teachers in the two cultures believed that children were competent to engage in cooperative problem solving with peers, and they wanted to enable children to take try out different options, ideas, and be confident in their abilities. The Chinese teachers preferred that children work with peers rather than rely on the teachers, whereas the US teachers were more interested in providing children with skills, language, and opportunities to practice cooperative problem solving. Both the Chinese and US teachers assumed varying. The Chinese teachers' efforts toward enabling children to engage in cooperative problem solving and the development of shared understandings was orchestrated, a priori, by their selection of particular materials, arrangements of desks and tables, and their more teacher-directed stances, as compared to the US teachers. In the process of supporting and guiding children, the US teachers tended to emphasize reciprocity of listening, mutual engagement in the process of problem-solving whereas the Chinese teachers tended to direct children's processes of problem-solving and/or modify the environment to enable particular forms of problem solving, i.e., tables pushed together. Regarding the classroom environments, US classrooms included far more play areas and diversity of play materials as well as more play time (approximately double) that in the Chinese

classrooms. The uniqueness of each classroom context was relevant to each teachers' beliefs about (a) what children were interested in, (b) what children needed for learning and development, and (c) what skills and knowledge that children needed to equip with for their successful transition to elementary school.

## **Discussion**

This cross-cultural study aimed to investigate teachers' beliefs about their roles and pedagogical decisions regarding their support of preschool children's cooperative problem solving during play in one Chinese and one US preschool. The teachers revealed salient differences, cross-culturally, even as they indicated variations among their teaching colleagues, regarding their image of child, role as teachers, and arrangements of classroom environments.

All teachers viewed children as competent and respected their autonomy. This belief allowed teachers to distance themselves from children by providing space, in which children could take risks and make independent choices. When teachers perceived children as competent, "the teachers' stance shift[ed] toward nurturers of children's questions and ideas and bridge builders between what children know and are coming to know" (Moran & Jin, 2016, p. 2). Often, this belief of children's competency and autonomy reflects a variation that relies on teachers' understandings of each child. Each child has her own zones of proximal development (Vygotsky, 1978) that requires teachers to adjust their teaching approaches – scaffolding (Wood, Bruner, & Ross, 1976). When teachers believe that children need to learn new knowledge, skills, and language for their successful engagement in cooperative problem solving, they often target their support in order to allow children to move beyond their current levels of problem solving (Berk & Winsler, 1995; Vygotsky, 1933). When children show their abilities to solve problems with

peers, teachers typically gradually withdraw their support and encourage children to practice cooperative problem solving with their peers (Wood, Bruner, & Ross, 1976).

The degree of teachers' involvement in children's cooperative problem solving as described in this study is contextually informed. Teachers in both cultures emphasized the value of shared understanding and responsibility in their classroom communities in their unique ways. For instance, the Chinese teachers often used teacher-directed activities to encourage children to work together for their development of collectivism, whereas the US teachers often guided children to be in group discussions for solving individual and shared problems. Teachers' arrangements of whom to include in the process of shared problem solving links to what Rogoff (1995) referred as guided participation, which emphasizes the mutual involvement of teachers and children through communication and coordination in socioculturally structured collective activity (Rogoff, 1990; Rogoff & Gardner, 1984). This mutual involvement also requires a reciprocity of listening in order to achieve a shared understanding.

Perceptions regarding the role of listening reflected another cultural variation. The Chinese teachers emphasized authoritative, dismissive, and/or compassionate listening, whereas the US teachers emphasized a reciprocity of listening. Davies (2014) emphasized emergent listening as a teaching stances that "open[s] up the possibility of new ways of knowing and new ways of being, both for those who listen and those who are listened to" (p. 21). Teachers are often encouraged to engage in pedagogical listening, "listening to thought – ideas and theories, questions and answers of children and adults" without a preconceived view about what is right or appropriate (Rinaldi, 2005, p. 12). Even as the teachers in this study varied in their approaches to and reasons for listening to young children there is no determination that one cultural context is more appropriate than the other. Indeed, the position taken by the engaged, listening teachers in



each context was well supported by her beliefs and the cultural mores of her particular setting. As Bruner (1996) explained, teachers' decisions on how to interact with children are influenced by their cultural and pedagogical beliefs and vary across diverse cultural settings.

Teachers' decisions regarding the classroom settings, play materials, and the opportunity for children to engage in a continuity of play episodes reflects not only cultural variations but also individual differences. This study suggests that the US teachers often provided a range of play areas and materials and more time for children's unstructured play than did the Chinese teachers. These variations not only reflect teachers' pedagogical beliefs about children's interests and needs but also their cultural and individual beliefs about how to prepare children to be ready to transition to elementary school. As Dewey (1938/1963/1997) explicated, teachers' values regarding the role of play and cooperative problem solving are often influenced by the ways in which they provide (a) a large space for children's play or cooperative problem solving, (b) a wide range of open-ended materials (versus materials with single functions) that encourages children to engage in a range of play episodes, and (c) uninterrupted time for children's engagement in cooperative problem solving. In the cross-cultural study conducted by Tobin, Hsueh, and Karasawa (2009), teachers in both the Chinese kindergarten and US preschool were on a journey of evolving their early childhood education to better serve their children. Similarly, here, the Chinese and US teachers' beliefs and pedagogical decisions also reflected their evolving trajectories aimed at supporting children's cooperative problem solving during play informed by their cultural values and social norms.

### **Limitations**

The interpretation and generalization of this study's findings should be utilized with prudence, considering the small sample size. The findings were situated in one Chinese

kindergarten and one US preschool center, and only six teachers' beliefs and experiences from the two schools were studied. Therefore, future studies are needed that include more teachers from a wider range of schools in diverse settings and across diverse cultural contexts.

### **Implications for Future Research and Practice**

Although this study's findings were based on a small sample size, the potential contributions to the field of early childhood education includes (a) descriptions of preschool teachers' beliefs about and pedagogical decisions regarding the support of children's cooperative problem solving across two cultures, (b) indications for teacher educators' and teachers' awareness of cultural differences possible differences between Chinese and US preschool classrooms, and (c) implications for teachers' and educators' development of culturally responsive teaching and curricula for the improvement of children's learning. As this is the only study that has included the investigation of preschool children's cooperative problem solving during play in two cultures, research related to the role of teachers in supporting children's cooperative problem solving during play is needed within and across cultures.

## References

- Agar, M. H. (1980). *The professional stranger: An informal introduction to ethnography*. San Diego, CA: Academic Press.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: A discussion paper. *Journal of Advanced Nursing*, 19(2), 328-335. doi: 10.1111/j.1365-2648.1994.tb01088.x
- Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20(2), 107-128. doi: 10.1016/j.tate.2003.07.001
- Berk, L. E., & Winsler, A. (1995). *Scaffolding children's learning: Vygotsky and early childhood education*. Washington, DC: National Association for the Young Children.
- Bernard, H. R. (2006). Field notes: How to take them, code them, manage them. In H. R. Bernard (Ed.), *Research methods in anthropology: Qualitative and quantitative approaches* (4<sup>th</sup> ed., pp. 387-412). Lanham, MD: AltaMira Press.
- Bodrova, E., & Leong, D. J. (1996). *Tools of the mind: The Vygotskian approach to early childhood education* (1st ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Bodrova, E., & Leong, D. J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education* (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson Education.
- Bringuier, J. C. (1980). *Conversations with Jean Piaget*. Chicago, IL: University of Chicago Press.
- Bruner, J. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University.

- Bruner, J. (1996). *The cultures of education*. Cambridge, MA: Harvard University Press.
- Cabell, S. Q., DeCoster, J., LoCasale-Crouch, J., Hamre, B. K., & Pianta, R. C. (2013). Variation in the effectiveness of instructional interactions across preschool classroom settings and learning activities. *Early Childhood Research Quarterly*, 28(4), 820-830. doi: 10.1016/j.ecresq.2013.07.007
- Charlesworth, R., Hart, C. H., Burts, D. C., Mosley, J., & Fleege, P. O. (1993). Measuring the developmental appropriateness of kindergarten teachers' beliefs and practices. *Early Childhood Research Quarterly*, 8(3), 255–276.
- Cheyne, J. A., & Rubin, K. H. (1983). Playful precursors of problem-solving in preschoolers. *Developmental Psychology*, 19(4), 577–584. doi: 10.1037/0012-1649.19.4.577
- Cleveland, G., Forer, B., Hyatt, D., Japel, C., & Krashinsky, M. (2007). *An economic perspective on the current and future role of nonprofit provision of early learning and child care services in Canada: Final project report*. Retrieved from [www.childcarepolicy.net/research/documents/final-report-FINAL-print.pdf](http://www.childcarepolicy.net/research/documents/final-report-FINAL-print.pdf)
- Coley, R. L., Li-Grining, C., & Chase-Lansdale, P. L. (2006). Low-income families' child care experiences: Meeting the needs of children and families. In N. Cabrera, R. Hutchins, & E. Peters (Eds.), *From welfare to child care: What happens to children when mothers exchange welfare for work* (pp. 149–170). Mahwah, NJ: Lawrence Erlbaum Associates.
- Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of Educational Research*, 77(1), 113-143.
- Creswell, J. W. (1997). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.

- Crossman, A. (2014). *What is participant observation research? An introduction to an important qualitative research method*. Retrieved from <http://sociology.about.com/od/Research/a/Participant-Observation.htm>
- Cuffaro, H. K. (1995). *Experimenting with the world: John Dewey and the early childhood classroom*. New York, NY: Teachers College Press.
- Davies, B. (2014). *Listening to children: Being and becoming*. New York, NY: Routledge.
- Dewey, J. (1899). *Psychology and philosophic method: The annual public address before the union*. Berkeley, CA: University of California Press.
- Dewey, J. (1902). *The child and the curriculum*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1938/1963). *Experience and education*. New York, NY: Collier Books.
- Dewey, J. (1907). *The school and society: Being three lectures*. Chicago, IL: The University of Chicago Press.
- Dewey, J. (1997). *Experience and education*. New York, NY: Touchstone.
- Dollar, B. (1988). Child care in China. In J. Wurzel (Ed.), *Towards multiculturalism: A reader in multicultural-education* (pp. 98-102). Yarmouth, ME: Intercultural Press.
- Dowsett, C. J., Huston, A. C., Imes, A. E., & Gennetian, L. (2008). Structural and process features in three types of child care for children from high and low income families. *Early Childhood Research Quarterly*, 23(1), 69–93. doi: 10.1016/j.ecresq.2007.06.003
- Edwards, C., Gandini, L., & Forman, G. (1992). *The hundred languages of children: The Reggio Emilia approach to early childhood education*. Norwood, NJ: Alex.
- Fetterman, D. M. (1989). *Ethnography: Step by step*. Newbury Park, CA: Sage.

- Fuller, B., Kagan, S. L., Loeb, S., & Chang, Y. (2004). Child care quality: Centers and home settings that serve poor families. *Early Childhood Research Quarterly*, 19(4), 505–527. doi: 10.1016/j.ecresq.2004.10.006
- Garvey, C. (1990). *Play*. Cambridge, MA: Harvard University Press.
- Geertz, C. (1973). *The interpretation of cultures*. New York, NY: Basic Books.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine Pub.
- Griffin, S. A. (2004). Building number sense with number worlds: A mathematics program for young children. *Early Childhood Research Quarterly*, 19(1), 173-180. doi: [10.1016/j.ecresq.2004.01.012](https://doi.org/10.1016/j.ecresq.2004.01.012)
- Guba, E. G., & Lincoln, Y. S. (1982). *Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches*. San Francisco, CA: Jossey-Bass.
- Hadfield, M., & Haw, K. (2012). Video: Modalities and methodologies. *International Journal of Research & Method in Education*, 35(3), 311-324. doi: 10.1080/1743727X.2012.717434
- Head Start (2015). *Head start program facts fiscal year 2015*. Retrieved from <http://eclkc.ohs.acf.hhs.gov/hslc/data/factsheets/2015-hs-program-factsheet.html>
- Head Start (2016). *About head start*. Retrieved from <http://eclkc.ohs.acf.hhs.gov/hslc/hs/about>
- Heidemann, S., & Hewitt, D. (2010). *Play: The pathway from theory to practice*. St. Paul, MN: Redleaf Press.
- Hu, B. (2011). *Exploring the cultural relevance of developmentally appropriate practices from the point of view of preschool teachers in Beijing*. In The 2011 yearbook of the Texas

- A&M University-Corpus Christi's Center for Educational Development, Evaluation, and Research (pp. 1-23).
- Hu, B., Fan, X., Yang, Y., & Neitzel, J. (2017). Chinese preschool teachers' knowledge and practice of teacher-child interactions: The mediating role of teachers' beliefs about children. *Teaching and Teacher Education*, 63, 137-147.
- Hu, B., & Li, K. (2012). The quality rating system of Chinese preschool education: Products and challenges. *Childhood Education*, 88(1), 14-22. doi: 10.1080/00094056.2012.643711
- Hu, B., & Szente, J. (2010). Education of young Chinese migrant children: Challenges and prospects. *Early Childhood Education Journal*, 37(6), 477-482. doi: 10.1007/s10643-009-0362-8
- Huberman, A. M., & Mikes, M. B. (1994). Data management and analysis methods. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 428-444). Thousand Oaks, CA: Sage.
- Huo, L. (2015). The centennial change from imitation to innovation: Early childhood education and curriculum reform in China. In L. Huo, S. B. Neuman, & A. Nanakida, *Early childhood education in three cultures: China, Japan, and the United States* (chap. 5). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Huo, L., Neuman, S. B., & Nanakida, A. (2015). *Early childhood education in three cultures: China, Japan and the United States*. Berlin, Heidelberg: Springer Berlin Heidelberg.
- Infant Society of Boston (1828). *Constitution and by-laws*. Boston, MA: T. R. Marvin.
- Jung, J. (2013). Teachers' roles in infants' play and its changing nature in a dynamic group care context. *Early Childhood Research Quarterly*, 28(1), 187-198. doi: 10.1016/j.ecresq.2012.05.001

- Jung, J., & Recchia, S. (2013). Scaffolding infants' play through empowering and individualizing teaching practices. *Early Education and Development*, 24(6), 829-850. doi: 10.1080/10409289.2013.744683
- Kagan, S. L. (April 2009). *American early childhood education: Preventing or perpetuating inequity?* Equity in Education Forum Series, Teachers College, Columbia University. Retrieved from [http://www.tc.columbia.edu/i/a/document/9833\\_EquityMatters\\_Kagan\\_Final.pdf](http://www.tc.columbia.edu/i/a/document/9833_EquityMatters_Kagan_Final.pdf)
- Komulainen, K. (2001) 1930-luvun suomalainen oppikoulu kansallisuuden näyttämönä [Finnish language secondary schools as a stage for nationality: The national pedagogy of the 1930s in the school memories of Russian, Swedish and Finnish speaking pupils], *Nuorisotutkimus [Finnish Journal of Youth Research]*, 1, 39–54.
- Leontiev, A. N. (1981). The problem of activity in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp. 37-71). Armonk, NY: Sharpe.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Liu, Y., Yang, X., Tu, Y., & Pan, Y. (2012). 我国城乡学前一年班级教育环境质量的比较 [The comparative study on one-year preschool education quality in urban and rural areas in Mainland China]. *Journal of Educational Studies*, 8, 74-83.
- Maccoby, E. E., & Lewis, C. C. (2003). Less day care or different day care? *Child Development*, 74(4), 1069–1075. doi: 10.1111/1467-8624.00592
- Magnuson, K. A., Meyers, M. K., Ruhm, C., & Waldfogel, J. (2004). Inequality in preschool education and school readiness. *American Educational Research Journal*, 41(1), 115–157.



- Martin, K. J. (2000). "Oh, I have story": Narrative as a teacher's classroom model. *Teaching & Teachers Education*, 16(3), 349-363.
- McMullen, M. B. (March 1997). *The effects of early childhood teacher education on self perception and beliefs about developmentally appropriate practices*. IAEYC Conference, Indianapolis, IN.
- Moran, M. J., Bove, C., Brookshire, R., Braga, P., & Mantovani, S. (2017). Learning from each other: The design and implementation of a cross-cultural research and professional development model in Italian and U.S. toddler classrooms. *Teaching and Teacher Education*, 63, 1- 11.
- Moran, M. J., & Jin, M. (2016). Teacher roles in inquiry. In D. Couchenour, K. Chrisman, & J. Pyles (Eds.), *Encyclopedia of contemporary early childhood* (n.d.). Thousand Oaks, CA: Sage.
- Moyles, J. R. (1989). *Just playing? The role and status of play in early childhood education*. Milton Keynes, UK: Open University Press.
- Mruck, K., & Breuer, F. (2003). Subjectivity and reflexivity in qualitative research: A few FQS issues. *Historical Social Research/Historische Sozialforschung*, 28(3), 189-212.
- NAEYC (2009). *Developmentally appropriate practice in early childhood programs serving children from birth through age 8*. Retrieved from <https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/PSDAP.pdf>
- Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies* 19(4), 317-328.

- Neuman, S. B. (2015). Describing the early childhood policy landscape in the USA. In L. Huo, S. B. Neuman, & A. Nanakida, *Early childhood education in three cultures: China, Japan, and the United States* (chap. 5). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Paley, V. G. (2004). *A child's work: The important of fantasy play*. Chicago, IL: The University of Chicago Press.
- Pan, Y., Liu, Y., & Lau, E. Y. H. (2010). Evaluation of the kindergarten quality rating system in Beijing. *Early Education & Development*, 21(2), 186-204. doi: 10.1080/10409281003631134
- Pang, Y., & Richey, D. (2007). Preschool education in China and the United States: A personal perspective. *Early Child Development and Care*, 177(1), 1-13. doi: 10.1080/14797580500252712
- Pellegrini, A. D., & Gustafson, K. (2005). Boys' and girls' uses of objects for exploration, play, and tools in early childhood. In A. D. Pellegrini & P. K. Smith (Eds.), *The nature of play: Great apes and humans* (pp. 113–138). New York, NY: Guilford Press.
- Peshkin, A. (1988). In search of subjectivity – one's own. *Educational Researcher*, 17(7), 17-21.
- Piaget, J. (1951). *Play, dreams and imitation in childhood*. London, UK: Heinemann.
- Piaget, J. (1963). *The origins of intelligence in children* (2<sup>nd</sup> ed.). New York, NY: Norton.
- Piaget, J. (1983). Piaget's theory. In W. Kessen (Ed.), *Handbook of child psychology: History, theory, and methods* (pp. 103–128). New York, NY: Wiley.
- Ramani, G. B. (2012). Influence of a playful, child-directed context on preschool children's peer cooperation. *Merrill-Palmer Quarterly*, 58(2), 159-190

- Ramani, G. B., & Brownell, C. A. (2014). Preschoolers' cooperative problem solving: Integrating play and problem solving. *Journal of Early Childhood Research*, 12(1), 92-108. doi: 10.1177/1476718X13498337
- Rao, N., Ng, S. S., & Pearson, E. (2010). Preschool pedagogy: A fusion of traditional Chinese beliefs and contemporary notions of appropriate practice. In C. K. Chan & N. Rao (Eds.), *Revisiting the Chinese learner* (pp. 255-279). Netherlands: Springer.
- Rinaldi, C. (2005). *In dialogue with Reggio Emilia: Listening, researching, and learning*. New York, NY: Routledge.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, P. D. Rio, & A. Alvarez, *Sociocultural studies of mind* (pp. 139-164). New York, NY: Cambridge University Press.
- Rogoff, B., & Gardner, W. P. (1984). Adult guidance of cognitive development. In B. Rogoff & J. Lave, (Eds.), *Everyday cognition: Its development in social context* (pp. 95-116). Cambridge, MA: Harvard University Press.
- Rubin, K. H., Watson, K. S., & Jambor, T. W. (1978). Free-play behaviors in preschool and kindergarten children. *Child Development*, 49(2), 534–536. doi: 10.2307/1128725
- Schulz, L. E., & Bonawitz, E. B. (2007). Serious fun: Preschoolers engage in more exploratory play when evidence is confounded. *Developmental Psychology*, 43(4), 1045–1050. doi: 10.1037/0012-1649.43.4.1045

- Sims, M., Hutchins, T., & Taylor, M. (1997). Classroom “culture” and children’s conflict behaviours. *Early Child Development and Care*, 134(1), 43-59. doi: 10.1080/0300443971340103
- Smith, P. K. (2005). Play: Types and functions in human development. In B. J. Ellis & D. F. Bjorklund (Eds.), *Origins of the social mind: Evolutionary psychology and child development* (pp. 271-291). New York, NY: Guilford Press.
- Spodek, B. (1988). Implicit theories of early childhood teachers: Foundations for professional behavior. In B. Spodek, O. N. Saracho, & D. L. Peters (Eds.) *Professionalism and the early childhood practitioner* (pp. 161–172). New York, NY: Teachers College Press.
- Stevenson, B. (2015). Third spaces and video-stimulated recall: An exploration of teachers’ cultural role in an indigenous education context. *Educational Action Research*, 23(2), 290-305. doi: 10.1080/09650792.2014.990986
- Stipek, D. J. (2004). Teaching practices in kindergarten and first grade: Different strokes for different folks. *Early Childhood Research Quarterly*, 19(4), 548-568.
- Stipek, D. J., & Byler, P. (2004). The early childhood classroom observation measure. *Early Childhood Research Quarterly*, 19(3), 375-397.
- Stone, J. E. (2012). A Vygotskian commentary on the Reggio Emilia approach. *Contemporary Issues in Early Childhood*, 13(4), 276-289. doi: 10.2304/ciec.2012.13.4.276
- Strauss, A., & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage.
- Tobin, J., Hsueh, Y., & Karasawa, M. (2009). *Preschool in three cultures revisited: China, Japan, and the United States*. Chicago, IL: The University of Chicago Press.

- Tolman, E. C. (1951). A psychological model. In T. Parsons & E. Shils (Eds.), *Toward a general theory of action* (pp. 279-361). Cambridge, MA: Harvard University Press.
- Tomasello, M. (2009). *Why we cooperate*. Cambridge, MA: MIT Press.
- Trivette, C. M., Dunst, C. J., Hamby, D. W., & Meter, D. (2012). Relationship between early childhood practitioner beliefs and the adoption of innovation and recommended practices. *Research Brief*, 6(1), 1-9.
- Vandenburg, B. (1980). Play, problem-solving, and creativity. *New Directions for Child and Adolescent Development*, 9, 49–68. doi:10.1002/cd.23219800906
- Vartuli, S. (1999). How early childhood teacher beliefs vary across grade level. *Early Childhood Research Quarterly*, 14(4), 489-514.
- Votruba-Drzal, E., Coley, R. L., Koury, A., & Miller, P. (2013). Center-based child care and cognitive skills development: Importance of timing and household resources. *Journal of Educational Psychology*, 105(3), 821-838. doi: 10.1037/a0032951
- Vygotsky, L. S. (1933/1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- US Census Bureau. (2017). Characteristics of the foreign-born population by nativity and US citizenship status. Retrieved from <https://www.census.gov/data/tables/2014/demo/foreign-born/cps-2014.html>
- Wang, J., Elicker, J., McMullen, M., & Mao, S. (2008). Chinese and American preschool teachers' beliefs about early childhood curriculum. *Early Child Development and Care*, 118(3), 227-249. doi: 10.1080/03004430600722671
- Williams, L. R. (1996). Does practice lead theory? Teachers' constructs about teaching: Bottom-up perspectives. In J. A. Chafel & S. Reifel (Eds.), *Advances in early education and day*

*care: Theory and practice in early childhood teaching* (Vol. 8, pp. 153-184). Greenwich, CT: Jai.

Wolcott, H. F. (1994). *Transforming qualitative data: Description, analysis, and interpretation*. Thousand Oaks, CA: Sage.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology & Psychiatry*, 17(2), 89-100. doi: 10.1111/j.1469-7610.1976.tb00381.x

## **Chapter 5. Conclusion**

This dissertation, that comprised three manuscripts, was designed to expand knowledge about children's cooperative problem solving during play by investigating (a) previous research that studied children's cooperative problem solving during play in everyday classroom contexts, (b) preschool children's different patterns of engagement in play and cooperative problem solving in Chinese and US preschool classrooms, and (c) preschool teachers' beliefs about their roles and pedagogical decisions for supporting children's cooperative problem solving during play in two cultures.

In first manuscript (Chapter 2), the Preferred Reporting Items for Systematic Reviews (PRISR) was used to unfold methodologies and findings regarding children's cooperative problem solving during play and discuss what additional studies were needed in this field in future research. Through this systematic and saturated literature view, it was found that there were only eight studies that investigated children's cooperative problem solving during play. These studies were all conducted in Western cultures and only used an experimental approach to observe children's cooperative behaviors in pre-designed settings. Therefore, findings from this review provided evidence that (a) there was a lack of studies that investigated preschool children's cooperative problem solving during play in their everyday classroom contexts, within and across cultures, and (b) there was a lack of studies that investigated teachers' roles in children's development of cooperative problem solving during play. Through this research a first step in addressing these gaps has been attempted with findings reported in Chapters 3 and 4.

In the second manuscript (Chapter 3), a 10-month field work in a Chinese kindergarten (4 months) and US preschool center (6 months) was conducted with the integration of ethnographic informed observations. This field work included an analysis of data generated through (a) the video recordings of four- and five-year-old children and (b) researcher's field notes and research



journal entries. In particular, 16 children's 60-minutes of video footage were analyzed with MANOVA and ANOVA, and field notes and research journal entries were analyzed using qualitative content analysis (Hsieh & Shannon, 2005). Results in this chapter included that (a) there were cultural and gender differences in children's engagement in types of play (construct play, fantasy play, and rough-and-tumble play) whereas there were no age differences, and (b) there were cultural and gender differences in children's cooperative problem solving behaviors (debating and mentoring) during play with no evidence of age differences. For instance, between the two cultures, US four-year-old boys engaged in more rough-and-tumble play than the Chinese four-year-old boys; the US five-year-old girls engaged in more fantasy play than the Chinese five-year-old girls. With no age differences, the Chinese girls spent more time on constructive play, in particular, than did the US girls. Within the US cultural context, boys significantly engaged in more constructive play than the girls without any evidence of age differences. Regarding children's cooperative problem solving, the Chinese four-year-old girls used more debating (explanation, asking questions, and disagreement) than the US girls during their cooperative exchanges. Within the US cultural context, four-year-old boys used more mentoring behaviors (physical demonstration, directing attention, narration, and discussing strategies) than did the four-year-old girls during their cooperative interactions. Qualitative findings present a contextual understanding of (a) teachers' beliefs about the impact of age and gender on children's engagement in a particular type of play and cooperative problem solving, and (b) teachers' decision on play space, play materials, and play schedule for supporting children's needs and interests and their successful transition to elementary school. Particularly, teachers in two cultures believed that child age was not the major factor influencing children's development of cooperative problem solving. However, they did believe that there were gender

differences in preferences of a particular type of play and engagement in cooperative problem solving. Regarding the classroom environments, US classrooms included far more play areas and diversity of play materials as well as more play time (approximately double) than in the Chinese classrooms.

In the third manuscript (Chapter 4), three Chinese teachers and three US teachers were interviewed using a semi-structured interview protocol that included the integration of a visual stimulated recall approach. These teachers were demonstration/master teachers for the children who participated in this study. Data included (a) teacher interview transcriptions, (b) researcher's field notes, and (c) research journal entries that were triangulated and analyzed by using the constant comparative analysis method. Findings in this chapter revealed that teachers in the two cultures not only revealed differences but also commonalities regarding their image of the child, their role of teachers, and their arrangements of classroom environments. For example, teachers in both cultures believed that children were competent to engage in cooperative problem solving with peers, and they wanted to empower children to take risks and be confident in their abilities to negotiate and remain in relation with their peers. The Chinese teachers preferred children to work with peers rather than rely on their teachers, whereas the US teachers emphasized their desires to equip children with the necessary skills and language that they could draw upon when engaging in cooperative problem solving with their peers. Both the Chinese and US teachers emphasized the importance of children's development of shared understandings and shares responsibilities; in particular, the US teachers emphasized reciprocity of listening more than the Chinese teachers during child-child and teacher-child interactions. The classroom environments in the two cultures revealed variations, with each classroom having its own unique characteristics that were reflected by each teacher's beliefs about (a) what interested the children, (b) what

children needed for optimal learning and development, and (c) what skills and knowledge children needed to equip them for a successful transition to elementary school.

Overall, this dissertation presented (a) an innovative, cross-cultural methodology to study children's cooperative problem solving during play in their everyday classrooms, and (b) a descriptive analyses and findings by situating child participants and teachers in their everyday classroom settings as well as in their own cultural contexts. However, interpretations, generalizations, or replications of this study methodology and findings should be considered with caution because of (a) the small sample size and (b) unique characteristics of populations, classroom contexts, geographies, time, and cultures. Although the study findings were based on a small sample size, it is believed that this study has made an important contribution to the field of early childhood education by providing (a) a description of preschool children's cooperative problem solving across two cultures, (b) new knowledge related to the influence of cultural contexts on children's cooperative problem solving, (c) an innovative methodology of ethnographic informed observations for studying children's cooperative problem solving in their every classroom contexts, (d) a description of preschool teachers' beliefs about and pedagogical decisions for supporting children's cooperative problem solving across two cultures, (e) an indication for how teachers can reference their teaching and be mindful about cultural differences, and (f) implications for teachers' and teacher educators' development and study of culturally responsive teaching and curricula for the improvement of children's learning, nationally and globally.

### **Vita**

Meilan Jin is from Helong City, Jilin Province, China. She graduated with a B. A. in Applied Psychology at Changchun University, China and earned a ME.d. in Educational Psychology at the Wayne State University. Meilan Jin will have her Doctor of Philosophy Degree in Child and Family Studies with the guidance from Dr. Mary Jane Moran. Meilan's concentration is focused on young children's cognitive development in diverse cultural contexts as well as play contexts with a minor in statistics.