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A Quasi-Experimental Study On The Effectiveness Of CCR&R TA/Coaching On Child Care Center Licensing Compliance

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ABSTRACT

High quality in early care and education is critical for children in their early ears and has a lasting benefit through their lives. Research in various fields such as education, medicine, psychology, economics. has provided evidence of positive outcomes for children who have been exposed to safe, rich, and engaging environments in their early years through high quality early care and education. The baseline of child care quality is providing protection for children by establishing regulations on health and safety areas such as response to disease, fire and other building safety, injury, abuse and neglect, adequate supervision, and developmentally appropriate activities. In child care, this protection is secured by the child care licensing agency in charge of monitoring on-site health and safety practices through annual unannounced inspections. Other agencies involved in quality are the State Child Care Resource and Referral (CCR&R) agencies in every state who provide a wide variety of services to help child care programs meet state licensing compliance requirements as well as improve the quality of a program, thereby leading to positive child outcomes. This study uses a quasi-experimental design to analyze the effect of CCR&R services on child care programs' compliance with state licensing regulations as well as the severity levels of the deficiencies cited. Longitudinal administrative data from licensing regulation records and the technical assistance database are used to examine whether CCR&R services have a significant effect on the number and severity of licensing deficiencies in child care programs during their annual reviews.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Introduction

Within the system of early care and education, child care licensing serves as a baseline protection of children from birth to school age while they attend out-of-home care programs (National Center on Child Care Quality Improvement [NCCCQI] & National Association for Regulatory Administration [NARA], 2015). States' human services agencies are responsible for establishing and administering regulations through unannounced health and safety inspections at child care facilities. Licensing agencies are in charge of setting requirements for health and safety that emphasize the avoidance of known hazards and detection of correctable health problems (Aronson & Aiken, 1980). Although the composition of regulations varies across states, generally the regulated areas include response to disease, fire and other building safety, injury, abuse and neglect, adequate supervision, and developmentally appropriate activities.

Although the primary objective of licensing regulations is child protection, some argue that licensing standards should also serve some educational purposes (Larson, Ward, Neelon, & Story, 2011; Morgan & LeMoine, 2004). A majority of states require child care centers to implement a program of activities that address intellectual development (Morgan & LeMoine, 2004). Larson et al. (2011) suggest that regulation be aligned with national health and safety standards to prevent childhood obesity. Licensing

rules embed child care quality elements in their regulations, and therefore, licensing compliance is always considered to be the foundation of child care quality.

On-site monitoring, commonly known as health and safety inspections, is an essential practice of licensing agencies to ensure child care programs are complying with state-determined licensing requirements. Monitoring methods have different types: differential monitoring, full and abbreviated compliance reviews, risk assessment, and key indicators. In South Carolina, the state in which the current study occurs, Department of Social Services (DSS) licensing monitors conduct a full on-site compliance review, although they use an abbreviated checklist as a starting point and guideline because South Carolina's licensing regulations/rules exceed 400 items. It is important to note that in South Carolina, child care facilities are "cited" for deficiencies of the regulations and each citation is counted as a deficiency. Child care facilities can receive any number of deficiencies or none depending upon the deficiencies found by the licensing monitor during the on-site visit. There is no "pass/fail" scoring.

The frequency of inspection differs across states, and the number of observed areas made during one investigation also varies from one visit to another (United States. Department of Health Human Services. Office of Inspector General, 2013). The frequency of licensing inspection has increased since 2007 (Trivedi, 2015). The national health and safety performance guidelines suggest that states' licensing agencies conduct at least one unannounced inspection each year and more announced/unannounced inspections as needed to achieve satisfactory compliance (United States Administration for Children and Families , 2015). The frequency of inspections for center-based child care ranges from "more than three times per year" to "less than every three years"

(Trivedi, 2015). By 2015, 14 states were conducting inspections with frequency that is aligned with the national guidelines . A state's licensing agency makes other types of inspections at a child care facility if the agency receives an official "complaint" about a facility. States' licensing agencies are open to the public so that anyone can report an alleged violation (Witte & Queralt, 2004). If a violation is found during the investigation of the complaint, the licensing monitor is allowed to make a few more visits to the program to make sure the violation is corrected and does not recur. However, Administration of Children and Families (ACF) (2015) has suggested that states not include inspections made for complaints among the total number of annual unannounced visits.

Licensing deficiency is the violation of a regulation standard. For example, if the child care regulation stipulates a 1:6 ratios for 9-month infant classrooms, and during an inspection a classroom is found to have seven children and one teacher for a ratio of 1:7, the licensing monitor will cite this classroom for being out-of-ratio. Another example is when a child care facility does not clean the rest equipment, such as mats, on a weekly basis. Licensing regulations define deficiencies with different severity based on the degree of health and safety risk to children. Some deficiencies, such as attendance records, do not pose an immediate threat to the health and safety of children, whereas other deficiencies, such as improper supervision and improper medication practices, are very likely to impact the health and safety of children.

For child care programs that have been identified to have deficiencies, the licensing agency will outline a series of actions to reinforce compliance (NCCCQI, 2014a). These reinforcement actions are of different strengths: Preventive and Corrective

Strategies, Intermediate Sanctions, and Terminal Sanctions. The agency decides which enforcement strategy to use by considering the degree of non-compliance, which is determined by factors including (a) the violation's severity of harm to children, (b) the number of observed deficiencies during the inspection visit, (c) the existence of repeated deficiencies and the length of their presence, (d) the size of the facility, and (e) the type of service the provider offers (NCCCQI, 2015; Witte & Queralt, 2004). Preventive actions such as Technical Assistance (TA), Training, and Consulting are the least intrusive and most commonly used strategies to support and encourage child care programs' overall performance, whereas Terminal Sanctions, such as Revocation of License, are applied sparingly only if other less intrusive strategies fail to result in compliance.

Technical Assistance is a commonly used strategy to increase the capacity of programs to deliver better educational services (Kahn, Hurth, Diefendorf, Kasprzak, Lucas, & Ringwalt, 2009; Smith, Dong, Stephens, & Tout, 2017). The National Association for the Education of Young Children and the National Association of Child Care Resource and Referral Agencies (NAEYC & NACCRRA, 2011) define TA as "the provision of targeted and customized supports by a professional(s) with subject matter and adult learning knowledge and skills to develop or strengthen processes, knowledge application, or implementation of services by recipients." For decades, TA has been widely used in early care and education settings and has been targeted towards specialized quality improvement areas, such as infant/toddler care, school-age care, inclusion, teaching dual language learners, mental health, business management practices, and entering and moving up in Quality Rating and Improvement System

(QRIS) (Child Trends, n.d.; LaRowe, Tomayko, Meinen, Hoiting, Saxler, Cullen, & Wisconsin Early Childhood Obesity Prevention Initiative [WECOPI], 2016; Pennsylvania. Office of Child Development and Early Learning [OCDEL], 2013)

Technical Assistance is an overarching term often used to describe multiple strategies: coaching, mentoring, consultation, professional development advising, and peer-to-peer TA (NAEYC & NACCRRA, 2011). Coaching is the most common type of TA provided by QRISs across states (Build Initiative, 2015). Coaching emphasizes the relationship-based process that is used to enhance existing skill, develop new skills, and build confidence and competence of the recipient (Rush & Shelden, 2011). Key activities during the coaching process include joint planning, observation, action, reflection, and feedback for compliance with licensing. On-going coaching is a core component for high-fidelity implementation (Fixsen, Blase, Naoom, & Wallace, 2009; Fixsen, Naoom, Blase, & Friedman, 2005). In this study, the TA provided by CCR&R coaches largely falls under the coaching model. In South Carolina, TA for quality improvement and compliance is generally provided by a statewide CCR&R agency that is supported by the state using Child Care and Development Fund (CCDF) funds. There are a few other state-supported agencies that provide TA that is focused on a specific initiative such as serving children with disabilities or assisting programs with infants and toddlers in child care settings. The focus of this study is to understand the effects of TA that uses coaching as the strategy (TA/Coaching) to improve child care quality and compliance.

All TA/Coaching delivered by the South Carolina CCR&R is provided by state-certified technical assistance providers (TAPs), also known as Quality Coaches, who have the expertise in the area of early childhood to provide technical assistance and

training to child care providers using adult learning strategies (South Carolina Center for Child Care Career Development [CCCCD], 2010). In South Carolina all Quality Coaches are required to take college-level credit hours each year to keep their certificate valid. The courses taken by Quality Coaches must be on the topic of child care or child development (CCCCD, 2010). There are 12-14 Quality Coaches serving 46 counties in the state. Each Quality Coach is assigned 2-4 counties based on the number of child care providers in each of the counties. The director of the CCR&R team also provides ongoing professional support to staff by holding monthly team meetings to strategize about ways to work more effectively with child care programs and provide consistent services throughout the state (CCCCD, 2010). See Appendix A for a description of certified Quality Coaches' qualifications.

1.2 Overview of the problem

High quality in early care and education in a formal child care setting or in a family child care home is a critical element of a child's success. Research in various fields, such as education, medicine, psychology, and economics, has provided evidence of positive outcomes for children having exposure to a safe and engaging environment in their early care and education setting (Howes, Whitebook, & Phillips, 1992). Quality in early child care is a complex construct with health and safety at its foundation. Health and safety is a precursor to quality. Regarding licensing compliance, health and safety requirements are overseen by state licensing agencies that award child care licenses to operate a child care facility legally. Another critical building block of quality is the professional development and support available and accessed by child care programs in a state. In most states (including South Carolina) this support system is provided by state

CCR&R agencies that offer a wide variety of services to help child care facilities. These services include training and TA to meet health and safety requirements of the state licensing regulations, improve the quality of child care programs, and provide professional development to child care teachers and directors, ultimately leading to positive outcomes for children served in these facilities.

To date, few research studies have examined the impact of TA on child care licensing regulations as an outcome variable. The focus of research studies has been to find program characteristics that possibly have effects on child outcomes and offer recommendations to policymakers about how to better fulfill their regulatory system's protective functions for children's well-being and development. Research studies relevant to licensing regulations have focused on predicting children's welfare or development of some program indicators. Fiene et al. (2002) synthesized various research studies conducted in the 1990s that provided evidence for 13 health and safety indicators of child care quality, such as immunization and staff qualification, that protect children from harm. These 13 indicators consistently appear in licensing regulations from state to state.

The research findings on the association between program characteristics, measured quality, and child outcomes are complex and sometimes discrepant. Kontos and Fiene (1987) found capacity, group size, and ratios were related to quality measures. They also found these child care program characteristics more strongly predicted children's development when treated as clusters than individually. Howes, Phillips, and Whitebook (1992) conducted a study to predict the pathways from two regulatory variables (ratios and group size) to process quality (variables for how teachers conduct activities) to teacher-child relationships to peer relationships (outcome variable). The

findings suggest the licensing standard for ratios is associated with the higher quality of caregiving. Thus Howes, Phillips, et al. (1992) recommended more stringent regulations on ratios. However, Burchinal, Howes, and Kontos (2002) found that, among home-based programs, teacher training and education are more salient predictors of children's development than ratios or group size. This finding has some consistency with another research study which was conducted slightly earlier. Bordin, Machida, and Varnell (2000) found that, among home-based child care programs, the regulated quality indicator for training is associated with better provider engagement with children. However, this study also found that provider knowledge of child development and health care practices was a more significant predictor of process quality than regulated quality indicators. Despite the inconsistency among their findings, these research studies collectively suggest that licensing systems be more stringent with some regulatory structural indicators.

In addition to the regulated areas mentioned in the previous paragraph, licensing regulations consist of many other health and safety standards (handwashing, background checks, staff records, immunization, etc.). The research studies commonly overlooked these health and safety rules because they seemed to have no association with how teachers conduct caregiving activities or make meaningful interactions with children. However, these regulations are relevant to the well-being of children. These health and safety standards are developed by other national associations and recommended to licensing systems. A lack of compliance with health and safety standards among child care programs has persisted for decades. Non-compliance with health and safety standards commonly existed among child care programs (Pizzo & Aronson, 1976). The

adoption of guidelines for the control of infectious diseases and injuries (recommended by the American Public Health Association and the American Academy of Pediatrics) among child care centers varied widely (Addiss, Sacks, Kresnow, O'Neil, & Ryan, 1994). Implementation of some practices, such as drying hands with single-use disposable towels, was common, whereas the implementation of reporting diarrhea outbreaks was rare. One study also found that state-to-state variations in the stringency of licensing regulation, staff training, or availability of technical consultation are associated with variations of performance (Addiss, Sacks, Kresnow, O'Neil, & Ryan, 1994). More recent studies also found low compliance with handwashing among child care programs where the overall compliance among all personnel was 22% and caregivers had a compliance rate of 30% (Clark, Henk, Crandall, Crandall, & O'bryan, 2016). Child care programs that have deficiencies of these regulations are likely to increase children's exposure to health risks. For example, a child care program with low compliance of handwashing would be more likely have to infectious disease spread, leading to more absenteeism. In addition a child care program that has unsafe playground equipment may have greater risk of physical injury.

Over 11 million young children attend out-of-home care and education programs. States need strong licensing systems to regulate and ensure that programs comply with regulations. States are reforming and strengthening standards to better promote the health, safety, and school readiness of children, especially in federally-funded child care settings. Current licensing trends show that regulations have become more stringent in the following areas: (a) increased pre-service qualifications for teachers and directors, (b) increased amount of administrative training for directors, (c) increased number of annual

training hours for at least one center role, (d) comprehensive background checks, (e) training requirements about reducing sudden infant death syndrome (SIDS), and (f) requirements for reporting severe injuries and death (NCCCQI & NARA, 2015). Statutes that ensure the implementation of these regulations also addressed their enforcement and consequences, such as tiered enforcement, so that severe deficiencies may result in revocation of the license (NCCCQI, 2014a). Appropriate and consistent application of licensing regulations relies on two areas—validity of licensing instrument and professionalism of licensing staff (National Center on Child Care Quality Improvement, 2014, Fiene, 2002, 2014).

Appropriate support for child care programs to meet stringent licensing requirements is necessary to ensure compliance. However, some studies revealed that tougher regulations might result in some unintended negative consequences (Blau, 2007; Hotz & Xiao, 2011). For example, a requirement to have college degrees might induce child care centers to use less-skilled aids (Hotz & Xiao, 2011) and be less likely to meet the standard for ratios because of an inability to afford to hire more teachers with higher educational attainments (Blau, 2007). Hotz & Xiao (2011) found an increase of child care quality only in higher income areas as a result of stringent regulations. In addition, having tougher regulations also induces a reduction in the number of center-based child care establishments, especially in lower income markets, therefore decreasing child care access to low-income families. Hotz & Xiao (2011) also found tougher regulations induced more families to use home-based child care providers who were less likely to prepare children for school readiness when compared to center-based child care. Because tougher regulations and enforcement made the cost of maintaining licensing compliance

higher, the regulation input, in reality, did not induce higher quality output (Blau, 2007; Hotz & Xiao, 2011).

The importance of CCR&R services in the landscape of quality child care services is evident from the endorsement they have received through the reauthorization of the Child Care and Development Block Grant Act (CCDBG) of 2014. Through the reauthorization of the CCDBG, the federal government, recognizing the need for intervention in health and safety, made several significant revisions to the law to expressly support the increase in quality of early care and education services broadly. More specifically, the revisions increase accessibility of those services (NCCCQI, 2015). The law addressed licensing requirements as well as approved the use of CCDF funding streams for CCR&R agencies in the state (Matthews, Schulman, Vogtman, Johnson-Staub, & Blank, 2015). Since then, the CCDF has increased funding for initiatives on child care quality enhancement, including tiered reimbursement, professional development, grant opportunities, and, most importantly, on-site TA or coaching (NCCCQI, 2015).

By 2013, all states reported that they provide TA to assist child care facilities with licensing or quality monitoring activities (NCCCQI, 2014b). If licensing monitors find severe deficiencies which cannot be immediately corrected on-site, they often make a referral to state or regional TA providers (CCR&R or other entities) to support the child care program in resolving the deficiencies. The target area of TA received by child care programs depends on the areas in which the deficiencies were cited (NCCCQI, 2014b). A child care program is required to resolve their non-compliance issues with the help of TA within a limited amount of time (one month to three months). Depending upon state

regulations, failure to resolve the issues may result in restrictive sanctions, such as fines or revocation of license (NCCCQI, 2014a). Despite reports of the extensive use of TA, the literature about the services provided by state or local-level TA providers to help child care providers in their licensing needs is scant. For example, what model (coaching, mentoring, consultation) did they use? How much TA is needed to achieve compliance? Even fewer research studies have looked at whether TA helped child care programs foster sustainable change or had an effect on licensing compliance.

1.3 Purpose of the research

The purposes of this study are to investigate the significance of the impact of CCR&R services using a coaching model on licensing compliance outcomes at child care centers and to further our knowledge on the use of coaching to improve health and safety conditions in child care environments. In this study, TA/Coaching provided by CCR&R coaches mainly falls under a coaching model. In South Carolina, CCR&R agencies are the main providers of TA/Coaching with additional TA provided by state-supported agencies who specialize in supporting providers who serve children with disabilities or infants and toddlers. The focus of this study is to understand the effects of TA/Coaching as a strategy to improve child care quality and compliance. Although a large body of research has been conducted to examine the effectiveness of coaching on the quality of child care programs, the topic was limited to the implementation of instructional/teaching practices and curriculum implementation. Because teacher's practices and the implementation of curriculum are considered as having direct impact on child outcome, these areas have been focused on more in research studies. Although compliance with health and safety standards is the basic threshold of quality, the effect of coaching on

compliance with these standards has not been examined. By examining the number of child care center deficiencies and their severity during their annual inspection before and after the date(s) the child care programs received targeted support, this research study aims to fill the gap in research of on-site coaching's effect on the basic threshold of child care quality, i.e. health and safety. While research studies that examined the efficacy of coaching were commonly conducted in experimental settings that may have limited implications for realistic situations (Sheridan, Edwards, Marvin, & Knoche, 2009), this study uses large administrative datasets from South Carolina departments that administer licensing and TA in the state. These data, although challenging to use in research studies, are a realistic portrayal of the state's child care licensing program and its practices as well as the TA/Coaching support network and its activities. No other study to date, to the best of the researcher's knowledge, has used administrative data to study the effects of TA.

1.4 Research questions

The following research questions will be investigated:

Research Question 1: What is the effect of CCR&R TA/Coaching services on the number of licensing deficiencies of child care centers?

Research Question 2: What child care characteristics (e.g., ABC Quality Level, receiving CCR&R services) are the significant predictors of receiving licensing deficiencies at high, medium, and low severity levels?

1.5 Data sources

The current study drew data from two state-level databases: South Carolina Child Care Licensing Data and Technical Assistance Provider (TAP) Data. South Carolina

Child Care Licensing Data contains all child care providers: Licensed/Approved Child Care Center, Registered Faith-Based Center, Licensed Group Child Care Home, Licensed Family Child Care Home, and Registered Family Child Care Home. This database contains the most detailed information on licensing inspection visits to all child care programs. Critical information needed from this database includes the date of the inspection, child care programs that have licensing deficiencies, and descriptions of the deficiencies. The dataset is longitudinal and contains histories of annual review visits and citations made during the last decade.

The TAP database contains information on details of TA/Coaching services provided by CCR&R to child care programs. This database documents information regarding the rationale, dosage, and essential activities for all TA. The two variables from this database that are most relevant to the current research are facilities (that received TA) and date (for completion of the TA). This study uses data from two fiscal years: July 2014 to June 2015 and July 2015 to June 2016. The dataset includes all child care programs that received CCR&R services during the selected period. The criteria used to select the final sample is outlined in Chapter 3.

1.6 Significance of the study

By examining the number of health and safety deficiencies and their severity before and after TA/Coaching, this current research will contribute to our understanding of the targeted support child care facilities receive for quality improvement. Effects of CCR&R services on licensing compliance as an outcome of interest has rarely been the focus of prior research in studies related to the effectiveness of targeted support for quality. Previous research studies were predominantly interested in children's intellectual

and social-emotional development and thus narrowly defined process quality as "quality." Nonetheless, with the existence of low compliance with health and safety regulations, one would question: "How can a child care program that does not meet the minimum health and safety standards provide a good learning experience for children?"

So far, the literature on TA/Coaching as targeted support for licensing compliance and child care quality is limited to policy papers, evaluation reports, and fact sheets. This literature only consists of (a) brief introduction of the targeted support, (b) some implementation examples, (c) number of TA providers and recipients, and (d) perspectives and challenges of TA providers for consistent implementation. Questions of whether TA/Coaching is efficient and whether the programs continue to engage in quality improvement remain unanswered. Besides, no research has yet used a statistical analysis approach to examine the outcome data of licensing compliance and quality. Because the current study uses statistical analysis to look at the outcomes of TA/Coaching, it contributes to a methodological advance on this topic.

1.7 Summary

This chapter introduced the licensing regulations, monitoring, deficiencies, and actions taken to ensure child care providers' compliance. Compliance with health and safety regulations is the primary threshold of child care quality. Although TA is mandated by federal law as an action to support licensing compliance, the effects of such an intervention are yet to be investigated. The intervention, TA/Coaching, is provided using an internally developed coaching model to guide the consistency and fidelity of services while flexibly applying a range of evidence-based and experience-based activities to recipients with different needs.

Coaching is a long-term, relationship-based adult learning process which is oriented to empower early childhood educators and programs. It is a popular intervention for teachers' skills and knowledge to promote children's development and learning. Coaching is also commonly used by TA providers in the QRIS to improve child care programs' quality levels. The purpose of this current research is to examine the efficacy of TA/Coaching used by CCR&R technical assistance providers (TAPs) to support child care programs' licensing compliance.

Chapter 2 introduces the theoretical framework that informed the current research study. This chapter also focuses on the summary of existing research studies on TA and coaching that are provided to improve child care quality. Chapter 3 introduces the methodology of the current research study. This chapter elaborates on the research design, process, independent and dependent variables, and the analysis plan. Chapter 4, in manuscript form, reports the results of Research Question 1, focusing the effect of TA/Coaching on the change in the number of deficiencies. Chapter 5, also in manuscript form, presents the results of Research Question 2, focusing on building a model to predict the severity of the deficiencies. The last two chapters further discuss the findings regarding their practical significance and the use of administrative data to conduct a research study on coaching.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter begins with the conceptual framework that underlies the current research study. The conceptual framework is a research design that examines the effect of the utilization of TA/Coaching as an intervention on licensing compliance. This chapter presents a summary of research studies that investigate targeted support (TA, coaching, consultation, mentoring) in the field of early education. The synthesis of research will include interventions in child care programs as well as the research methodologies used to analyze them and their findings. Alongside the synthesis, each section includes discussions about the insights gained from the selected research studies in relation to the current research.

It is necessary to note that the selection of research articles discussed in this literature review is based on characteristics of the interventions that are common with the CCR&R intervention examined in the current research study. These characteristics include goals for quality improvement; targeted, on-site key activities during the intervention process; and other characteristics that will be discussed later in this chapter. However, TA/Coaching, which is the intervention in this study, is described using several different types of terminology, such as coaching, mentoring, TA, and even professional development. Although there is very little consistency, in general, the terminology used depends on the identified role of intervention providers and if the purpose of the

intervention is problem-solving or moving up the quality continuum. Coaching emphasizes delivery by an expert with specific knowledge and skills, whereas mentoring emphasizes guidance provided by a more experienced colleague, and consultation emphasizes collaboration with an external consultant to solve specific concerns (National Center on Quality Teaching and Learning, 2014). Some interventions in the selected literature also combine training/workshops/courses with targeted on-site support (coaching, consultation, or TA) (Sheridan et al., 2009). While the terms can be used singularly, they appear to be mixed or used in combination in many of these selected research studies. For example, although Abell, Arsiwalla, Putnam, and Miller (2014) called their intervention "mentoring," it was delivered by experts and used approaches such as modeling and coaching. In another study, the intervention identified as "consultation" (Alkon, Bernzweig, To, Wolff, & Mackie, 2009) was also described as guidance and TA to child care providers that addressed their health and safety needs.

2.2 Conceptual framework

The purpose of licensing regulations is to provide children with a healthy and safe environment while attending out-of-home care programs. Many licensing regulations are informed by scientific research about children's well-being and their intellectual and socio-emotional development (Fiene, 2002). With the expectation that children would benefit from higher or stricter regulation standards, such as more training for teachers and smaller group size, licensing systems increased the stringency of their regulations and policies (NCCCQI & NARA, 2015). However, tougher regulations and policy do not function as a driver for fidelity of implementation of high standards in child care

programs. Instead, some researchers found that they may induce more deficiencies (Blau, 2007; Hotz & Xiao, 2011).

In order to bridge the gap between research and practice, practitioners need some supports that facilitate the implementation of what they are expected to do (Fixsen & Blase, 2009). Within the ideology of Implementation Science, Implementation Core Components can facilitate behavior change at the practitioner, supervisory, and administrative support levels in order to implement with fidelity. Coaching is the principal way in which behavior change is brought about throughout the stages of implementing evidence-based practices (Fixsen et al., 2009). These targeted supports are widely acknowledged as effective because they use adult learning approaches that are consistent with Bandura's social cognitive and self-efficacy theories. The strategies include observation of models, guided practice, and constructive verbal feedback to support the development of behavioral competencies and a sense of efficacy (Bandura, 1977; Olds, Kitzman, Cole, & Robinson, 1997). In addition to learning strategies that are identified as effective, targeted support also relies on the relation base. Research findings suggest that recipients have tangible change in their practices when targeted support (intervention) is provided in the context of respect and support (Olds et al., 1997; Robinson, Emde, & Korfmacher, 1997).

TA and coaching are commonly applied interventions within organizations and communities to build capacity for human services performance improvement (Katz & Wandersman, 2016). TA and coaching are used to respond to program or system-level needs for improvement using a range of resources, information, and supports (Cox, Hollingsworth, & Buysse, 2015). Recent research has also confirmed that organizations

which use TA are more likely to fully implement evidence-based intervention/programs (Chilenski et al., 2016; Dusenbury, Brannigan, Falco, & Hansen, 2003). Research investigating effectiveness of systems for professional development has consistently reported that TA, when guided by a specific implementation model that is implemented with fidelity, is an effective approach for improving performance (Alkon et al., 2009; Katz & Wandersman, 2016; Le, Anthony, Bronheim, Holland, & Perry, 2016).

The procedure of TA/Coaching is comprised of multiple phases, beginning with collaborative and data-informed decision making that guides the process of subsequent phases of learning about new strategies and implementing strategies in routine practice, and concluding with a phase of evaluation and reflection (Katz & Wandersman, 2016; Le et al., 2016). Moreover, TA/Coaching should be grounded in the context of client needs and an interest in improving performance (Chilenski et al., 2016; Katz & Wandersman, 2016; Le et al., 2016). Since the focus of TA/Coaching is dependent upon the mutually determined needs of the child care program and the Quality Coach and is responsive to specified needs and goals, the structure of TA varies in intensity and content (Snyder, Hemmeter, & Fox, 2015).

TA incorporates multiple adult learning approaches, including (a) information and resource dissemination, (b) coaching, (c) mentoring, (d) consultation, and (e) professional development advising (NAEYC & NACCRRA, 2011). Mentoring, coaching, and consultation are all relationship-based learning processes characterized by more experienced individuals working in a one-on-one or small-group setting. Mentoring focuses on overall professional effectiveness; coaching focuses on specific professional dispositions, skills and behaviors; whereas consultation focuses on issue-specific

concerns. Although these interventions are slightly distinct in their processes, they are clearly different from training and formal education because TA/Coaching is a service delivery method that focuses on the relationship between providers and recipients and assumes ongoing interactions over time to produce a sustainable positive outcome (Bromer & Korfmacher, 2017).

Given the pervasiveness of state and local TA systems that are being implemented throughout the US in support of broad-based goals related to child care licensing compliance and quality enhancement, one might expect relatively in-depth evidence documenting the efficacy of this strategy (NCCCQI, 2014). Unfortunately, practice appears to be outpacing science, as only a few research studies that specifically investigate the effectiveness of these approaches on general child care program quality have been conducted. While the information regarding more general TA and a system of support is somewhat limited, the knowledge base related to more specific or targeted TA provides compelling evidence that these learning approaches are effective in enhancing teachers' implementation of specific evidence-based practices (Pianta, DeCoster, Cabell, Burchinal, Hamre, Downer, LoCasale-Crouch, Williford, & Howes, 2014). These interventions, used as adult learning approaches, were also used as interventions for child care licensing compliance.

2.3 Empirical literature relevant to coaching

Coaching for evidence-based practices/curriculum

The current trend in improving child care quality is changing teacher behavior through coaching (Moreno, Green, & Koehn, 2014; Sheridan et al., 2009). The topic

areas for coaching in child care settings include teacher-child interaction, evidence-based instruction curriculum implementation, tiered instruction, and addressing challenging behavior. Many research studies conducted between 2008 and 2016 have consistently found effectiveness in these indicators of child care quality. In addition, a large body of empirical research studies has found coaching to be an effective way to increase teachers' implementation of evidence-based practices/curriculum (Pianta et al., 2014; Wilson, Dykstra, Watson, Boyd, & Crais, 2011; Zan & Donegan-Ritter, 2013). Most of these research studies showed that coaching is more effective than training in promoting teachers' behavior change (Dennis & Horn, 2014; Hemmeter, Hardy, Schnitz, Adams, & Kinder, 2015; Milburn, Hipfner-Boucher, Weitzman, Greenberg, Pelletier, & Girolametto, 2015; Mohler, Yun, Carter, & Kasak, 2009; Moreno et al., 2014). Some studies found that the dosage of coaching is positively associated with changes in practice (Pianta et al., 2014; Shidler, 2008).

Features of the coaching models

In the literature, a coaching model as an intervention with highly structured cycles during the intervention procedure is more common. The cycles contain essential practices, such as targeted observation, feedback, reflection, and brainstorming. The intervention cycles reoccur on a weekly, bi-weekly, or monthly basis over the total duration of intervention. It is also common that coaching is combined with initial trainings or classroom instruction. Most initial trainings and instruction lay the foundation for evidence-based practices. Literature also shows a trend in web-mediated approaches becoming widely adopted by coaching models. Web-mediated approaches include online videos that demonstrate evidence-based practices or video conferences

between coach and teacher. This trend also includes coaches conducting focused observation by viewing video clips of teachers using evidence-based practices in their classrooms. Some practice-based coaching models include peer-coaching, a reciprocal sharing of information, and support between lead and assistant teachers in a one-on-one manner (Zan & Donegan-Ritter, 2013).

Research methods

Most empirical research studies used randomized sampling in their research design to examine the relationship between coaching and evidence-based practices (Pianta et al., 2014; Rudd, Lambert, Satterwhite, & Smith, 2009; Wilson et al., 2011; Zan & Donegan-Ritter, 2013). Intervention groups in these studies received training and coaching, whereas control groups only received training. Few studies had all participants exposed to the intervention in their research design (Hemmeter et al., 2015; Shidler, 2008). Change in teacher behavior was measured by popular and pre-established assessment tools that have been tested for reliability and validity, such as the Classroom Assessment Scoring System (CLASS) that measures the interaction between teacher and children and the Teacher-Pupil Observation Tool (T-POT) that measures challenging behaviors and the teacher's response to those behaviors (Hemmeter et al., 2015; Zan & Donegan-Ritter, 2013). The research studies utilized various statistical analyses to test the significance of change. Some studies built complex predictive models by considering the impact of moderating variables, such as teachers' education, years of experience, and proportion of students in poverty; some studies used t-test or a non-parametric test (for violation of normality) to examine group differences; whereas a few studies simply calculated the frequency of challenging behaviors before and after the intervention.

Intervention for compliance

Intervention studies that examined child care licensing compliance also incorporated adult learning activities along with coaching to utilize evidence-based practices in the classroom. However, in comparison to the coaching models summarized earlier, the interventions for licensing compliance appear to be of much shorter duration and with no recurring cycles. In research studies that examined licensing compliance intervention, slightly different terms were used to name these interventions, such as on-site health consultation, training and TA, or mentoring. For example, Linkage Project in California provided health consultation for the purpose of improving child care centers' written policy and practices related to health and safety (Alkon, Bernzweig, To, Wolff, & Mackie, 2009). Keystone STARS (QRIS of Pennsylvania) works in partnership with regional TA agencies to provide intensive, one-on-one support for participating facilities to meet specific health and safety standards and move up STAR levels (OCDEL, 2013). Alabama's Family Child Care Partnerships Project provides mentoring in areas of business operation, licensing compliance, global quality, and fidelity to increase the quality of family child care homes (Abell et al., 2014). The New York City Department of Health and Mental Hygiene (DOHMN) provided training and TA to facilitate compliance with New York City's standards for beverages served in child care facilities and the minimum time period for daily physical activity engagement. Similarly, for the purpose of childhood obesity prevention, Wisconsin's statewide Active Early program also provided training and TA to child care programs to implement the state's policy on physical activities (LaRowe et al., 2016).

Features of the interventions

Most of the literature on studies that examined licensing compliance lacks a clear description of the intervention in terms of delivery, procedures, and essential activities. However, TA providers/mentors/consultants frequently delivered their services on-site in a child care facility, and the dosage of intervention varied from one child care program to another based on their needs (Alkon et al., 2009; LaRowe et al., 2016; Smith, Schneider, & Kreader, 2010). In comparison with highly structured coaching to implement evidence-based practices, interventions for licensing compliance emphasized needs assessment and action planning. Many providers of compliance intervention also identify their approach as relation-based, strength-based, and evidence-based (Alkon et al., 2009; Smith et al., 2010). Alkon, Farrer, and Bernzweig (2004) conducted a qualitative study about the roles and responsibilities of health consultants, wherein they found that consultants acknowledged the importance of establishing a strong relationship with child care providers. Similarly, Abell et al. (2014) noted that mentors of Family Child Care Partnerships (FCCP) need to provide services with respect and support. The FCCP model identifies the mentor's role as "quality partner" rather than "the expert."

Research methods

Although some TA providers also use coaching as intervention to improve compliance with licensing regulations, very little research has examined its direct efficacy (Kakietek, 2014). To the best of the researcher's knowledge, only one study conducted by Alkon et al. (2009) employed randomization to assign participants into an intervention or control group. Some studies had all participants exposed to the intervention. Abell et al. (2014) measured each participant twice: within the first 3

months of enrollment (Time 1) and at the time of a program's departure or the latest assessment for programs still participating (Time 2). The study used latent difference score modeling (McArdle, 2009; McArdle & Hamagami, 2001; Steyer, Eid, & Schwenkmezger, 1997) to estimate the change from Time 1 to Time 2. LaRowe et al. (2016) had all participants exposed to the intervention and measured the participants at baseline, 6 months, and 12 months; then they used t-test and Generalized Linear Modeling (GLM) to analyze the change.

Two studies compared participants who received intervention with participants who did not (Kakietek, 2014; OCDEL, 2013). However, neither of these studies randomly assigned participants into intervention and control groups. The participants in the comparison group received intervention because they were located in the catchment area of the intervention provider or because they voluntarily received the intervention. These studies used strategies to create a control group that is equivalent to the intervention group based on program characteristics, such as capacity, location, and percentage of children in poverty.

Measurement for compliance

Pre-established observation tools are commonly employed to collect data for compliance. Alkon et al. (2009) employed checklists based on the National Health and Safety (NHS) Standards. The Family Day Care Environmental Rating Scale (FDCERS) is a standardized observation measure with 32 items using a 7-point scale (1=inadequate and 7=excellent) (Harms, Cryer, & Clifford, 2007). Kakietek (2014) collected data on licensing compliance with child care regulations by using site inventories and self-reporting for center staff. LaRowe et al. (2016) used Nutrition and Physical Activity Self-

Assessment. Pennsylvania OCDEL used program STAR level administrative data as a measure of change.

Changes in compliance

Research studies for compliance intervention showed that targeted support has some effect on program quality. Yet not all of these interventions completely achieved their objectives (Alkon et al., 2009). Child care centers in the control group demonstrated significant improvements in writing a health and safety policy. The control group had higher mean scores on two subscales of the Health and Safety Checklist: emergency preparedness and handwashing. However, the study did not find significant improvement on implementation of health and safety practices (Alkon et al., 2009).

Abell et al. (2014) found participating family home providers demonstrated a statistically significant increase in quality subsequent to enrolling in FCCP (Abell et al., 2014). The study also found an association between global qualities with dosages of intervention. Dosage of intervention varied across child care providers according to their rating level. Lower quality at the time of enrollment was associated with longer participation in the FCCP as well as a higher rate of increase in global quality.

In a study on increasing physical activity and meeting state beverage regulation standards, Kakietek (2014) found that participating in an intervention is associated with better compliance with regulations on physical activities, yet neither training nor TA is associated with compliance with beverage regulations. The study also found two moderating variables related to beverage standards: compliance outcome and physical activity outcome. Centers that participated in the federal program related to nutrition and

physical activity were dedicated to high standards and compliance and may have been more likely to participate in training and TA than their less dedicated counterparts. Training appears to have less influence on compliance with beverage regulations because merely having knowledge is insufficient to changing practice (Kakietek, 2014).

OCDEL (2011) found that, among participants at all quality levels, child care programs that received TA were more likely to move up in quality than those that did not participate in TA activities. However, when looking into the odds ratio of quality change by STARS, the start-level and the highest level (Level 3) did not show a significant difference between intervention and control group. OCDEL (2013) conducted further analysis to confirm the effectiveness of TA and additionally examined the relationship between STAR movement and dosage of TA. The study found a positive association between STAR movement and number of hours of consultation received.

LaRowe et al. (2016) found improved physical activity environment for all sites as measured by the Environment and Policy Assessment and Observation (EPAO) instrument. Correlation was found between teacher-led physical activity and children's engagement in physical activity, but the correlation was not significant. However, other results from this study showed a significant increase in structured physical activity and observed play time and improvement in written physical activity policy.

2.4 Summary

Coaching is commonly used to support implementation of evidence-based practices. Many research studies have demonstrated the effectiveness of an adult learning approach in teachers' characteristics, such as credentials, knowledge, and practices. Many

early intervention programs also incorporate TA as an integral part to facilitate implementation (Kahn et al., 2009). Coaching as an intervention is somewhat different from intervention for compliance. Although both coaching and intervention for compliance use strategies that facilitate on-site learning, they are differentiated by purpose of the intervention. Coaching that facilitates teachers' implementation of evidence-based practices focuses on the practices. This type of coaching model has only one goal: to help teachers adopt the practices. Whereas coaching, mentoring, and consultation used as targeted support for regulation compliance and program quality rating are characterized by identifying the program's needs and developing an agreed-upon action plan to meet standards.

TA/Coaching has commonly been used in early care and education settings for compliance with regulations and quality standards (NCCCQI & NARA, 2015). By 2015, all child care licensing agencies stated they provide TA to child care programs as a facilitative approach to support for compliance with health and safety regulations (NCCCQI & NARA, 2015). TA/Coaching is also commonly provided to child care programs participating in statewide or local QRISs (Build Initiative, 2015; Smith et al., 2017; Smith, Robbins, Schneider, Kreader, & Ong, 2012). However, the effectiveness of these interventions is less frequently investigated by research studies. Moreover, few research studies have been conducted to investigate the effectiveness of TA in child care to improve licensing compliance. The current study investigates the effectiveness of these learning approaches (using a customized and structured coaching model) in the particular context of resolving licensing deficiencies. Although some of the selected studies investigated the intervention for improving compliance with specific regulations or

policies, they commonly overlooked the improvement of overall scoring on regulations or policies. None of them have focused on child care centers' need to reduce the number of deficiencies, which is the interest of the current research.

By reviewing the selected research studies, the researcher found research studies on TA/Coaching for licensing compliance are highly needed. The selected research studies on intervention for compliance left a lot of questions unanswered. States' agencies for regulations and quality improvement have an abundance of data in terms of outcomes and program level covariates that have not been fully utilized to explore the effectiveness of targeted support. On the other hand, research studies on targeted support for licensing compliance and quality sometimes are constrained in terms of methodology. In the real world, heterogeneity among child care providers, customized action plans, specific and broad needs of child care directors, and differences in motivation to receive TA are some of the reasons that make a true experimental design study difficult. However, annual licensing data and quality data, as well as TA/Coaching databases from state agencies running these programs, provide powerful sources of information to conduct a study with a strong research design.

CHAPTER 3: METHOD

3.1 Purpose of the study

Professional development of the child care workforce is an important element of high quality early care and education. Professional development includes ongoing education, training, and technical assistance (NAEYC). One of the strategies used to provide customized technical assistance is on-site coaching, which is a major part of professional development of the early child care workforce. In several states, the state Child Care Resource and Referral agencies (CCR&Rs) provide workshop-style training events coupled with on-site practice-based coaching to support early care and education teachers to provide quality child care to young children ages birth through 5 years. Although the specific model and service delivery system differ, CCR&R agencies throughout the country provide TA and coaching services that are aligned with state Quality Rating and Improvement Systems (QRISs) to improve child care quality. The current study examines the effectiveness of TA/Coaching provided by South Carolina CCR&R in improving licensing compliance at center-based child care programs in the state. While most of the studies examining TA or coaching have focused specifically on impacts related to QRIS performance, impacts of CCR&R services on licensing compliance have been overlooked in the extant literature. Licensing compliance, which ensures that the child care program is meeting basic health and safety standards, is the foundation of quality in child care centers. However, although compliance with health

and safety standards is the basic threshold of quality, the effect of CCR&R service interventions on this core element of quality has not been examined by researchers. Compliance in child care is measured in different states in different ways depending on the measurement tool used by the licensing monitors in the states. In South Carolina, the number and severity of deficiencies are cited during an annual unannounced visit, also known as the review visit, to child care programs. By examining the number of deficiencies of child care centers before and after the date they received the TA/Coaching intervention, this research study aims to fill the gap in research studies by focusing on potential impact on other important aspects of child care quality, namely licensing compliance.

Another purpose of this exploratory study was to identify predictors of the severity of deficiencies, especially high or medium severity levels that may indicate unsafe conditions for children in child care centers. Characteristics of child care centers, such as size of the child care center and ABC Quality Level, were examined along with data on whether providers received CCR&R service or not.

3.2 Research questions

The following research questions will be investigated in this study.

Research Question 1: What is the effect of CCR&R TA/Coaching services on the number of licensing deficiencies of child care centers?

Research Question 2: What child care characteristics (e.g., ABC Quality Level, receiving CCR&R services) are the significant predictors of receiving licensing deficiencies at high, medium, and low severity levels?

3.3 Study design

This study employs a quasi-experimental, pre-post research design using secondary data from South Carolina Technical Assistance Provider (TAP) Database System and the state Licensing Data System. This study will compare licensing deficiencies in each child care program before and after they have received CCR&R services and examine the impact of the services on the number and severity of deficiencies in the child care program.

This study uses real, existing, large-scale administrative data that has been designed for the purposes of documentation and reporting of child care service activities in the state. Since it is not a research study designed specifically for understanding CCR&R services, the exposure to intervention and the data collection is not controlled by the research. Therefore, a true random sample of control and treatment groups cannot be created. It is an authentic sample of child care providers who are diverse and access CCR&R services for a variety of reasons. This is a one-sample design in which data were extracted from a large administrative database for all child care centers that received intervention. Therefore, the one-sample of child care providers acts as its own control to answer the first research question on the effect of CCR&R services on licensing compliance. The intervention, TA/Coaching services from CCR&R, is available to all the child care providers in the state at no cost. However, in general, there are two groups of child care providers who access these services. One group is required to get the intervention as a mandate from child care licensing due to the magnitude of deficiencies with serious impact on the health and safety of children in child care centers during annual inspection visits. The second group voluntarily reaches out to CCR&R requesting

services to improve their operations or start a new venture. Regardless of the motivation of the child care facility to access CCR&R services, TA/Coaching services are implemented based on a statewide coaching manual, developed in South Carolina, that provides a structured yet customized action plan to be implemented by both the Quality Coach as well as the staff in the facility. Creating a comparable control group of child care centers to the treatment group is difficult because of the diversity among child care providers, such as their size, location, operations, financial status, management, etc., which may confound the results of the study. Therefore, using secondary data analysis of state level administrative data on licensing deficiencies, the research design employed a one-sample pre-post design for Research Question 1 to study the effects of TA/Coaching provided to child care providers.

The dependent variable in the study, for Research Question 1, is the number of deficiencies a child care provider received during their annual review. The uniqueness of this research is the use of licensing deficiencies as a dependent variable. Although licensing compliance is the foundation of quality, to the best of our knowledge, no other study has examined the effect of TA/Coaching on licensing deficiencies.

The study examines the effect of CCR&R intervention by comparing the licensing records of a group of regulated child care centers before and after receiving the intervention. Every child care program in the state that is licensed to operate receives at least one unannounced annual visit to review the health and safety conditions at the child care facility. The design includes two measures from two observations: Observation One is the annual review that occurred before intervention and the number of deficiencies during this visit, and Observation Two is the annual review that occurred after

intervention and the number of deficiencies during this visit. The observations are annual unannounced inspection visits conducted by licensing monitors from the Division of Early Care and Education (DECE) to inspect compliance with state child care regulations (SC Child Care, 2017). The licensing monitors use an annual review checklist on an electronic tablet with software designed for the purpose of determining compliance with state regulations.

The intervention TA/Coaching

Both TA and coaching appear in the literature as targeted and customized professional development provided by experienced professionals with the primary aim of supporting child care quality enhancement by promoting evidence-based inclusive practices in high quality early childhood environments (Smith et al., 2012). However, CCR&R and other agencies providing technical assistance identify targeted professional support as coaching because it emphasizes a relationship-based approach that endures over time (CCR&R-SCIC, 2017).

CCR&R TA/Coaching, in the state, uses several methods of delivering their services based on the needs of recipients. The varying forms of delivery include delivery by an individual Quality Coach or a team, consultation with an individual or group of child care staff, and the use of resource sharing, training, and hands-on modelling or a combination thereof. The service may also be delivered through on-site, distance, technology-enabled, or hybrid methods. The CCR&R coaching model uses various approaches: coaching, mentoring, consultation, professional development advising, training, peer-to-peer TA, and other forms of support. The services also vary in intensity and duration depending on the recipients' needs.

Although the interventions vary in delivery, dosage, and intensity, consistency of services is established across the services provided to all participating child care centers. The consistency is mainly derived through the use and implementation of the coaching manual developed for the use of delivering state CCR&R services. All provisions of the intervention in this research study are guided by the coaching manual to ensure that the services follow the procedure and utilization of essential practices. All TA/Coaching services start with the referral process. This stage includes the following activities: initial contact by the licensing agency or child care provider requesting CCR&R services, an initial meeting to establish rapport with the child care program director, and collection of available evidence through an observational assessment to prepare for the planning stage. Next, during the planning stage, the Quality Coach will analyze the assessment data and present her/his findings to the child care program director. Based on these identified strengths and needs, they establish an agreed upon overall goal for the services. Then they identify the specific practices, an action plan, and coaching schedule needed to achieve the overall goal. The next stage is teaching/learning stage, which is the core of the coaching model that will use training or coaching guided by outlined protocol. Once the program has achieved their identified goals, the Quality Coach will engage in the plan completion stage. During this stage, the Quality Coach will conduct a summative assessment, facilitate final reflections, and document their rating on the implementation of the program action plan. In the final follow-up stage, the Quality Coach will seek to maintain the improvement of quality in the child care facility through the relationship established during earlier stages. Appendix A contains some excerpts from the CCR&R-

SCIC coaching manual that describe the stages of the coaching model and the essential practices.

The learning approach, delivery form, and amount of CCR&R services are based on the overall goal of an action plan and determined collaboratively by the child care provider and the CCR&R Quality Coach. Typically, an action plan consists of several on-site visits by the Quality Coach (that may be combined with distance or technology based approaches). Each on-site visit typically contains several sessions. In a typical on-site session, the Quality Coach uses the essential practices of coaching to guide the learning for an individual or a small group of recipients.

Although the CCR&R services in the state are provided in a consistent manner, each one of the Quality Coaches provides services in the real world to child care providers who are diverse in their characteristics, leadership, needs, motivations and compliance with licensing regulations. This study is conducted in authentic settings and is believed to be an authentic sample of child care providers in the state. In the context of a scientific study, this is a limitation of this study.

3.4 Data

Data sources

Division of Early Care and Education (DECE). The sample used in this study is selected from secondary datasets provided by the DECE, a division of the Department of Social Services (DSS) in the state. DECE is the administrator of the CCDF in the state and undertakes licensing of all child care providers serving children for more than four hours a day. DECE is entrusted with the monitoring of compliance with the licensing

regulations related to health and safety in these child care centers. DECE provided two datasets for this study: licensing database and technical assistance database. One of the datasets used in this study is from the licensing department of DECE, which contains data from when a provider applies for starting a new business, their annual reviews, and the deficiencies cited during the annual reviews as well as additional monitoring visits to maintain compliance. The second dataset is the technical assistance database that is maintained by the Center for Child Care Career Development (CCCCD, read "4Cs and a D"). Both of these datasets have been described in detail below.

State Center for Child Care Career Development (CCCCD). Technical assistance datasets were provided by CCCCD, the agency that oversees the overall area of career development of child care. CCCCD oversees Credential, Training, Technical Assistance, and T.E.A.C.H. Early Childhood Scholarship programs for the child care workforce. It administers the application process by facilitating the certification of persons providing TA to educators of young children and offers annual professional development opportunities for certified technical assistance providers. The Center also maintains the oversight and management of the certified TA Registry.

The TAP database is used by several agencies providing technical assistance in the state to document the services they provide. When a Quality Coach provides coaching services at a child care program, they enter data into this database. This dataset will be used in this study to identify a subset of providers who have received coaching and technical assistance from CCR&R. This database, using an iPad web interface, captures all the information regarding the services provided to a child care provider. Data is entered as the Quality Coaches work with providers either on-site or off-site. Details

about the provider, the source of referral to CCR&R services, the sessions on-site and off-site, duration of the on-site services, staff who received direct contact with the Quality Coach, qualitative notes on the work accomplished, and other information is captured in this database that allows us to identify the provider who received services and the date they received services. CCCCD maintains the database server and management of the TAP database. Table 1 shows all the datasets that are utilized for the current research.

TAP datasets

This data extract is an Access database with several relational database tables. Table 3.1 shows all the tables in the Access database that contain information regarding action plans and demographic information on child care programs that received CCR&R services. Several data tables in the TAP dataset are combined together to create a new data table that contains the relevant information on the CCR&R services received by child care programs. As mentioned in an earlier paragraph, CCR&R services start with the identification of an overall goal, which is broken down into smaller sub-goals with several targeted action plans. The action plans are closed after the goal identified in the action plan is categorized as either "complete" after successful completion of the action plan or as "services-discontinued" if the plan is prematurely terminated due to some unforeseen reason. After data management, the final TAP dataset used in this study was organized as a record for each action plan that was completed. This dataset was primarily used to extract (a) providers who successfully received coaching and technical assistance services and (b) the date on which they received services to determine pre and post date deficiencies to be compared in the licensing database.

After merging all the data tables, the analytic data set contained 744 action plans during the two fiscal years: July 1, 2014 to June 30, 2016. These 744 action plans were provided to 545 child care programs. The whole subset of data contains information about the goal for centers receiving TA, number of visits/sessions included in each action plan, and activities (e.g. classroom observation, demonstration, feedback) the Quality Coaches used during each session. Table 2 provides more information on the action plans and child care providers who received CCR&R services.

3.4.3 Licensing datasets

The licensing datasets contain multiple data tables that provide information on the child care facilities, their application for license, the renewal, structural measurements, etc., and data on the regulation process. The list of tables in the licensing dataset is shown in Figure 2. For this study, we only used the datasets related to the regulation and monitoring of child care providers for health and safety. Three data tables from the datasets are used for the purpose of this research. The three data tables are FacilityJan2017, Review Jan2017, and ReviewTopicJan2017 and are explained in detail below. These data tables were combined to select child care programs that met all the data requirements for this research study.

Facility The Facility table contains all the facilities that have either operated or are currently operating in the state with a license to serve children. It also contains some "pending" facilities that are about to open business operations as well as facilities that are no longer active. Original licensing datasets extracted by the end of January 2017 from DSS contain 23,564 child care programs that include programs that applied for a license and all the providers who ever obtained a license to operate since the year 2007. From

this original facility data, child care providers that are currently closed were excluded. This information about child care programs was determined by comparing the licensing database with the current child care providers listed on the DSS website.

The 2,503 child care providers that are currently operating have three types of licensing status: Licensed, Registered, Approved. The differences in the license type are mainly based on the type of child care facility. With exceptions, all child care providers in a family home are "Registered" and all child care providers in public schools and Head Start programs are "Approved." After-school programs typically operate under 4 hours a day and therefore do not require a license to operate. They are also known as "Exempt" programs because they are exempt from licensing.

The 2,503 child care providers may also be categorized as licensed child care center, registered faith-based child care center, licensed group child care home, licensed family child care home, and registered family child care home (SC Child Care, 2017). Different child care regulations are applicable for these different child care providers. Policies related to child care centers, which make up the majority of regulated child care in the state, have more or less remained constant over the years and have therefore been selected for this study. Table 3 below shows the distribution of the child care providers based on their license type.

Although all the three types of licenses are monitored for health and safety inspections, there are some differences in the monitoring practices of licensed and registered providers. For example, until recently, licensed child care providers were visited by licensing monitors for two unannounced annual visits and registered providers

were only visited if the agency received a complaint. Current practice requires both licensed and registered providers to be monitored for health and safety through one unannounced annual visit. Due to these and other differences in monitoring practices between the three license types, only licensed providers were used in this study. By further selection with criteria, the study located 952 child care centers that are currently open and have a license status as "licensed" in the administrative dataset.

Review The licensing regulations for child care facilities in the state require that all licensed child care centers receive at least one annual visit by licensing staff to inspect their compliance with regulations. When a child care facility has violated a child care regulation, and there are about 450 regulations in the child care licensing manual (SCDSS, 2005), a deficiency is cited. Although the monitors use a checklist on their tablet to guide them through the health and safety inspection process, this checklist does not comprehensively cover all the regulations—only the major inspection areas. The dependent variable in the study is the number of deficiencies cited during an annual review visit.

There are four types of visits made by licensing monitors to a child care facility. First is an application visit when a child care facility applies for a child care license to legally operate in the state. The licensing monitor will visit the site and confirm that it meets the state health and safety standards as stated in the child care regulations. The second visit is related to an application visit; it is the application renewal visit conducted after the initial license expires. Although deficiencies are cited during these visits, they are more of a documentation or record of all the items that need to be fixed and are not considered deficiencies, especially in the case of initial application, since the center is not

operational. This study eliminated all records in the database related to deficiencies at the application renewal and application visits. Another type of visit occurs only when the state licensing agency receives a complaint about a child care center. This complaint could be from a parent, worker, or anyone who is concerned about health and safety standards in a child care facility. Complaints require immediate visits to the child care facility and tend to be varied from facility to facility and result in numerous deficiencies. These types of deficiencies were also eliminated from the records. Lastly, all child care centers are visited for an annual unannounced review visit. These are recorded in the Review Table. These visits, also known as the annual reviews, have been identified as the ideal visits to be used in this study for computing the number of deficiencies for equal comparison of health and safety compliance among child care centers. Given the nature of administrative data, considerable time and data management was required to determine the annual review visits and distinguish them from other visits. One of the main reasons for this data management exercise is the limitation in the licensing database that had only three options for visits and the monitors coded every follow-up visit as a review visit. More details on determining the visit as an annual review are discussed later in this chapter.

Review Topic The third table from the licensing datasets used in this study is the Review Topic table. When a child care facility is cited for a deficiency, the deficiency is recorded in this table. This data table stores all the deficiencies found from all the facilities. An example of a deficiency is when the classroom is “out of ratio” indicating that the number of staff in a classroom is lower than that required by child care licensing. These staff-to-child ratios are listed in the table 4 below.

The licensing staff from DSS observe child care programs by all regulated areas during an annual review visit using Child Care Licensing Regulations (SC Child Care, 2017) to evaluate compliance of a program to licensing regulations. Each deficiency has a Review Topic ID, a Review ID tying it to the Review Visit, and other information about the deficiency, such as Licensing Code Cited, Deficiency category, detail, and notes. Each value in Review Topic ID is unique, thus no two different deficiencies have the same ID. However, multiple deficiencies may have the same Review ID, indicating that these deficiencies were cited together during the same review visit. Using these variables, we can calculate the number of deficiencies cited during a review visit. Table 5 gives an overview of the number of review visits and deficiencies citied during the years 2014 – 2016.

Using the category and deficiency detail variables, we can categorize the deficiencies by their severity. The severity of the deficiency is not based on the discretion of the monitor; it is based on the category of the deficiency. It is important to note that the Review Topic table does not capture all the information about review visits, especially when a center has been operating very well, and data management was used to fill the gap. Since it is a table only of deficiencies, it does not contain the Review ID visit information when licensing staff made a review visit to a child care center and found no deficiencies. In such circumstances, the review will be documented in the dataset Review with an identification number, but not documented in the dataset "Review Topic." Therefore, data management was used to assign a zero to missing Review IDs in the Review Topic table, indicating that the licensing visit resulted in zero citations.

3.5 Sample

The following criteria were used to select a child care provider to be included in the sample of Research Question 1:

1. center-based programs (because they are regulated and monitored differently than other types of programs) that

2. currently operate (to validate our results on the number of deficiencies with the information on the website) and

3. received TA/Coaching during the CCR&R fiscal years July 1, 2014 to June 30, 2016.

The licensing data (requested from DSS) and TAP data (requested from CCCCD) were combined to select all the center-based child care programs that meet the three criteria. The current research obtained 159 child care centers that exist in both licensing data and TAP data. For the study, child care programs which had "completed" action plans were considered. Then the author utilized the date variable "Action Plan (AP) completion date" from TAP data to calculate the difference with the date variable "Review Date" from licensing data in the case of all annual reviews. If the "Review Date" for a child care center is earlier than "AP completion date" in the TAP database system indicating the date of completion of an action plan, the review becomes the observation before intervention and is therefore marked as a pre-intervention record. If the "Review Date" is after the "AP completion date," the review becomes the observation after intervention and is therefore marked as the post-intervention record. The licensing data has multiple years of licensing information, since 2007, whereas the TAP database

contains only two fiscal years of information on the intervention. Therefore, many child care centers had multiple observations prior to the "AP completion date" and fewer annual review visit records after the intervention. Using SAS programming and extensive data management, our study only used one before observation and one after observation which is the "before" and "after" review dates that were closest to the "AP completion date." To be selected into the sample for the first Research Question, a child care center must have at least one annual review visit before the "AP completion date" and one after the "AP completion date." Some centers had no before or no after observations and were therefore excluded from the research study. Finally, through careful application of all the rules and criteria listed above, 65 child care centers met the criteria and therefore were included in the study. Table 7 below gives a brief overview of the child care centers who received TA/Coaching in 2014 – 16.

The sample for Research Question 2 was selected from the licensing database using two criteria: (a) licensed child care centers and (b) had an annual review visit during the time period of 2014 – 2016. When child care facilities had multiple annual review visits, data from the last visit were used in the sample. A total of 909 child care centers were selected into the sample; these included 148 centers that received TA/Coaching and 761 centers that did not receive TA/Coaching. Table 7 below shows some characteristics of the child care centers in the sample. In this sample, the number of deficiencies during this last visit was computed and the severity of the deficiencies was aggregated at the three categories and combinations to construct the outcome variables for the multinomial analysis.

3.6 Variables

Number of deficiencies

Number of deficiencies cited during an annual review is the outcome variable for Research Question 1. When the licensing staff visited a child care center for annual review, they observed the facility by all the regulated areas and laws on child care facilities and then determined if deficiencies existed. They documented all deficiencies found during each review visit in the DSS licensing database. All licensing deficiencies were cited based on two documents: (a) State Regulations for the Licensing of Child Care Centers and (b) State Code of Laws: Title 63 - State Children's Code written by the Legislature.

Regulations for child care centers

"Regulations for the Licensing of Child Care Centers" is reviewed by DSS every three years (SCDSS, 2005). In 2005, the regulations were amended to include (a) increasing the number of staff to children ratio for certain age groups of children and (b) updating health sanitation and safety requirements to ensure consistency with the state Department of Health and Environmental Control (DHEC) and/or United States Department of Agriculture (USDA) requirements (SCDSS, 2005). The regulations were written to meet the United States Department of Health and Human Services (USDHHS) safety guidelines as well as USDA food and snack regulations. The changes were made to add more quality standards in child care regulations to promote better outcomes for children, including better language development, behavior, and more school readiness (SCDSS, 2005).

The regulations for child care centers have 10 categories with sub-categories, and detailed regulations are organized under the sub-categories. The 10 areas were numbered from 114-500 to 114-509, subareas were identified by letters and regulations were identified by numbers [e.g. the deficiencies code for Fire Code Violation is 114-505 H (1)]. Although there are more than 450 regulations in the code book, in the interest of time, the monitors observe the child care centers for only the major areas of health and safety such as teacher-child ratio, food safety, hazardous material, etc.

Using SAS programming, the number of deficiencies cited during a single annual review visit was computed for all the child care centers in the sample. Each child care center had been selected because they had an annual review before and after they received services from CCR&R. Therefore, two variables were created for the statistical analysis of the pre-post design: number of deficiencies before and number of deficiencies after the intervention. The original datasets did not have such variables. In one of the original licensing datasets, each deficiency is a single record with several variables describing the citation and deficiency. Sometimes a licensing staff makes a review visit to a child care center and finds no deficiencies indicating zero deficiencies. In such circumstances, the review will be documented in the dataset Review with an identification number, but not documented in the dataset "ReviewTopic." Therefore, this study has to rely on both tables in licensing ("ReviewTopic" and "Review") to locate all the reviews.

The study sorted the variable "Review Date" in descending order for the reviews categorized as "pre" and sorted "Review Date" in ascending order for the reviews categorized as "post." The sorting of "Review Date" allowed for identification of Review

date which is the closest to Intervention Completion Date. For each pre-post review, the number of deficiencies before and after the intervention were computed by counting the number of deficiency IDs for each Review ID.

Identifying annual review

All visits to child care facilities by licensing monitors may only be categorized as Review, Complaint, or Application. A review visit is the unannounced monitoring visit made to centers once or twice a year. The licensing staff may also make an unannounced visit to a center to investigate a complaint. Application visits pertain to inspections for initial applications and the renewal of licensing made every two years. If a center is cited for deficiency during any monitoring visit and the deficiency is not resolved on-site, the licensing staff will make additional follow-up visits to check if the deficiency is resolved. Since there was no "follow-up" category in the licensing database, the follow-up visits were also categorized as "review" visits. Some centers may receive multiple monitoring visits each year; however, the multiple visits could be made to resolve one deficiency cited during the initial review visit. It is very likely that, during these follow-up visits, very few or no other deficiencies were cited. Given that the purpose of the current study is to measure the effectiveness of coaching in reducing the likelihood of subsequent licensing deficiencies, only annual unannounced monitoring visits are an appropriate measure. Therefore, any monitoring visit that was prompted due to a complaint or follow-up to previously cited deficiencies should be excluded from the analysis. In order to identify an annual review and distinguish it from follow-up visits to the child care center, days between two monitoring visits were calculated for each child care center. If the

number of days is greater than 180, the visit was considered a regular monitoring visit and coded as “annual review.” If not, the visit was assumed to be a follow-up visit.

Identifying three categories of deficiency

The second Research Question required the identification of the level of severity of deficiencies cited at child care centers. However, such variable does not exist in the original dataset Review Topic. Review Topic has the variable “Detail” which is the detail of the violation (e.g., Out of Ratio, or Playground deficiency). In 2015, DSS began to post the deficiencies of all regulated child care facilities on the website to make the information available to parents and the public. The deficiencies are displayed with their detail and severity. The details posted on the website for each child care program match with the Detail variable in Review Topic. This allows the study to label all the deficiencies with three levels of severity: high, medium, and low.

The deficiencies at high and medium severity have the potential to pose a risk to the health and safety of children, therefore they were grouped together to form a new category labeled “High Severity.” Examples of “High Severity” are “Improper Supervision” (high) and “Fire Code Violation” (medium). The “Low Severity” category has lower implication for health and safety. Examples of low severity deficiencies are “Operating Policy” and “Attendance Records.” Although the severity levels of high, medium, and low deficiencies are ordinal in nature, the type of deficiencies in each category were very different. The implications of the severity category were also different. Due to these differences, mathematically these groups cannot be equated or placed on a continuous scale. For this very reason, providers with “Zero Deficiencies” were treated as a separate category.

TA/Coaching

In the sample for the second Research Question, a majority of child care centers did not receive TA/Coaching. For this reason, we calculated the number of deficiencies by severity level for each child care center by their latest annual review. Next, we compared whether a center had more severe deficiencies than low severe deficiencies. We found in our sample that a few centers were not cited with any deficiency in their latest annual review. This "No Deficiency" status indicated their good performance for licensing, and these centers formed another category. We expected to use TA/Coaching (received, or not, along with two other center characteristics) to estimate the odds ratio of having more severe deficiency.

Quality levels

In empirical research, quality indicators are measured by rating tools, such as ECERS-R, and teacher-child interaction, such as CLASS (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; S. Park, Ferretti, & Ames, 2012). QRIS broadened the construct of quality by combing the rating tools and other components, such as licensing compliance, staff qualifications, and family partnerships (Kirby, Caronongan, Malone, & Boller, 2015). QRIS across the states commonly assesses using different assessment approaches for different rating levels. For example, licensing compliance is assessed for all levels of child care programs, whereas family partnership and curriculum are assessed for higher rating levels. In addition, since participation in QRIS is voluntary, some centers in our sample are not in the system.

Size of the center

Although group size and teacher-child ratio were commonly used to estimate quality (measured by rating tools), research prior to 2011 had yet to investigate the association between the size of the child care program and quality of child care (Burchinal, Howes, & Kontos, 2002; Dickinson & Caswell, 2007). With the increased number of QRIS validation studies from 2012 through 2015, some states began to use program size as a factor that is controlled for a clearer understanding of the relationship between QRIS and quality measured by rating tools (Tout, Starr, Wenner, & Hilty, 2016). Other program level factors that were controlled are center-based/family home, other program types, and program location/urbanicity. Because program size is used by multiple QRIS validation studies and the current study has QRIS levels as a predictor, we decided to include it in our statistical model of deficiency severity.

Identifying number of deficiencies by severity

The second research question is regarding the effect of CCR&R services on the severity of deficiencies after the intervention. The three levels of severity are High, Medium, and Low. However, the original data table Review Topic does not have a categorical variable for the level of severity. The severity of the deficiency is only listed on the DSS website and appears to be calculated from the "detail" variable in the Review Topic table. In addition to deficiency category, the variable "detail," which is the detail of the violation (e.g., Out of Ratio, or Playground deficiency), is used to categorize a deficiency as high, medium, or low severity. The information on the deficiencies are displayed on the website along with the inspection type, deficiency type, severity, date of the review, and whether they were resolved on-site. Using the information on the website,

the researcher was also able to categorize the severity of the deficiency as High, Medium, or Low. For Research Question Two, the total number of deficiencies in each of the categories are summed for each center and each review visit. Table 6 gives the category of the deficiency and its severity.

3.7 Analysis

An overview of analysis approach in extant research studies

Utilizing coaching, consultation, and mentoring (often combined with training/workshop/coursework) in early care and education settings is not new. Many research studies were conducted on professional development initiatives that adopted these learning approaches to enhance teachers' implementation of evidence-based practices. These studies provided evidence that coaching, mentoring, and consultation are effective at the teacher level. Nevertheless, only a few extant research studies investigated the effectiveness of these adult learning approaches on child care program quality at the foundational level of health and safety compliance.

The research studies for the professional development of Evidence-Based Practices utilized various statistical analysis to test the significance of change. Some studies built complex predictive models by considering the impact of moderating variables. Shidler (2008) used Hierarchical Linear Model (HLM) regression to investigate the relationship of the effect of the education level and years of experience on children's literacy achievement. The study used ranked correlation to answer the question of time spent in the professional development program and literacy outcomes (Shidler, 2008). Pianta et al. (2014) conducted an analytic model to annual growth in CLASS

scores with the dosage of intervention by incorporating teacher level covariates: education, experience, and program level covariates: the proportion of students in poverty and program type (Head Start or not Head Start).

Some studies used a t-test or a non-parametric test (for violation of normality) to examine group differences. Zan and Donegan-Ritter (2013) used t-test to analyze the difference of means of each dimension of CLASS to examine the change in practice of teacher-child interaction. Although they reported the change of degreed teachers separately with the change of non-degreed teachers, they did not use an analytic model that had the Degree as a predictor or covariate. Milburn et al. (2015) used Mann-Whitney U test to identify the significance of group difference in teachers' use of phonological awareness utterance before and after the intervention. Similarly, they did not use a model that included teacher characteristics to predict the change.

Some studies that had only a few teacher participants used single-subject design to investigate the change. Visual analysis is a common approach used to analyze single-subject data by using graphs to display the change of practices for all participants when the sample size is small (Parsonson, Baer, Kratochwill, & Levin, 1992). Dennis and Horn (2014) visualized the scores of observed teachers' (n=3) use of strategies (making interactions with children who have special needs) from Baseline to Intervention. Descriptive statistics are also used for these sing-subject data. Rudd et al. (2009) reported that the descriptive statistics show a favorable result in teachers' (n=12) use of math mediated language in eight categories. However, they also noted that the visual analysis of single-subject data is quite complex and showed far too much variability. Visual analysis displayed more complexity of teachers' (n=3) use of emergent literacy strategy

across 20 time-points (Hsieh, Hemmeter, McCollum, & Ostrosky, 2009). However, the descriptive statistics used by Hsieh et al. (2009) showed the rate of using strategy only at baseline and two time-points after the intervention.

Among the selected research studies on TA/Mentoring/Consultation for program compliance or quality level, statistical analyses are commonly used to predict outcomes with the intervention. T-test or non-parametric tests are used to predict the outcome with intervention. Alkon et al. (2009) used Matched Wilcoxon signed-rank tests to analyze the improvements in the number of written policies and the quality of policies from baseline to the post-intervention time. Then they used paired t-test to analyze the change of health and safety practices from baseline to the post-intervention times for emergency preparedness, facilities, handwashing, food preparation, and overall Health and Safety Checklist mean. The research that examined the effectiveness of Training and TA provided by Active Early used various statistical analyses (LaRowe et al., 2016). Mean difference t-test was used to compare the Physical Activity Environment and Teacher-led Physical Activity before and after the intervention. Matched paired t-test was used to analyze child outcome about physical activities.

The majority of these research studies used regression analysis to examine the relationship between program change and the characteristics of program. Kakietek et al. (2014) used multivariate logistic regression modeling to examine the association between compliance and training and technical assistance by controlling some center level variables: center size, average classroom size, teacher-child ratio, presence or absence of indoor and outdoor play spaces and staffing, etc. Alkon et al. (2009) researchers used regression analysis for the improvement of health and safety scores in emergency

preparedness and handwashing by controlling the baseline scores, advocate model, length of time between measures, and director turnover. The study used latent difference score modeling (LDS; McArdle 2009; McArdle and Hamagami 2001; Steyer et al. 1997) to estimate the change from Time 1 to Time 2. The LDS model used is known as the ‘‘change-regression model’’ and has advantage in answering questions about change in studies that have a pre-post focus (Abell et al., 2014). OCDEL (2013) used a logistic regression model to estimate the effect of TA on the movement in quality rating with control of program type and quality level. LaRowe et al. (2016) used general linear models (PROC GLM) with fixed and random effects to estimate child outcomes.

Analysis plan

To answer the first research question, the current study used paired t-test or Wilcoxon Signed Rank test to analyze the difference in deficiency before and after TA/Coaching. Paired t-test measures the significance of change of the means before and after the intervention when observations were obtained from the same group (Hsu & Lachenbruch, 2008). To use paired t-test, the study has to evaluate the deviation from two of the assumptions in order to assess the quality of the results. First, the two observations on one subject must be dependent of each other (Shi, 2009). The current research study assumes that the two observations are dependent of each other because two annual reviews were identified for each child care center during data management.

Second, paired t-test assumes the difference between the two observations should be normal distribution (Der & Everitt, 2007; McDonald, 2014; Shi, 2009). H. M. Park (2015) ran a Proc Univariate procedure with SAS to examine if the difference between the number of deficiencies before and after is normally distributed. They obtained pr

<0.0001 for the Shapiro-Wilk test. The p-value indicated that the distribution is deviated from normal (H. M. Park, 2015). Although the violation of normal distribution, the research may still use the t-test because it is robust to the violation. Although it is widely believed that t-test is valid with samples that are normally distributed, Lumley, Diehr, Emerson, and Chen (2002) disagreed with this concept. They noted that the rationale for a widespread belief is that the normal distribution allows the mathematical criteria to identify the t-test as optimal analysis. They suggested that the assumption of Normality is sufficient but not necessary for the t-test (Lumley et al., 2002).

This research also considered using Wilcoxon signed-rank sum test. This test is commonly known as the non-parametric analysis of matched-pair data based on differences (Woolson, 2007). The test is similar to paired t-test because it analyzes the significance of change of the two dependent observations measured on the same sample. However, unlike the paired t-test the Wilcoxon signed-rank sum test does not require the observations to meet the assumption of normal distribution (Lumley et al., 2002). This test transforms each instance of difference between pretest and posttest XA-XB into its absolute value, and then assigns ranks to these values (Taheri & Hesamian, 2013). Instead of comparing the difference between the means before and after intervention, the test compares the median of the two observations. In most applications of the Wilcoxon procedure, the cases in which there is zero difference between XA and XB are at this point eliminated from consideration, since they provide no useful information (Taheri & Hesamian, 2013).

For the second research question, multinomial logistic regression was used to model the nominal outcome variable of severity of deficiencies at a child care center

during an annual visit. Using this regression modelling, the Log Odds of a center receiving high, medium, low, or zero deficiencies were modeled as a linear combination of the predictor variables. The three nominal outcomes are receiving high or medium deficiencies, receiving low deficiencies, and, lastly, receiving no deficiencies. The predictor variables include ABC Quality Levels, the size of the center as measured by their licensing capacity, and whether they received TA/Coaching from CCR&R agencies.

Table 3.1 All Datasets Needed for the Current Research

TAP Datasets		Licensing Datasets
actionitemdisposition	facility	Facilityjan2017
actionplan	facilityemployee	Reviewjan2017
actionplantype	licensetype	Reviewtopicjan2017
activity	overallgoaltype	
abcprogramtype	referralsourcetype	
approgramsize	sessiontypeap	
caretype	tap	
county	targetareaap	
employeerole		

Table 3.2 Overall Goals of TA Received by Child Care Facilities

		Child Care Type			
Year	Goal	Center	Family Home	Group Home	Other
2014	Resolve Corrective Action	13	4	1	
	Maintain License in Good Standing	7			1
	Maintain ABC Rating Level	6			
	Increase ABC Rating	4			
	Achieve Quality Improvement Plan	1			
	Increase ABC Score Above 80%	1			
	Achieve Licensing Status				1
2015	Resolve Corrective Action	53	5		1
	Increase ABC Rating	25	3		
	Maintain License in Good Standing	20	5	1	1
	Achieve Quality Improvement Plan	17	2		2
	Maintain ABC Rating Level	12	2		
	Achieve Licensing Status	7	2		
	Increase ABC Score Above 80%	1			
	Increase ERS Overall Score	1			
2016	Resolve Corrective Action	25	2		
	Maintain License in Good Standing	16	1		1
	Increase ABC Rating	11	1		1
	Achieve Quality Improvement Plan	10	1		
	Maintain ABC Rating Level	6	1	1	1
	Achieve Licensing Status	5			1
	Increase ABC Score Above 80%	4			
	Increase ERS Overall Score	1			

Table 3.3 Number of Child Care Providers by Facility and License Type

	License Type		
Facility Type	Licensed	Registered	Approved
Center	*911*	200	394
Family Home	17	883	
Group Home	98		

Table 3.4 Examples of Child Care Regulation on Ratio

Child's Age	Staff-to-Child Ratio
Birth to one year	1:5
One to two years	1:6
Two to three years	1:8
Three to four years	1:12
Four to five years	1:17
Five to six years	1:20
Six to twelve years	1:23

Table 3.5 Review Visits and Deficiencies for all Child Care Providers

License Status	2014		2015		2016	
	N[a]	N[b]	N[a]	N[b]	N[a]	N[b]
Licensed	1567	4298	1611	4809	1669	3611
Approved	365	581	422	1043	441	697
Registered	416	427	1155	680	1264	705
Total	2348	5306	3188	6532	3374	5013

[a] are the number of reviews conducted 2014 through 2016.

[b] are the number of deficiencies cited during all reviews 2014 through 2016.

Table 3.6 The Capacity Ranges of Child Care Centers in the Sample

Capacity	2014	2015	2016
0-50	1	7	3
50-100	5	14	5
100-150	3	14	
150-200		4	3
>200	3	2	4

Table 3.7 Child Care Centers by Severity Levels and Intervention

Intervention	Severity Level		
	Zero[a]	Low	High
0	264	435	62
1	39	95	14

a Are the centers that did not have any deficiency during their latest annual visit.

Table 3.8 List of Licensing Deficiency by Three Risk Levels

Low Risk		Medium Risk	High Risk
Attendance Records	No Liability Notification to Parents	Building/Structure/Equipment Deficiencies	Failure to Report Incident to DSS Within Required Time Frame
Bath Rooms	Operating Policy	Fire Code	Failure to Report Incidents to DSS
Care for Mildly Ill Child	Other Health and Safety	Fire Code Violation	Hazards
Child Records	Outside Play Area	Improper Medication Practices	Improper Supervision
Communications	Pet/Animal	Indoor Area	Operator Denied Access to DSS
Cribs	Playground	Outside Doors	Out of Ratio
Diaper Changing	Playground Deficiencies	Phone Number Not Listed	Over Enrolled
Disciplinary Policy	Posted Information	Physical Site	Over Enrolled in 24 Month and Younger Rooms
Electrical Outlets	Rest Time	Room	Over Enrolled in 30 Month and Younger Rooms
Emergency Preparedness	Restrooms	Safety Violation	Personnel Behavior
Emergency Preparedness (Licensed FCCH Only)	Sanitation Deficiencies	Staff Training	Poisonous/Hazards Materials
Failure to Report Person Residing in Home	Schedule of Activities	Temperature	Staff Central Registry
Feeding	Staff CPR/First Aid	Transportation Deficiencies	Staff SLED/FBI
Food Safety/Menu	Staff CPR/First Aid (Licensed FCCH Only)	Unauthorized/Unqualified Caregiver	Water Safety
Food Service	Staff Records	Water Supply	
Infestation	Unauthorized Person In or Around Facility		
Night Care	Unreported Person Residing in Home		

CHAPTER 4: THE EFFECTIVENESS OF RELATIONSHIP-BASED COACHING ON HEALTH AND SAFETY COMPLIANCE

Compliance with the health and safety regulations is the basic threshold of child care quality. However, extant research on child care quality tends to focus on a few aspects of health and safety, namely, ratios and group size, whereas many other regulations are overlooked. Due to this reason, overall compliance as observed during annual unannounced licensing inspections is rarely examined. Services provided by Child Care Resource and Referral Networks (CCR&Rs) in every state help child care providers improve their quality, as well as meet the health and safety requirements as stipulated in the state's licensing regulations. The purpose of this study was to evaluate the licensing compliance of child care centers that received TA/Coaching provided by the state's CCR&R by using administrative data collected during licensing inspections. The sample consisted of 65 center-based child care facilities that were currently open, had operating status as "licensed," and received TA/Coaching July 1, 2014 through June 30, 2016. The sample included child care centers at various quality levels (A, B+, B, C, and Not Participating) except for the highest rating level A+. The sample also contained centers with a wide range of licensing capacities (17-500). A Wilcoxon signed rank test was used to compute the difference in licensing compliance, as measured by the number of licensing deficiencies (deficiencies), before and after the child care centers received TA/Coaching services from CCR&R. The results indicate a significant reduction in

licensing deficiencies after child care centers received relationship-based, individualized TA/Coaching from the state CCR&R agency.

4.1 Introduction

Within the system of early care and education, child care licensing serves as a baseline protection of children from birth to school age while they attend out-of-home care programs (National Center on Child Care Quality Improvement [NCCCQI] & National Association for Regulatory Administration [NARA], 2015)[National Center on Child Care Quality Improvement, 2015 #328@@hidden]. In general, the Department of Health and Human Services (DHHS) or the Department of Social Services (DSS) in every state is responsible for establishing and administering licensing regulations for child care programs through unannounced health and safety inspections at child care facilities. Licensing agencies are in charge of setting requirements for health and safety that emphasize the avoidance of known hazards and detection of correctable health problems (Aronson & Aiken, 1980). Although the composition of regulations varies across states, generally the regulated areas include response to disease, fire and other building safety, injury, abuse and neglect, adequate supervision, and developmentally appropriate activities. On-site monitoring, commonly known as health and safety inspections, is an essential practice of licensing agencies to ensure child care programs are complying with state-determined licensing requirements.

High quality in early care and education in an out-of-home child care setting is a critical element of a child's success. Research in various fields, such as education, medicine, psychology, economics, etc., has provided evidence of positive outcomes for children having exposure to a safe and engaging environment in their early care and

education (Howes, Whitebook, et al., 1992). Quality in early child care is a complex construct with health and safety at its foundation. Health and safety is a precursor to quality. Another critical building block of quality is the professional development and support available and accessed by child care programs and their staff in a state. In most states (including South Carolina) this support system is provided by state CCR&R agencies that offer a wide variety of services to improve the quality of child care facilities, including compliance with the health and safety standards set by the state. These services include training and TA to meet the health and safety requirements of the state licensing regulations, improve the quality of child care programs, and provide professional development to child care teachers and directors, ultimately leading to positive outcomes for children served in these facilities.

To date, few research studies have examined the impact of TA on child care licensing regulations as an outcome variable. The focus of research studies has been to find program characteristics that possibly have effects on child outcomes and offer recommendations to policymakers about how to better fulfill their regulatory system's protective functions for children's well-being and development. Research studies relevant to licensing regulations have focused on predicting children's welfare or development of some program indicators. Fiene et al. (2002) synthesized various research studies conducted in the 1990s that provided evidence for 13 health and safety indicators of child care quality, such as immunization and staff qualification, that protect children from harm. These 13 indicators consistently appear in licensing regulations from state to state.

The research findings on the association between program characteristics, measured quality, and child outcomes are complex and sometimes discrepant. Kontos and

Fiene (1987) found capacity, group size, and ratios were related to quality measures. They also found these child care program characteristics more strongly predicted children's development when treated as clusters than individually. Howes, Phillips, et al. (1992) conducted a study to predict the pathways from two regulatory variables (ratios and group size) to process quality (variables for how teachers conduct activities) to teacher-child relationships to peer relationships (outcome variable). The findings suggest the licensing standard for lower teacher-child ratios is associated with the higher quality of caregiving. Thus Howes, Phillips, et al. (1992) recommended more stringent regulations on ratios. However, Burchinal, Howes, and Kontos (2002) found that, among home-based programs, teacher training and education to be a more salient predictor of children's development than ratios or group size. This finding has some consistency with another research study which was conducted slightly earlier. Bordin, Machida, and Varnell (2000) found that, among home-based child care programs, the regulated quality indicator for training is associated with better provider engagement with children. However, this study also found that provider knowledge of child development and health care practices was a more significant predictor of process quality than regulated quality indicators. Despite the inconsistency among their findings, these research studies collectively suggest that licensing systems be more stringent with some regulatory structural indicators.

In addition to the regulated areas mentioned in the previous paragraph, licensing regulations consist of many other health and safety standards (handwashing, background checks, staff records, immunization, etc.). The research studies commonly overlooked these health and safety rules because they seemed to have no association with how

teachers conduct caregiving activities or make meaningful interactions with children. However, these regulations are relevant to the well-being of children. These health and safety standards are developed by other national associations and are recommended to licensing systems. Non-compliance with health and safety standards commonly existed among child care programs for decades (Pizzo & Aronson, 1976). The adoption of guidelines for the control of infectious diseases and injuries (recommended by the American Public Health Association and the American Academy of Pediatrics) among child care centers varied widely (Addiss, Sacks, Kresnow, O'Neil, & Ryan, 1994). Implementation of some practices, such as drying hands with single-use disposable towels, was common, whereas the implementation of reporting diarrhea outbreaks was rare. The study also found state-to-state variations in the stringency of licensing regulation, staff training, or availability of technical consultation are associated with variations of performance (Addiss et al., 1994). Recent studies also found low compliance with handwashing among child care programs where the overall compliance among all personnel was 22% and caregivers had a compliance rate of 30% (Clark et al., 2016). Child care programs that have deficiencies of these regulations are likely to increase children's exposure to health risks. For example, a child care program with low compliance of handwashing would likely have infectious disease spread, leading to more absenteeism. Or a child care program that has playground equipment that is unsafe may cause physical injury.

Over 11 million young children attend out-of-home care and education programs. States need strong licensing systems to regulate and ensure that programs comply with regulations. States are reforming and strengthening standards to better promote the

health, safety, and school readiness of children, especially in federally-funded child care settings. Current licensing trends show that regulations have become more stringent in the following areas: (a) increased pre-service qualifications for teachers and directors, (b) increased amount of administrative training for directors, (c) increased number of annual training hours for at least one center role, (d) comprehensive background checks, (e) training requirements about reducing sudden infant death syndrome (SIDS), and (f) requirements for reporting severe injuries and death (NCCCQI & NARA, 2015). Statutes that ensure the implementation of these regulations also address their enforcement and consequences, such as tiered enforcement, so that severe deficiencies may result in revocation of the license (NCCCQI, 2014a). Appropriate and consistent application of licensing regulations relies on two areas—validity of licensing instrument and professionalism of licensing staff (National Center on Child Care Quality Improvement, 2014, Fiene, 2002, 2014).

Appropriate support for child care programs to meet stringent licensing requirements is necessary to ensure compliance. However, some studies revealed that tougher regulations might result in some unintended negative consequences (Blau, 2007; Hotz & Xiao, 2011). For example, a requirement to have college degrees might induce child care centers to use less-skilled aids (Hotz & Xiao, 2011) and be less likely to meet the standard for ratios because of an inability to afford to hire more teachers with higher educational attainments (Blau, 2007). Hotz & Xiao (2011) found an increase of child care quality only in higher income areas as a result of stringent regulations. However, having tougher regulations also induces the reduction in the number of center-based child care establishments, especially in lower income markets, therefore decreasing child care

access to low-income families. Hotz & Xiao (2011) also found tougher regulations induced more families to use home-based child care providers who were less likely to prepare children for school readiness when compared to center-based child care. Because tougher regulations and enforcement made the cost of maintaining licensing compliance higher, the regulation input, in reality, did not induce higher quality output (Blau, 2007; Hotz & Xiao, 2011).

The importance of CCR&R services in the landscape of quality child care services is evident from the endorsement they have received through the reauthorization of the Child Care and Development Block Grant Act (CCDBG) of 2014. Through the reauthorization of the CCDBG, the federal government, recognizing the need for intervention in health and safety, made several significant revisions to the law to expressly support the increase in quality of early care and education services broadly. More specifically, the revisions increase accessibility of those services (NCCCQI, 2015). The law addressed licensing requirements as well as approved the use of Child Care and Development Fund (CCDF) funding streams for CCR&R agencies in the state (Matthews et al., 2015). Since then, the CCDF has increased funding for initiatives on child care quality enhancement, including tiered reimbursement, professional development, grant opportunities, and, most importantly, on-site TA or coaching (NCCCQI, 2015).

By 2013, all states reported that they provide TA to assist child care facilities with licensing or quality monitoring activities (NCCCQI, 2014b). If licensing monitors find severe deficiencies which cannot be immediately corrected on-site, they often make a referral to state or regional TA providers (CCR&R or other entities) to support the child care program in resolving the deficiencies. The target area of TA received by child care

programs depends on the areas in which the deficiencies were cited (NCCCQI, 2014b). A child care program is required to resolve their non-compliance issues with the help of TA within a limited amount of time (one month to three months). Depending upon on state regulations, failure to resolve the issues may result in restrictive sanctions, such as fines or revocation of license (NCCCQI, 2014a). Despite reports of the extensive use of TA, the literature about the services provided by state or local-level TA providers to help child care providers in their licensing needs is scant. For example, what model (coaching, mentoring, consultation) did they use? How much TA is needed to achieve compliance? Even fewer research studies have looked at whether TA helped child care programs foster sustainable change or had an effect on licensing compliance.

The aim of this study is to evaluate the efficacy of TA/Coaching provided by CCR&R using the state administrative data of licensing reviews and TA/Coaching services. The use of administrative data in this study also makes it a unique approach to understanding the impact of CCR&R services on licensing compliance. All the studies on TA or coaching have collected data for the purpose of the study. Administrative data is a rich source of data that has been captured by the state for accountability, recording, and reporting purposes. This study utilized two administrative databases—the licensing database that captures information on the annual compliance review visits and the CCR&R services database (TAP database).

4.2 Methods

Sample

The licensing database contains all the information about child care facilities beginning in 2007 that ever operated a child care program in their home or a center, including their application and approval process, the type of facility, how often they were visited for inspections, and the deficiencies found during these visits. To create a homogeneous sample for valid comparisons, the following criteria were used to select a child care provider to be included in the sample: (a) center-based programs (because they are regulated and monitored differently than family child care homes), (b) currently in operation (to validate our data on the number of deficiencies with the information on the DECE website), and (c) received TA/Coaching during the CCR&R fiscal years July 1, 2014 to June 30, 2016.

Additionally, in order to set up a pre-post research design, the child care center must have had at least one annual review visit before the "AP completion date," which is the date the CCR&R services ended for the action plan, and one after the "AP completion date." When child care centers had multiple annual reviews before or after the "AP completion date," the ones closest to the start and end of CCR&R services were used for analyses. Given the complexity of using secondary data for the analyses, several such criteria were applied to select the sample for the study. Finally, through careful application of all the rules and criteria listed above, 65 child care centers met the criteria and therefore were included in the study.

The intervention

CCR&R TA/Coaching, in the state, is individualized to the child care provider's unique needs. Therefore, the staff at CCR&R use several methods of delivering their services based on the needs of recipients. The varying forms of delivery include coaching by an individual Quality Coach or a team, consultation with an individual or group of child care staff, and the use of resource sharing, training, and hands-on modelling or a combination thereof. The service may also be delivered through on-site, distance, technology-enabled, or hybrid methods. The CCR&R coaching model uses various approaches: coaching, mentoring, consultation, professional development advising, training, peer-to-peer TA, and other forms of support. The services also vary in intensity and duration depending on the plan of action to achieve the overall goal of the TA/Coaching.

Although the interventions vary in delivery, dosage, and intensity, consistency of services is established across the services provided to all participating child care centers. The consistency is mainly derived through the use and implementation of the coaching manual developed for the use of delivering state CCR&R services. All provisions of the intervention in this research study are guided by a coaching manual (SCCCRRN-SCIC) developed specifically for CCR&R to ensure that the services follow the procedure and utilization of essential practices. All TA/Coaching services start with the referral process. This stage includes initial contact by the licensing agency, QRIS monitors, or child care provider requesting CCR&R services. This is followed by an initial meeting to establish rapport with the child care program director, collect all the information, and perform a general observational assessment to prepare for the planning stage. Next, during the

planning stage, the Quality Coach analyzes the data and presents her/his recommendations to the child care program director. Based on identified strengths and needs, they establish an overall goal for the services. As a team, they identify specific practices, an action plan, and coaching schedule needed to achieve the overall goal. The next stage is the teaching/learning stage, which is the core of the coaching model that will use training or coaching guided by outlined protocol. Once the program has achieved their identified goals, the Quality Coach engages in the plan completion stage. During this stage, the Quality Coach conducts a summative assessment, facilitates final reflections, and documents their rating on the implementation of the program action plan. In the final follow-up stage, the Quality Coach seeks to maintain the improvement of quality in the child care facility through the relationship established during earlier stages.

Annual reviews

All visits to child care facilities by licensing monitors, as recorded in the licensing database, may only be categorized as Review, Complaint, or Application. A "Review" visit is an unannounced monitoring visit made to centers once or twice a year. The licensing staff may also make an unannounced visit to a center to investigate a "Complaint." "Application" visits pertain to inspections for initial applications to operate a child care center and the renewal of this license every two years. During a "Review" visit, if a center is cited for deficiency during any monitoring visit and the deficiency is not resolved on-site, the licensing staff make additional follow-up visits to the facility to check if the deficiency is resolved. These follow-up visits are compliance visits to resolve deficiencies of the health and safety regulations found during the annual "Review" visit. Since there was no "follow-up" category in the licensing database, the follow-up visits

were also categorized as “Review” visits. Some centers may receive multiple monitoring visits each year; however, the multiple visits could be made to resolve one deficiency cited during the initial review visit. It is very likely that, during these follow-up visits, additional or no other deficiencies were cited. Given that the purpose of the current study was to measure the effectiveness of coaching in reducing the likelihood of subsequent licensing deficiencies, only annual unannounced monitoring visits were an appropriate measure. Therefore, any monitoring visit that was prompted due to a complaint or follow-up to previously cited deficiencies was excluded from the analysis. In order to identify an annual review and distinguish it from follow-up visits to the child care center, days between two monitoring visits were calculated for each child care center. In order to capture the first visit during a review, if the number of days between visits was greater than 180 days, the visit was considered a regular monitoring visit and coded as “annual review.” If not, the visit was assumed to be a follow-up visit.

Number of deficiencies

When the licensing staff visit a child care center for annual review, they observe all the regulated areas in the facility for compliance with the health and safety child care regulations and licensing requirements. A violation of these regulations results in citations for deficiencies. They document all deficiencies found during each review visit in the DSS licensing database. All licensing deficiencies were cited based on two documents: (a) State Regulations for the Licensing of Child Care Centers and (b) State Code of Laws: Title 63 - State Children's Code written by the Legislature. The number of deficiencies was the sum of all deficiencies cited during an annual review. For this study and research design, each child care center in the sample had two annual review visits:

one before TA/Coaching and one after. The number of deficiencies was calculated for each child care center based on each review they received. Therefore, each child care center has a number of deficiencies before TA/Coaching and a number of deficiencies after.

Data analysis

The sample for the study was not a random sample because of the use of administrative data. The sample was limited to child care centers only since the monitoring visits to family child care homes and group child care homes (licensed family child care homes) differ considerably from visits to child care centers. Data were analyzed using SAS software. A descriptive analysis of the sample was conducted to examine the general distribution of the child care facilities that were included in the sample.

Before selecting the single-group pretest-posttest analyses for the study, the normality of the data was tested. The results of the normality test indicated that the data were highly skewed. Given that the data were not normally distributed not on interval scale (see the QQ plot for the distribution of the difference between before and after in Figure 4-1), Wilcoxon signed-rank sum test was used to analyze the difference between the number of deficiencies child care centers received during two annual reviews before and after the intervention. This test is also known as the non-parametric analysis of matched-pair data based on differences (Woolson, 2007). The test is similar to the paired t-test because it analyzes the significance of change of the two dependent observations measured on the same sample. However, unlike the paired t-test, the Wilcoxon signed-

rank sum test does not require the observations to meet the assumption of normal distribution (Lumley et al., 2002).

This test transformed each instance of difference between pre (XA) and posttest (XB) into its absolute value, and then assigned ranks to these values (Taheri & Hesamian, 2013). For this current research, the difference of number of deficiencies between the first and second annual review was transformed into absolute value and ranked by these values. In this non-parametric test, instead of comparing the difference between the means of observations before and after intervention, the test compared the medians of the two observations. In the Wilcoxon procedure, the cases in which there was zero difference between XA and XB were at this point eliminated from consideration, since they provided no useful information (Taheri & Hesamian, 2013).

The initial sample size in the study was 65 child care centers, each of which had a pre and post measurement and received CCR&R services in between these measurements. For each child care center, “Before” denoted the first annual review and “After” denoted the second annual review. We calculated the absolute value of deficiency “Before” substract the deficiency “After”. Since Wilcoxon signed-rank required the exclusion of pairs that had absolute value as 0, the sample had some centers that had no change in the number of deficiencies (n=10) before and after the intervention was removed, and thus a reduced sample size of n=55 was used for the test statistics (Statistics Solutions, 2017). The reduced sample was ranked beginning with the smallest absolute value, and the tied values got the averaged rank. Then the ranks were labeled with the sign function: + if >0 , and - if <0. A partial table of 10 observations of the signed ranks of the differences between the two reviews is shown in Table 4.1. For

hypothesis testing we calculated the test statistics $W = \sum_{i=1}^{N_r}[sgn(x_{2,i} - x_{1,i}).R_i]$ which was the sum of the signed ranks (Kerby, 2014)(Kerby, 2014)(Kerby, 2014). Next z score calculated as W divided by the standard deviation of W. If $|z| > z_{critical}$, H_0 should be rejected (Lowry, 2018).

4.3 Results

Wilcoxon signed-rank test

The means, medians, min, and max of pre and post reviews are reported in Table 4.2. The mean, median, and max value decreased in the review after the intervention. This decrease revealed a trend of decrease in the number of deficiencies as an effect of TA/Coaching. However, the min value showed that some centers (n=15, 23%) had no deficiencies before they received the TA/Coaching. The number of centers that had no deficiencies increased slightly (n=5) after receiving of TA/Coaching.

As shown in the table 4.2 below, the number of deficiencies on the sample minimum, the lower quartile, the median, the upper quartile, and the sample maximum all became smaller after the TA/Coaching. Also shown in the Figure 4-2 below, the extremely large values of the deficiency in the "post" review were much smaller than those of the "pre" review. However, we found that the change of deficiencies of all centers was not uniform. Some centers got fewer deficiencies in the review after the TA/Coaching, whereas 20 centers were observed with more deficiencies after the intervention. The two types of changes are demonstrated in a later section in this chapter. As shown in table 4.3 below the p-value for this study was smaller than α n of .05. With such p-value we were able to reject α level of .05. Therefore we can reject our null

hypothesis that the median difference between the number of deficiencies reviewed before and after the intervention was no different from zero (Shier, 2004).

Effect size

The analysis above tested our research hypothesis that the intervention was effective for the centers, however it did not quantify the difference (Coe, 2002). The effect size was needed to show the strength of the effectiveness (Tomczak & Tomczak, 2014). We calculated the effect size of the study by using rank correlation for the Wilcoxon signed-rank test. The effect size statistics are calculated as $r = \frac{4\times|T-(\frac{R_+ + R_-}{2})|}{N(N+1)}$. The rank correction was the correlation in terms of the smaller of the liked-signed ranks (T), the sum of positive ranks (R_+), the sum of negative ranks (R_-) and the sample size (N) (Kerby, 2014). The study obtained an effect size statisitcs r=.44 when R+ were composed of 72% of total sum rank, and R_- were composed of 28% of total sum rank. Such effect size indicated that the odds of our prediction being correct was 18 to 7. Although this effect size was medium, it was still better than the effect size of r=.30 which was criticized as too small to be important (Kerby, 2014).

Sample characteristics

The reduced sample of 55 facilities contained one Level A center, 10 Level B+, 26 Level B, 11 Level C, and seven that were not in QRIS and therefore did not have a quality level. The majority of centers were QRIS centers, and over half of the QRIS centers were rated as Level B and above. This distribution approximates the distribution of all child care centers in the state with a few exceptions; currently, there are more child care centers not participating in QRIS and Level C centers are slightly higher in number

than the other quality levels. The size of the centers, as measured by the capacity of the center, was more evenly distributed across the ranges: 0-50 (18%), 51-100 (32%), 101-150 (23%), 151-200 (13%), and >200 (13%). Table 4.4 below shows the sample by their QRIS and capacity ranges.

Location of the centers

Of all the 55 centers, a majority were located in the counties that are identified as "urban" in the policy manual of South Carolina's QRIS system (DSS, 2016). For the centers that were located in "rural" counties, about 88% of the centers were in the QRIS system, and over half of these centers were Level B. The distributions of the centers by QRIS and Urban/Rural are shown in Table 4.4.

Fewer or more deficiencies after the intervention

The number of centers categorized by the number of deficiencies was compared before and after the intervention. The number of deficiencies was created by grouping the observed deficiencies for each center during each post-intervention annual review: (0-5, 6-10, 11-15, 16-20, and >20). Table 4.5 below shows the centers by their number of deficiencies before and after intervention.

As we further used more descriptive statistics to examine the change (increase or decrease in deficiencies), we noticed that the change in the centers with "decreased" number of deficiencies was much larger than the change in centers with an "increased" number of deficiencies. In other words, although 20 centers increased their deficiencies in the later review, the average that increased was much smaller than the average that

decreased. The centers (n=11) that had more than 10 deficiencies all decreased after the intervention.

An overview of the TA/Coaching

The TA/Coaching services provided to the child care centers were based on an individual center's overall goal for improvement. Some of the goals were focused on licensing compliance, whereas other goals focused on quality rating. Each goal of TA/Coaching was broken down into action plans, and each action plan was spread over several sessions to complete. A session was generally an on-site visit during which a Quality Coach worked with an individual or a small group of child care personnel. Usually, the sessions took place over a period of time, typically one to three months, depending on the type of goal. See 4.7 for the number of centers that received TA/Coaching for each type of goal, the sessions, and durations.

Centers had no change

We took a closer look at the child care centers that did not change the number of deficiencies after receiving the TA/Coaching services. A majority of these centers had no deficiencies before the intervention and also did not have deficiencies after. We also examined the "no change" centers by their quality level. Over half of the zero-deficiency centers were rated Level B and B+. The center that had 13 deficiencies before and after the intervention was a Level C center located in an "urban" county. See Table 4.5 for more details about the "no change" centers by their TA/Coaching goals, QRIS levels/participation, and location.

Difference in the number of deficiencies by categories of ABC levels and Capacity

The change in compliance of the centers was further examined by stratifying the sample by two center characteristics. In our sample, a majority of centers participated in the state's QRIS. Among the QRIS (n=47) centers, a majority (n=32, 68%) were Level B or B+. Our sample only had one (2% of all QRIS centers in the sample) Level A center. Capacity of the centers was grouped by ranges because they were varied. Our sample had fewer larger capacities: 151-200 (n=7) and >200 (n=7) than smaller capacities: 17-50 (n=10), 51-100 (n=18), and 101-150 (n=13).

Generally, the descriptive statistics showed the effect of TA/Coaching at all types of centers (both QRIS centers and non-QRIS centers). However, the changes varied slightly among centers when they were stratified by QRIS levels. The change of deficiencies was shown by each QRIS level and the centers that were not in QRIS below in Figure 4-3. Most capacity ranges had centers that decreased their deficiencies outnumber centers that increased. However, as shown in Figure 4-4 that among the centers that had small capacities (17-50, n_{increase}=6, n_{decrease}=4) there were more centers increased their deficiencies.

4.4 Discussion

The main aim of this study was to compare the number of deficiencies of child care centers before and after they received TA/Coaching. The results of the hypothesis testing show that, overall, the difference between the two medians of the two annual reviews was significantly lower than zero, providing strong evidence of the effectiveness of TA/Coaching for improving the compliance of child care centers with licensing

regulations. These changes were more pronounced when the pre-intervention deficiencies at the child care center were very high.

The results show that, for centers that have a large number of deficiencies (≥11), there was a reduction of the number of these centers. The reduction of deficiencies for these seven centers was greater than the reduction of deficiencies of the centers that had fewer deficiencies, signifying the effectiveness of relationship-based coaching that probably began with a referral for services from the licensing monitors when these centers faced a high number of deficiencies during their annual visit. The larger numbers of reduction, when using statistical analysis, had more influence on the results. Twenty out of 55 (30.76% of our sample) centers increased their number of deficiencies after the intervention. Although the increases in the number of deficiencies were low and ranged from 1 (n=4, 20%) to 10 (n=1, 5%), a further examination of the details of the intervention in these centers to examine a pattern or further explanation is warranted.

The results of the study grouped by QRIS level/participation did not produce any pattern of change that could be attributed to the quality level of the center. A limitation of this study is that we used the latest data for the center characteristics, whereas the QRIS levels and licensing capacity of the centers might change from time-to-time. We noticed that some centers in the QRIS moved up one level from the time they received TA/Coaching to the time we received the facility datasets for analysis. In a future study, we would incorporate the change of QRIS level as in outcomes of the intervention. This result in this study prompts the field to further examine the effect of number of deficiencies received by a center and their QRIS participation and continued upward movement in the QRIS.

When the centers were stratified by capacity ranges (17-50, 51-100, 101-150, 151-200, and >200), we found that larger centers (greater than 100) had better licensing compliance outcomes. However, as we discussed earlier, “the number of deficiencies” is just one aspect of licensing compliance. Similarly, we need to explore the severity and repetitiveness of some deficiencies with an in-depth qualitative study into the TA/Coaching provided to the centers to better understand the efficacy of TA/Coaching.

In conclusion, this study provides valuable evidence of positive licensing compliance outcomes from TA/Coaching CCR&R services as professional development that was implemented in child care programs using real world, large scale administrative data. Present findings show some positive outcomes of the centers that received TA/Coaching. In addition, by stratifying the sample by QRIS Level/participation and capacity ranges, we noticed the outcomes were varied across the stratums. Future research studies that explore specific factors implemented in the CCR&R services using TA/Coaching, as well as the centers that received them, will provide information to improve the services or involve other stakeholders to condition the child care programs so that the services would be more beneficial to them. In such cases more child care programs would move along the quality continuum.

Table 4.1 An Example of Ranks and Signed Ranks

Center	Before	After	sgn	Absolute Difference	R	R_+	R_-
1	18	4	-	14	48.5		-48.5
2	11	1	-	10	45.5		-45.5
3	0	2	+	2	11	11	
4	1	0	-	1	4		-4
5	5	13	+	8	43	43	
6	3	9	+	6	38	38	
7	4	2	-	2	11		-11
8	2	5	+	3	21	21	
9	6	2	-	4	31		-31
10	5	2	-	3	21		-21

Note: the first 10 observations in our sample (n=55) were reported

Table 4.2 Five Number Summary Before and After the Intervention

Review	N	Min	Q_1	Median	Q_3	Max
Pre	55	0	2	4	8	35
Post	55	0	1	2	4	13

Table 4.3 Result for the Wilcoxon Signed Rank Test

Variable	N	S	Pr>.05	*r*
Pre-Post	55	338.5	0.0035	.44

Table 4.4 Child Care Centers by ABC Level and Capacity

	Capacity Ranges				
ABC Levels	17-51	51-100	101-150	151-200	>200
A	0	0	0	0	1
B+	2	4	1	2	1
B	6	8	6	3	3
C	1	4	4	1	1
N/A	1	2	2	1	1

Table 4.5 Child Care Centers in Rural and Urban Counties

	Rural		Urban	
Quality	n	%	n	%
A		0	1	3
B	10	59	16	42
B+	3	18	7	18
C	2	12	9	24
N/A	2	12	5	13
Total	17	100	38	100

Table 4.6 Number of Centers by Their Change in Deficiencies

	Deficiency				
Type of Change	0-5	6-10	11-15	16-20	>20
Less deficiencies					
0-5	13	11	4	4	2
6-10					
More deficiencies					
0-5	13				
6-10	4	1			
11-15	1	1			

Table 4.7 Discriptive Statistics for the Action Plans(n=55)

Action Plan Goals	Centers	Sessions			Duration of Days		
		Min	Max	Mean	Min	Max	Mean
Achieve Licensing Status	1	12	12	12.0	70	70	70.0
Increase ABC Score above 80%	1	18	18	18.0	322	322	322.0
Increase ABC Rating	7	4	18	8.9	118	354	240.4
Maintain ABC Rating Level	7	3	10	4.9	5	289	77.9
Achieve Quality Improvement Plan	10	3	11	4.7	28	338	112.3
Maintain License in Good Standing	11	3	22	6.8	43	357	113.2
Resolve Corrective Action	18	3	24	6.1	41	295	100.6

Table 4.8 Centers That Have no Change or Increased Deficiencies

	Number of Deficiencies			
Variable	0	2	3	13
Goal				
Quality Improvement Plan	1			
Increase ABC Rating	1		1	1
Maintain License Standing	2			
Corrective Action	3	1		
Quality				
B+	2			
B	2	1	1	
C	2			1
N/A	1			
Location				
Rural	2			
Urban	5	1	1	1

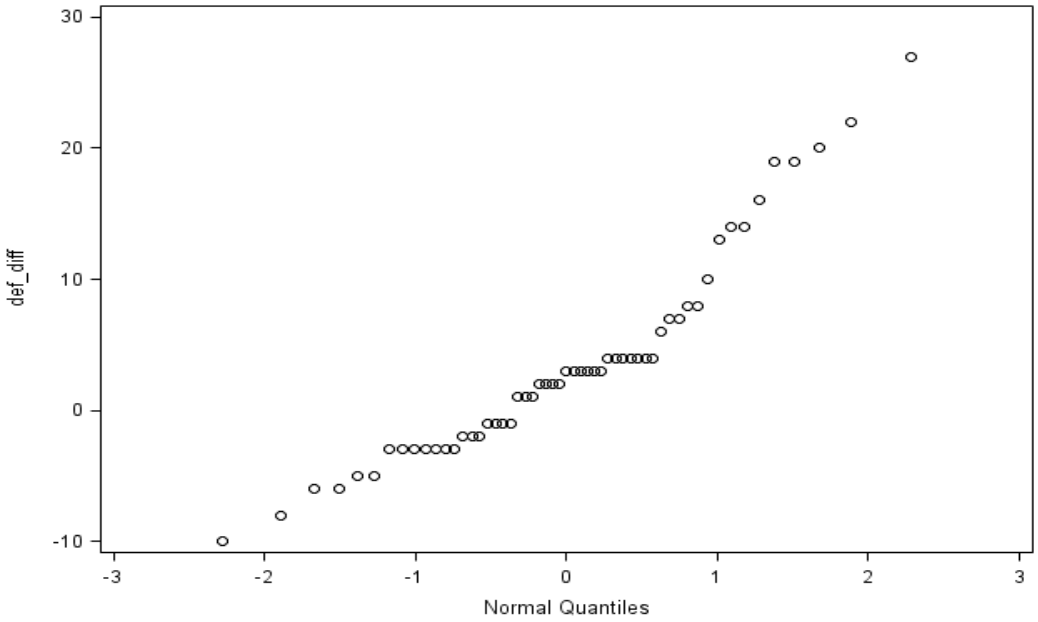

Figure 4.1 Difference between number of deficiencies before and after.

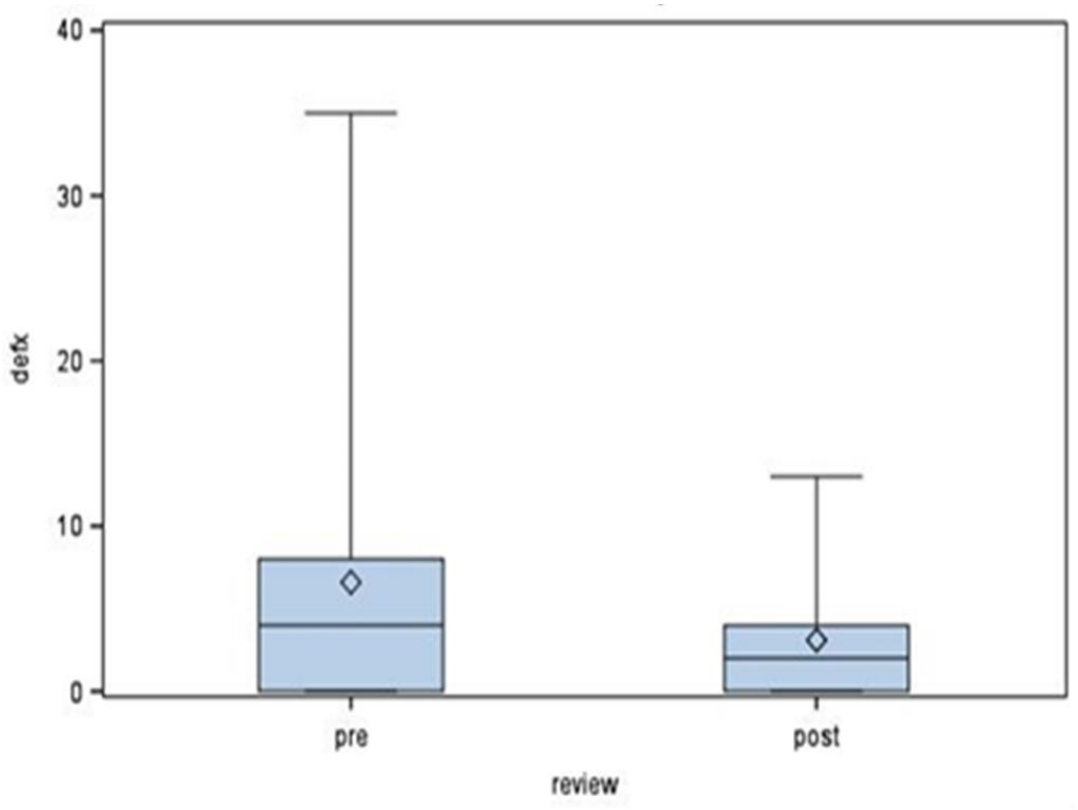

Figure 4.2 Box and wisker plot of the number of deficiencies before and after.

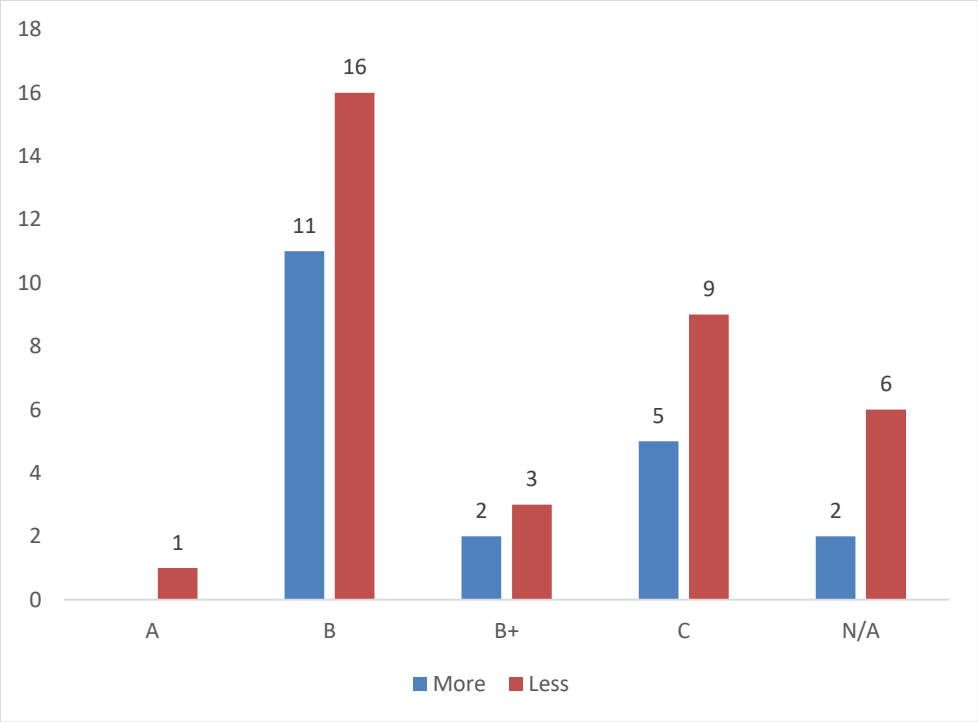

Figure 4.3 Centers by quality level and change in deficiencies.

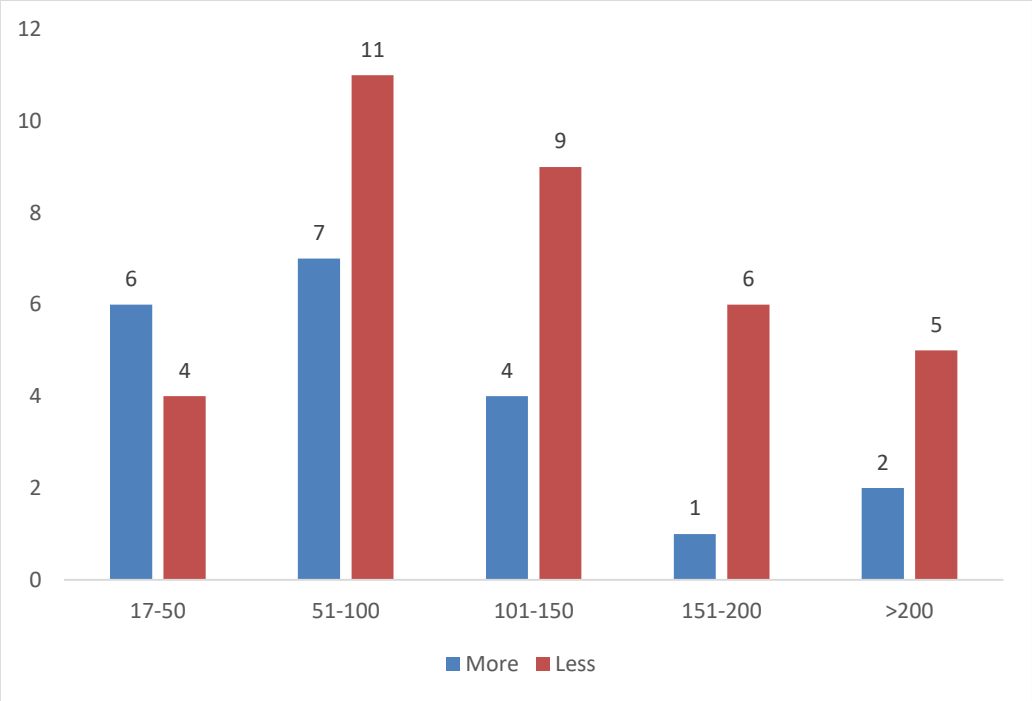

Figure 4.4 Centers by their capacity and change in deficiencies.

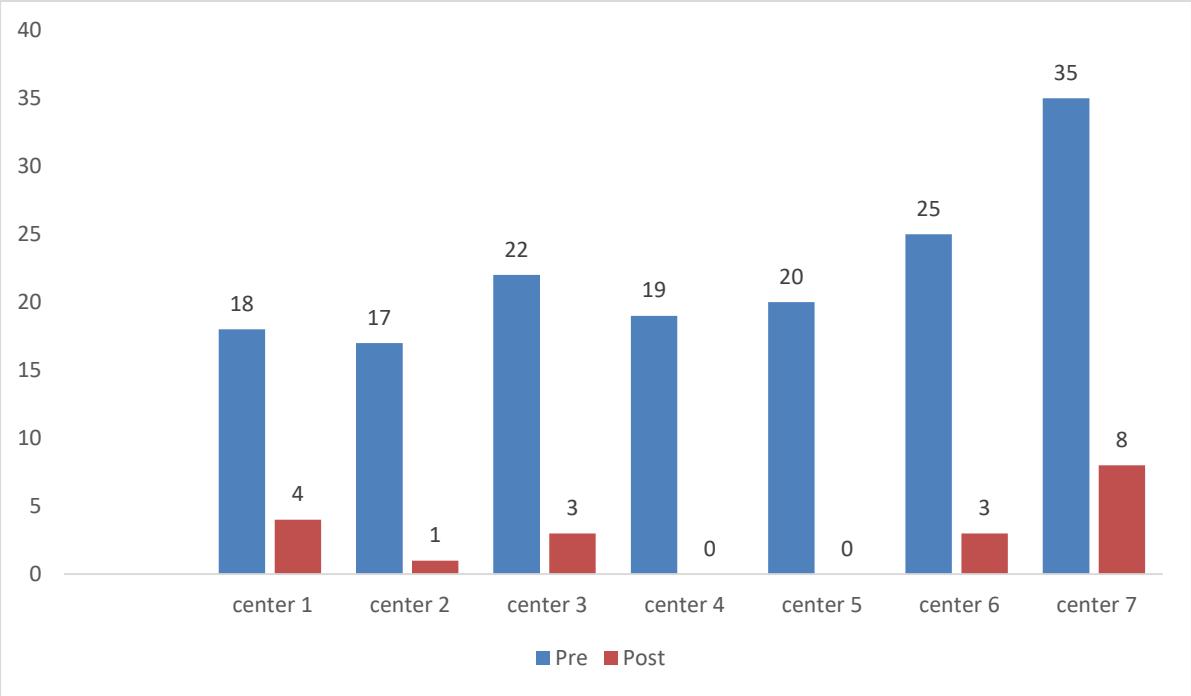

Figure 4.5 The centers that reduced more than 15 deficiencies.

CHAPTER 5: ESTIMATING THE SEVERITY OF LICENSING DEFICIENCY WITH CHARACTERISTICS OF CHILD CARE CENTERS

Licensing rules and regulations related to child care tend to be very comprehensive, examining several aspects of child care facilities that ensure the health and safety of children. Although the regulations incorporate some elements of child care quality, health and safety areas are their number one priority and are often regarded as the foundation of quality in child care. Therefore, violation of these regulations, called deficiencies, are varied in their severity. Some deficiencies are more likely to put children at greater risk and therefore are classified as high severity, while others may be categorized as medium or low severity. Technical assistance provided by CCR&R agencies prioritizes services to child care programs that have medium to high risk deficiencies, as they are often referred to CCR&R services by licensing specialists who have cited the child care programs for deficiencies.

The purpose of this exploratory study was to identify predictors of the severity of deficiencies, especially high or medium severity levels indicating unsafe conditions for children in child care centers. Characteristics of child care centers, such as size of the child care center and ABC quality level, and the use of CCR&R services were examined as factors that may predict the severity of deficiencies in child care centers. The sample consisted of 887 center-based child care facilities with a child care license. The sample

included both child care centers that received TA/Coaching provided by CCR&R and centers that did not. The sample also consisted of centers at various quality levels (A, B+, B, C, and Not Participating) and licensing capacities (small size, medium size, and large size). A multinomial logistic regression model was used to predict the severity of deficiencies with three center characteristics: TA/Coaching services from CCR&R (received or not received), Quality Level, Licensing Capacity, and Duration of Operations. Despite the lack of statistical significance, the results indicate a trend that CCR&R intervention and higher quality level are positively associated with licensing compliance.

5.1 Introduction

High quality in early care and education is critical for children. Research in various fields, such as education, medicine, psychology, economics, etc., has provided evidence of positive outcomes for children having exposure to a safe and engaging environment in their early care and education (Howes, Whitebook, et al., 1992; NICHD Early Child Care Research Network, 2002). For children in poverty, research shows that they are at risk of falling behind academically (Welsh, Nix, Blair, Bierman, & Nelson, 2010; Wright, Diener, & Kay, 2000). Studies have found that children who have less behavioral problems are more likely to have better learning outcomes because they can pay better attention and have better working memory (Fantuzzo, Bulotsky-Shearer, McDermott, & McWayne, 2007). Non-parental care settings that have sufficient meaningful and positive teacher-child interactions are important for children's cognitive and social emotional development (Burchinal et al., 2010). Thus, researchers recommend improvement in teacher-child interactions, especially for child care programs that have

low-income children (Welsh et al., 2010). However, research studies on child care quality are limited to the aspects that have direct impact on children's intellectual and social-emotional development; they address the relationship between child outcomes and child care quality.

Indeed, the quality of child care is a complex construct. Although health and safety areas have been recognized as the foundation of quality, they are commonly overlooked in research about early care and education. In extant research, quality is categorized as either process quality or structural quality. Indicators related to caregiving practices are categorized as process quality and have received more attention by researchers, as they are more directly associated with child outcomes. Indicators such as the number of children, ages, ratio of children to adults, caregiver education, training, experience, etc. are categorized as structural quality. These structural quality elements are important elements of quality that impact child outcomes indirectly.

It is common for research studies to incorporate these structural variables in the analysis of process quality (Harms, Cryer, & Clifford, 2007) in comprehensive assessments of quality. However, compliance with health and safety regulations, in its entirety, is rarely investigated in research on early learning. We know that child care programs that have some health and safety deficiencies may pose potential physical harm to children, yet little attention has been paid to the impact of these deficiencies on school readiness.

A state or local QRIS is a system that assesses, improves, and communicates the information about the quality in child care programs (National Center on Early Childhood

Quality Assurance, n.d.). Participation in the QRIS is voluntary, and the participating centers are incentivized because they receive quality assistance, incentives, and a higher voucher payment rate in a tiered reimbursement system. The intention of the QRIS is to establish a continuum that brings programs from meeting minimum health and safety standards to accreditation at the high end (Kirby et al., 2015). The connection between licensing and quality can be seen at the eligibility level of the QRIS in the rating tools; some states require licensing compliance as a prerequisite to application or an entry level of the QRIS system, while other states allow license-exempt programs to participate in the QRIS (Quality Compendium, 2018). This connection between licensing compliance and quality has not been investigated sufficiently to determine if higher quality center tends to have lower or higher rates of deficiencies. One reason for this gap in research could be attributed, in general, to the perception that licensing and quality are two different systems due to their separate implementation. In some states licensing is housed in one governmental agency such as DHEC or DSS and quality is housed in another one such as Department of Education. The effect of quality levels of child care programs on the severity of deficiencies, as well as the number of deficiencies, is part of this study. This research study explored the association between licensing compliance, focusing on the deficiencies that have potential harm, with three characteristics of child care centers: receiving TA/Coaching, Quality Levels, and Licensing Capacity.

Licensing regulations for child care programs consist of standards that help prevent children from various forms of harm—the spread of disease; fire and other building safety hazards; injury; and developmental impairment (NCCCQI & NARA, 2015). In a continued effort to protect children from harm, the reauthorization of CCDBG

in 2014 has higher licensing requirements regarding health and safety—sudden death prevention; preparedness for emergency and disaster; staff background check; report of abuse; ratio and group size; and staff training. States have responded with revisions to their regulations, making the topic of licensing compliance a relevant issue for research.

Licensing regulations are identified with different levels of risk when deficiencies occur (NCCCQI, 2014b). Severity of risks are determined by their potential harm to children. For example, "lack of supervision," "out of ratio," and "hazards" are identified with higher potential of posing children to immediate risk, whereas "attendance records" and "posted information" are identified as having reduced risk for children. An increasing number of states make the licensing information, including the deficiencies and levels of risk, accessible online for the public. Thus, it is highly important for child care programs to resolve their deficiencies immediately.

Licensing monitoring agencies apply some prevention and intervention strategies for the child care program that have deficiencies with higher risks. Licensing monitors conduct several follow-up inspections for these centers, and more likely, they make a referral to the state or local level CCR&R who provides TA/Consultation that helps the child care programs resolve the deficiencies and sustain their compliance (NCCCQI, 2014a). These facilitative strategies for compliance are more frequently applied than penalties such as fines, reduction of capacity, corrective-action-plan, or closure.

In research studies examing the health and safety regulation compliance intervention, different terms were used to name these interventions, such as on-site health consultation, training and TA, or mentoring. The California Linkages Project provided

health consultation for the purpose of improving child care centers' written policies and practices related to health and safety (Alkon, Bernzweig, To, Wolff, & Mackie, 2009). For example, Keystone STARS (QRIS of Pennsylvania) works in partnership with regional TA agencies to provide intensive, one-on-one support for participating facilities to meet specific health and safety standards and move up STAR levels (OCDEL, 2013). Alabama's Family Child Care Partnerships Project provides mentoring in areas of business operation, licensing compliance, global quality, and fidelity to increase the quality of family child care homes (Abell et al., 2014). The New York City Department of Health and Mental Hygiene (DOHMH) provided training and TA to facilitate compliance with New York City's standards for beverages served in child care facilities and the minimum time period for daily physical activity engagement. Similarly, for the purpose of childhood obesity prevention, Wisconsin's statewide Active Early program also provided training and TA to child care programs to implement the state's policy on physical activities (LaRowe et al., 2016). Although these studies are related to providing technical assistance in the form of consultation, one-on-one support, or mentoring to child care centers on licensing compliance topics such as health and safety or physical activity, the diversity in terminology results in a gap in research on licensing compliance and TA.

5.2 Methods

Data

The current research used secondary data from state administrative datasets at the licensing division of the Division of Early Care and Education (DECE), a division of the state Department of Social Services (DSS). Multiple datasets (Licensing, ABC Quality,

and TAP) were integrated by using unique identifiers for individual child care programs. The Licensing dataset is a cumulative dataset containing all the information pertaining to licensing of 23,564 child care programs collected since 2007. ABC Quality datasets have the information on the rating levels of 3,377 child care programs. TAP datasets contain information on TA/Coaching provided to 308 child care programs from July 1, 2014–June 30, 2016. All types of programs (center, group home, family home) were included in the datasets.

The sample for this study was selected from the licensing database using three criteria: (a) licensed facilities, (b) child care centers, and (c) had an annual review visit during the time period of January 1st, 2014– December 31st, 2016. When child care facilities had multiple annual review visits, data from the last, indicating the most current information, was used in the sample. A total of 868 child care centers were selected for the sample; these included 148 centers that received TA/Coaching and 721 centers that did not receive TA/Coaching. Table 5.1 below shows some characteristics of the child care centers in the sample. In this sample, the number of deficiencies during the annual visit was computed and the severity of the deficiencies was aggregated at three categories and combinations to construct the outcome variables for a multinomial analysis.

Variables used in the study

The dependent variable of interest in this study is "Severity" of a deficiency that is categorized based on the number of deficiencies the child care center received in the three severity categories – low, medium, and high. This variable is calculated by using the deficiencies cited during the last annual review, which is the yearly unannounced inspection/licensing monitor visit at a child care facility. A deficiency is cited when a

licensing monitor finds that a child care center is violating a licensing regulation. The deficiency is categorized under "supervision," "health and safety," "ratio," etc. and a detail is selected from a menu that provides more information on the deficiency that is cited. All this information is collected in an administrative database maintained for the purposes of accountability and reporting. The classification of the visit indicating if it is an annual review visit or a follow-up visit after the initial visit is not recorded. If a center is cited for violation during any monitoring visit, the licensing staff might make additional follow-up visits to check if the deficiency is resolved. Since there was no "follow-up" category in the licensing database, the follow-up visits were also categorized as "review" visits. Therefore, to identify an annual review and distinguish it from follow-up visits to the child care center, days between two monitoring visits were calculated for each child care center. If the number of days was greater than 180, the visit was considered a regular monitoring visit and coded as "annual review." If not, the visit was assumed to be a follow-up visit. Visits classified as "complaint" or "application" were eliminated because they are not uniform across programs and time periods.

The lead agency posts the licensing deficiencies of every child care center that has had a "review" visit on the state child care website to enable parents to make an informed decision about child care for their children. The severity category assignment, i.e. high, medium, and low, for each deficiency is automated and not at the discretion of the monitoring specialist. The deficiencies at high and medium severity have a higher potential to pose a risk to the health and safety of children; therefore, for this analysis, they were grouped together to form a new category labeled "High Severity." As listed in the Table 3.8, examples of "High Severity" are "Improper Supervision (high)" and "Fire

Code Violation (medium)." The "Low Severity" category has lower implication for health and safety. Examples of low severity deficiencies are "Operating Policy" and "Attendance Records."

Although low, medium, and high severity of deficiencies appear to be on a continuum on a severity scale and ordinal in nature, the type of deficiencies in each category were very different. The implications of the severity category for the child care program were also different. Due to these differences, mathematically these groups cannot be equated or placed on a continuous scale. Also, there were many observations/reviews that had zero deficiencies which is an important category to include in the analysis but does not fit into the continuum of the high-medium-low categories. For this very reason, providers with "Zero Deficiencies" were treated as a separate category.

The dependent variable is a categorical variable with three levels: (a) centers that had zero deficiencies—coded as 0; (b) centers where the number of high and medium deficiencies are less than 50% of the total deficiencies—coded as 1; and (c) centers where the number of high and medium deficiencies are equal to or greater than 50% of all deficiencies—coded as 2. These severity categories, as well as the zero-deficiency category, create clear thresholds and non-overlapping categories that can be analyzed to understand factors that affect this outcome variable.

Our study has four independent variables: *TA/Coaching*, *Quality*, *Capacity*, and *Duration (of operation)*. The variable *Intervention* refers to the child care centers availing themselves of CCR&R services and is dichotomous: 0 for the centers that did not receive

TA/Coaching, 1 for the centers that received TA/Coaching. Investigation of the effect of CCR&R services on the number of deficiencies as well as the severity of the deficiencies is the main goal of this research. Including this variable in the study allowed us to measure the effect of this variable on the severity of the deficiencies.

In our original dataset we have a categorical variable that indicates whether a child care center is in the QRIS and their levels in the system. Originally this variable had six ranked categories: (a) 0 if the center was not in QRIS, (b) 1 if the center was level C, (c) 2 if the center was level B, (d) 3 if the center was level B+, (e) 4 if the center was level A, and (f) 5 if the center was level A+.

Level B and B+ centers were assessed the same way against four standards: (a) Staff-Child Interactions, (b) Activity, (c) Indoor Environment, and (d) Outdoor Environment. The centers that met at least 80% compliance for these standards were rated level B, and the centers that had 90% compliance were rated Level B+. Level A assessment had more measured areas (including ERS), and higher requirements. The centers' performance on ERS scores determined their rating as level A or A+. We decided to collapse all child care centers rated above B together because our sample only had a few centers that were rated at high levels.

Quality Level has also been recoded as a dichotomous variable: 0 for centers not participating in QRIS, as well as Level C centers in QRIS, and 1 for the centers that are rated Level B and above. Level C programs must meet an extended licensing compliance standard to qualify at the entry level of QRIS. Therefore, Level C has been coded along with the non-participating centers. Level B and above must demonstrate additional

elements of quality to obtain that rating; therefore this variable is re-grouped into two categories for this analysis.

Capacity is an independent variable that is a measure of the size of a facility. This variable exists in the original dataset and thus is ready to be used without further calculation. Capacity is defined as the size of the maximum number of children permitted to enroll in a center. The DSS measures the structural capacity of a child care center given the fire code regulations and states the number of children who can be served in the facility based on the available space, age of children, ratios, and group size on the application to operate a child care center. Due to this reason, the licensed capacity of centers are numerical values that vary from one another. In our sample, the licensed capacity of child care centers ranges from 17 to 930.

Duration (of operations) is also a predictor variable with continuous values. It is the number of months that the individual centers have been operating until January 1, 2017. Although there is no theory behind this assumption, anecdotally, child care centers that have been operating for a long time appear to have stability and fewer deficiencies. This theory is being tested here by including the variable "duration" in the analyses. These values range from 16 months to 492 months with several missing values for observations that were migrated from an older database.

Analysis plan

We decided to use multinomial logistic regression to make predictions of the center's compliance (in terms of the severity of deficiency cited) with some characteristic variables of centers. This type of regression is commonly used when dependent variable

is polytomous and does not have a natural order (Ertas & Shields, 2012). We used the category *Zero deficiency* as the reference group. Then we compared the probability of child care centers belonging to the *Zero* group to the *Non-Severe* group where the sum of high and medium severity deficiencies are less than 50% as well comparing the probability of belonging to the *Zero* group to the *Severe* group; this comparison is called odds ratio (Szumilas, 2010).

Here we describe the mathematical form of our regression model. p(S)i, p(N)i and p(Z)i are the predicted "group probabilities" of the ith child care center in each of the respective combination of center characteristics. The probability ratio is referred to as "odds" of a center that was identified by us as "Severe" (denoted as S) or "Non-Severe" (denoted as N) respectively against the "odds" of having "Zero Deficiency" (denoted as Z).

$$Y = ln(\frac{p(N)_i}{p(Z)_i}) = \beta_0 + \beta_{1(N)}(Intervention)_i + \beta_{2(N)}(Quality)_i + \beta_{3(N)}(Capacity)_i$$

$$\mathrm{Y} = \ln(\frac{p(S)_i}{p(Z)_i}) = \beta_0 + \beta_{1(S)}(Intervention)_i + \beta_{2(S)}(Quality)_i + \beta_{3(S)}(Capacity)_i$$

In our two equations above, the β which is subscripted with number is the regression coefficient for each predictor. Regression coefficient is a constant that indicates how much the Y changes for each one unit change in a predictor (Guido, Winters, & Rains, 2006). In addition, we subscripted β with letters (N and S) to show which one of the two categories (Non-Severe or Severe) is comparing with having Zero Deficiency. β_o is the value of Y when X is zero. The natural logarithm is denoted by ln; it is the logarithm to the base of mathematical constant e (Ballew, 2004).

5.3 Results

The result of our multinomial analysis show (in Table 5.1) that, the log odds of a child care center's deficiency categorized as *Non-Severe* was positively associated with the two categorical predictors. Therefore, the odds ratio of having *Non-Severe* deficiency is likely to increase with the exposure of *Intervention* and with the center rated Level B and above. However, our results indicate that the odds ratio of Non-Severe over Zero deficiency tends to decrease with the increase in capacity. *Intervention, Quality,* and *Capacity* are positively associated with the odds ratio of a center's deficiency categorized as *Severe*. In both models, *Duration (of operation)* is negatively associated with the odds ratio. This negative association indicates that the centers that have been open for a longer time are less likely to have deficiency at all risk levels: low, medium, and high.

Although the regression model revealed some trends that compliance with licensing regulation changes with the predictor variables, the results did not show any significance. As shown in Table 5.2, all the p-values of odds ratio were greater than .05. These p-values indicate that there is a lack of statistical significance for the regression coefficients (β). And thus, we cannot reject the null hypothesis that with the presence of these predictors (Intervention, Quality, and Capacity) the probability for the deficiency categorized as (1) *Non-Severe* and (2) *Severe* is increased or decreased.

Among the child care centers in our sample, the compliance of the child care centers differed across the categories of the two predictors: (a) Intervention and (b) Quality. The distribution of the centers across categories is shown in Table 5.4. The centers that are categorized as Severe for their compliance are less than 10% of all centers. Among the *Severe* centers, over 80% of them did not receive the intervention.

Among the centers that are categorized as *Non-Severe* for compliance, about 40% are rated Level B and above, whereas the Level C and Non-participating centers make up about 60 percent. Similarly, the percentage of the centers rated with higher quality is about 40% among the centers that did not have any deficiency in their latest review. The percentage of centers that are rated higher yet categorized as *Severe* for compliance is about 46%. Despite the non-random sample used in this study that may not allow us to generalize an inference to the population, our sample still displayed a pattern that the majority of centers that rated higher in quality also have better compliance with licensing standards.

We examined the collinearity among all predictor variables to identify if any two of these predictors are significantly correlated. This test is necessary prior to regressional analysis because the correlation of two predictors could influence the model (O'Hagan & McCabe, 1975). The result showed (in Table 5.3) that the correlation between the two dichotomous predictors, *Intervention* and *Quality*, is significant. Given that the correlation coeficient is positive, we know that the centers that received TA/Coaching provided by CCR&R are more likely to be rated with higher quality than those that did not receive the service. The correlation between *Duration* and *Quality* is also significant, indicating that the centers that opened earlier have higer ratings in QRIS. Despite the statistical significance, the correlations we just mentioned are weak and therefore we did not incorperate the interactions.

5.4 Discussion and conclusion

In this study, we tried to examine the effectiveness of relationship-based coaching and its association with the administrative data on licensing as well as the QRIS data. Few extant research studies have examined effectiveness of TA/Coaching on licensing compliance. The use of administrative data for the analyses is also a unique contribution to the field. Given that prior research studies have provided evidence for relationship-based coaching for the purpose of improving some process quality (e.g. teacher child interaction, language instruction), this type of professional development has been widely used at early care and education programs to improve global quality in this decade. Guided by the interest of child outcome and school readiness, existing research commonly focused on improving process quality, while few studies have examined the utilization of such approaches to improve the baseline for quality. While young children need a non-parental care and learning environment to promote their intellectual and social emotional growth, they also need to be protected from all types of health and safety risks. We wanted to find out whether the occurrence of medium to high risk deficiencies differs based on receiving relationship-based coaching, rated quality level, capacity, and the length of time the centers have been opened. Despite our analysis not finding statistical significance for these predictors, the results still revealed some trend.

Prior to running the multinomial model we conducted an analysis of the correlation among variables. The result showed that the two categorical predictors, Intervention and Quality, are significantly correlated (as shown in Table 5.3). This finding is consistent with the finding of the evaluational study on the TA provided for the child care providers who participate in the QRIS in Pennsylvannia. OCDEL (2013) found

that the TA is a significant predictor for child care providers' moving up in their ratings. However, when we incorporated the interaction of the two indipendent variables in our model, we did not find the interaction as significant.

One might expect a significant negative association with between TA/Coaching and having medium to high risk deficiency given the finding in Chapter 4 that the centers significantly reduced the total number of deficiencies after they used the relationship-based coaching at their center. However the current chapter revealed no significant association between TA/Coaching and the severity of deficiencies. This inconsistency between the findings in Chapter 4 and 5 suggests that, although the total number of deficiencies could be reduced after intervention, we cannot use the *Intervention* as a predictor variable for the odds ratio of having deficiency against having no deficiency.

It is important to note the limitation of this study for future research. First, this form of relationship-based professional development is provided on the condition of a referral for a child care center to the CCR&R by licensing or QRIS monitors. Therefore, it is hard to compare the centers that had exposure to intervention with the centers that did not. Other sampling techniques are needed to select the non-intervention centers to be comparable to the centers that received intervention. Second, we used TA/Coaching as a predictor variable; however, the variability within the variable might be a rationale for its lack of significance. In the research studies that used coaching as a predictor of improvement of process quality (e.g. interaction with children, language instruction), the intervention was highly controlled. In other words, coaching was provided to all teacher participants with the same dosage, duration, and contents. However, the TA/Coaching that we investigated is varied in terms of dosage, duration, and contents. Although the

Quality Coaches have to follow a structured approach to guide their practices, the implementation process is different based on the varied goals of the child care centers. Finally, the way we compute our dependent variable is defective. We put the centers that have medium to high risk deficiencies into two categories. If a center (Center A) had the number of medium to high risk deficiency equal to or greater than 50% of all deficiencies, we put such center into the Severe category. However, the categorization by percentage has made a center (Center B) that has the same number of medium to high risk deficiencies yet also has a high total number of deficiencies to be put into the category of Non-Severe. Comparing these two centers, Center B may have fared worse on licensing compliance because it has more deficiencies. However, our computation assigned Center B into the Non-Severe category which made it seem to have better compliance. Our future research alternative categorizations of the outcome variable, such as weighing a deficiency by its risk, will be explored so that it has more practical and statistical meaning.

In conclusion, all children deserve an out-of-home care and learning environment which is free of potential harm. On one hand we should provide teachers with support that enhances their skills to promote school readiness; on the other, we should not overlook the baseline of quality that the health and safety regulations are closely correlated. Not only should the state licensing agencies monitor for the occurrence of health and safety risks, they should also be connecting the child care programs with on-going support so that the harms can be resolved timely and prevented from recurrence.

Table 5.1 Descriptive Statistics of the Sample

Variables	n	%	Range	Mean
Intervention				
1	147	83.06		
0	721	16.94		
Quality				
Not participating and C	523	60.25		
B and above	345	39.75		
Severity				
Zero deficiency	294	33.87		
Non-Severe	502	57.72		
Severe	73	8.41		
Open month			16-492	158
Capacity			17-328	111

Table 5.2 Regression Table

	Non-Severe vs Zero Deficiency			*Severe vs Zero Deficiency*			
Predictors	*β*	*Odds ratio*	*p*	*β*	*Odds ratio*	*p*	*df*
Intervention	*-0.204*	*1.503*	0.052	-0.208	*1.516*	*0.235*	1
Quality	-0.0025	1.005	0.974	-0.015	1.03	0.916	1
Capacity	-0.00092	0.999	0.375	0.004	1.00	0.824	1
Open month	-0.0002	1.000	0.767	-0.00169	0.998	0.191	1

Table 5.3 Correlations of all Variables

	1	2	3	4	M	SD
1. Severity	-					-
2. Intervention	.064	-				-
3. Quality	.007	.18***	-			-
4. Capacity	-.010	-.02	.100	-	115	81.67
5. Open month	-.038	-.023	.167***	.023		

Note *** for p<.0001

Table 5.4 Discriptive Statistics of the Sample by Intervention and Quality

Variable	Observed values (*n*,%)		
Intervention	Zero deficiency	Non-Severe	Severe
0	259, 29.20	421, 47.46	59, 6.65
1	39, 4.40	95, 10.71	14, 1.58
Quality			
0	183, 20.63	310, 34.95	44, 4.96
1	115, 12.97	206, 23.22	29,3.27

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APPENDIX A

EXCERPTS FROM SOUTH CAROLINA EARLY CARE AND EDUCATION TECHNICAL ASSISTANCE SYSTEM

Technical Assistance Providers' Qualifications and Responsibilities:

Technical assistance providers who meet the following education and experience requirements may apply to become certified by CCCCD as part of the TAP System (See Addendum C)

1. Generalist I

Associate in Arts/Sciences Degree in Early Care and Education including at least *twenty-one semester hours of **core early childhood education courses and two-years' experience working with infants, toddlers or preschool children; and two letters of recommendation attesting to technical assistance skills and experience

or

Bachelor, Master, or Doctorate Degree in a field other than Early Childhood Education or Child Studies/Development with a minimum of *twelve semester hours **core coursework in Early Childhood Education and two years of experience working with infants, toddlers, or preschool children, and two letters of recommendation attesting to technical assistance skills and experience This level of certification would be recommended for Type II Guided Technical Assistance.

Certified Technical Assistance Providers' Responsibilities:

1. Work closely with program monitors, licensing specialists and other agencies or resource providers as appropriate to ensure that educators of young children receive the type and level of guidance appropriate to improve services;
2. Work closely with educators of young children to develop and implement a quality improvement plan. The improvement plan shall include key objectives, measurable results, and be time-limited;
3. Attend, within a three-year period from certification date, three professional development trainings or conferences (with a minimum of 5 contact hours each) that enhance knowledge and skills regarding the care and education of infants, toddlers, preschool and/or school age children;

4. Attend, within a three-year period from certification date, three professional development trainings or conferences (with a minimum of 5 contact hours each) that enhance knowledge and skills in providing technical assistance;
5. Send documentation of thirty hours of professional development as described in 3 and 4 above, to CCCCD every three years for certification renewal. TAP certification will not be renewed without documentation of Professional Development hours.
6. Maintain documentation of TA services through the online CCCCD TAP reporting system for all DSS sponsored technical assistance.
7. Follow all documentation of TA services procedures required by the TAP' sponsoring agency (employer).

APPENDIX B

EXCERPTS FROM SOUTH CAROLINA CHILD CARE RESOURCE & REFERRAL NETWORK COACHING MANUAL

FIVE Essential Practices

Observational Assessment: Collecting relevant and natural data through focused and structured observation for the purposes of identifying strengths and needs, monitoring progress, and evaluating success in achieving program improvement goals supports the data driven approach implemented by SC CCR&R. As a data driven system, the SC CCR&R Coaching model relies on assessment at all points of implementation. Beginning with the referral of a program for services SC CCR&R Quality Coaches will work with child care programs as well as other Early Care and Education System stakeholders to collect any and all program quality assessment data. This includes recent licensing monitoring visit assessments, QRIS assessments, and other information that the program has that can inform an overall evaluation of current functioning. Extending into the Planning stage of Coaching, the Quality Coach will conduct a direct observational assessment of program functioning using a valid and reliable measure (i.e. CLASS, BAS, PAS)

Goal Setting: Informed by the data collected via observation and other Early Care and Education system components (i.e. Licensing Compliance, QRIS assessment) setting Specific, Measurable, Attainable, Relevant, and Timely (SMART) goals provides the necessary direction to support quality enhancement efforts. Through the SC CCR&R Coaching process Quality Coaches will work in collaboration with program stakeholders (Program Director, Teachers, and other key personnel) to identify the primary goals to be achieved through an action plan, and a reasonable timeline of accomplishment. While observational assessment should guide goal development, the goals that are identified should drive all decisions related to quality improvement supports. All training that is provided should be directly linked to the quality improvement goals of the provider, all coaching sessions should be inextricably linked to the quality enhancement goals of the provider, and all continuous assessment should be directly related to the quality enhancement goals. Periodically throughout the Coaching Action Plan, the program stakeholders will review assessment data to determine the extent to which the identified goals are being achieved.

Training: During the course of supporting child care program quality enhancement, the need will arise to share new information with providers. The sharing of this information is referred to as training. During training SC CCR&R Quality Coaches share content related to specific evidence-based strategies that support developmentally and culturally appropriate practices among teachers, and business management strategies for program administrators. All training includes

explicit links to research to support stakeholder understanding of the rationale for the recommended practices as well as reasonable expectations for outcomes of implementation of recommended strategies. Training sessions will be conducted with individuals, small, and large groups depending on the needs of the program. All training sessions align with adult learning principles, ensuring opportunities for interaction, practice for implementation during training sessions, participant reflection on implementation, and will include tangible resources that can be used by participants after the training session to support generalization and application in practice.

Modeling: In order to help teachers and administrators implement recommended practices in their programs it is important for SC CCR&R Quality Coaches to provide a demonstration of recommended practices in the context that the subjects of coaching are working. Each coaching session will include some form of demonstration (direct interaction with children, or staff) which will depend on the needs of the program and the practice that is being learned. To ensure the teacher or administrator being coached is indeed learning the recommended strategies, opportunity to practice the behavior will be provided immediately following the demonstration by the Quality Coach. In addition to supporting the learning process, modeling desired behaviors also serves to establish and maintain the credibility of the Quality Coach. Rather than operating as a consultant that limits advise to "what should be done" the Quality Coach has the confidence and competence to actually implement recommended strategies so that the teacher or administrator being coached is able to see the impact of the recommended practice within the context of their program. Prior to actually engaging in modeling, it is imperative that the Quality Coach clearly articulate the practice that will be modeled, and identify key behaviors that the teacher or administrator should be looking for as they observe the practice being modeled.

Reflecting: A key element of the learning process it active reflection. Throughout the action plan for quality enhancement, teacher and program administrators should be guided through a process of reflection that encourages them to identify aspects of their practice that are effective (should not be changed) as well as aspects of their practice that are not effective (should be changed). Reflection is supported through each stage of the Coaching process, beginning with the initial referral (identifying a need to improve) extending through the planning stage (accounting for program strengths and needs), and in the teaching/learning stage (identifying how new strategies are similar and different from current practice, potential barriers to implementation, and most importantly identification of implementation successes and failures), and concluding with the final summary assessment of program quality improvement (identifying how the program has changed since the action plan was begun, and identification of key behaviors that should continue to maintain quality).

STAGES OF COACHING

Referral: As the initial state of the SC CCR&R Coaching Model, child care providers are either referred to SC CCR&R by another state Early Care and Education System Partner, or provides a self-referral, indicating a desire to engage in the quality improvement process. Ideally the majority of referrals that come to SC CCR&R are self-referrals, indicating that the child care provider is indeed ready to engage in the difficult, but rewarding, process of continuous quality improvement. Self-Referral, from previously served providers might also be an excellent indicator of the impact of our services. During this stage of the Coaching Model, the primary aim of the Quality Coach is to *Establish Rapport and Collect all available evidence* that will support an analysis of program strengths and needs. The steps outlined below, if followed, will guide the Quality Coach in achieving the two primary objectives of this stage of the Coaching Model.

Planning: The planning stage of the SC CCR&R Coaching Model establishes the specific goals that will drive the quality enhancement process, identifies the specific services that will be provided by SC CCR&R, and articulates the mutual commitment to quality enhancement that both the child care program and the SC CCR&R Quality coach will abide by throughout the SC CCR&R Action plan. The planning stage will typically consist of 1 or 2 meetings among the CS CCR&R Quality Coach and relevant Child Care Program Stakeholders and will proceed according the steps outlines below.

Teaching/Learning: At the core of the SC CCR&R Coaching model is the goal of supporting administrator and teacher professional development that results in meaningful learning among all participants. In this vein, the bulk of our services are in support of adult learning. The delivery system for our professional development is in the form of either training or coaching, both of which will be provided in concert to maximize the likelihood of sustained quality enhancement. The section below provides a brief description of both *Training* and *Coaching* as implemented through SC CCR&R and then presents a table of training topics with associated learning objectives and evidence-based practices that are included within each.

Plan Completion: The end…?

> At the conclusion of the action plan (once the program has achieved the identified goals) the Quality Coach will engage in the plan completion stage of the Coaching Model. At this stage the Quality Coach will conduct summative assessment, facilitate teacher and administrator final reflections, solicit feedback from program stakeholders, and will make final assessment of the program action plan.

Follow-up: How do we know we are good? An important stage in the Coaching Process is the follow-up visit. This additional touch point with the child care provider allows for the Quality Coach to maintain the established relationship and check-in with the provider to make sure that they have been able to maintain the change in practice. During the follow-up visit, the Quality Coach will inquire regarding the status of the quality enhancement activities, solicit information about problems that may have been encountered, and finally will offer support in addressing maintenance or another area of Quality Enhancement that the provider might be interested in.