Responsive Parenting in Hong Kong: An Evaluation Study of OneSky's Parent Training Program for At-Risk Families

A Dissertation

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Maya Bowen

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Abstract

Supporting early child development persists as a global challenge, with many children failing to reach their developmental potential, especially in high-risk communities. One solution to address this problem is to implement responsive parenting programs, as parents play an active role in shaping their child's development. One such responsive parenting program has been developed by OneSky, an international nonprofit organization that partners with communities throughout Asia to provide quality responsive care and early education training to caregivers with young children.

In this community participatory study, we collaborated with OneSky to evaluate the effectiveness of their adapted responsive parent training for at-risk families in Hong Kong. We used a pre-post quasi-experimental design for parents with children 0-6 years old, with an intervention group ($n = 66$) that received the parent training and a comparison group ($n = 72$) that did not, in order to assess impacts of the responsive parent training on short-term parent outcomes. The study's main aims were to test changes in: 1) parent self-perceived attitudes of stress and competence; 2) parent knowledge; and 3) parenting behaviors of sensitivity and responsiveness. A secondary aim also measured participant engagement, acceptability, appropriateness, and feasibility to examine the success of program implementation. All data was collected through pre- and post-surveys, except for behavioral data, which was filmed and coded for parenting behaviors.

Results revealed significant effects of the OneSky responsive training on increasing parent competence, increasing parent knowledge, and decreasing parent stress. However, this study did

not find any significant effects of the training on observed parenting behaviors. These results are important as they provide evidence of the effectiveness of a responsive parenting training in an east Asian cultural context, which expands the growing literature and provides useful data that local stakeholders can use to further support families in Hong Kong.

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List of Abbreviations

ABC	Attachment Biobehavioral Catch-up
AIM	Acceptability of Intervention Measure
ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
CIB	Coding Interactive Behavior
ECD	Early childhood (or child) development
FIM	Feasibility of Intervention Measure
FLY	Fun to Learn for the Young Program
HIC	High-income country
HK	Hong Kong
IAM	Intervention Appropriateness Measure
ICC	Intraclass correlation coefficient
LMIC	Low- and middle-income country
PACE	Parent and Child Enhancement Program
PSOC	Parenting Sense of Competence
PSS	Parent Stress Scale
SSP	Sham Shui Po
UN	United Nations
UNICEF	United Nations Children's Fund
VIPP-SD	Video-feedback Intervention to Promote Positive Parenting Sensitive Discipline
WEIRD	Westernized, educated, industrialized, rich, democratic

WHO	World Health Organization

Chapter 1: Introduction

The early years of life are an important time for healthy child development, as children are rapidly developing many foundational capacities during this period, and this lays the groundwork for later development and well-being (Shonkoff et al., 2012; Shonkoff & Phillips, 2000). The early years are a time of fast brain growth, and the developing brain is especially sensitive to early life experiences and environmental input, which can affect all areas of development. Increased risk of early life adversities, such as poverty, malnutrition, and lack of stimulation, can markedly affect cognitive, motor, and social emotional development in children, further demonstrating the particular vulnerability to risk in the first few years of life (Grantham-McGregor et al., 2007).

The 2017 Lancet series declared that early child development (ECD) is a global challenge, as an estimated 250 million children under the age of 5 in low- and middle-income countries (LMICs) fail to reach their full developmental potential (Black et al., 2017). Other international groups and entities have similarly expressed growing concern due to increased recognition of the importance and formative capabilities of the early years on child development.

These concerns helped prompt the creation of the "United Nations 17 Sustainable Development Goals," an extensive and ambitious list of pressing social challenges that the UN has determined are crucial to address (UN General Assembly, 2015). In creating this framework, the UN placed a strong focus on ECD, health, and education. Historically, the focus has been on securing basic child needs and removing physical threats, but more recently, this focus has been shifting toward providing nurturing care to help children thrive instead of simply survive. The most recent major action in this vein, taken in 2018 by the World Health Organization, is called

the Framework for Nurturing Care, which outlines a road map on how to improve ECD through policies and interventions that target health, nutrition, safety and security, responsive caregiving, and opportunities for learning (World Health Organization, 2018). Responsive caregiving is a key component of the Framework as it is actively interconnected with the other components and therefore presents a prime opportunity to address multiple challenges to child development at once.

Responsive Care

Responsive care programs were derived and influenced by predominantly Western theories and research on child development. Specifically, the theory of attachment was originally developed by British psychologist John Bowlby and refers to the tendency for children to seek comfort from a primary caregiver when distressed (Bowlby, 1969). Later research by US-Canadian psychologist Mary Ainsworth built upon Bowlby's theory of attachment and developed attachment classifications (i.e., "secure," "insecure," and "disorganized") that were found to influence several developmental domains across development (Ainsworth et al., 1978). Secure attachment was found to be associated with improved ECD outcomes, including higher levels of social-emotional competence, cognitive development, language abilities, and physical health (Ranson & Urichuk, 2008). Based on the work of Mary Ainsworth, there has been a focus in developmental research on the importance of responsive caregiving to support secure attachment and healthy ECD.

The theory of attachment argues that responsive care is an important factor that forms the experiential basis for the development of a secure relationship. "Responsive care" is characterized by a caregiver responding to a child's needs in a responsive and sensitive manner (Eshel et al.,

2006). Responsiveness often involves a caregiver observing a child's signals or cues, interpreting them, and then responding in a consistent and efficient way to meet the child's wants and needs. When a caregiver responds and attends to a child's needs, the child can then develop a sense of trust in their caregiver, which allows them to explore and learn. This can lead to the child having more opportunities to interact with the world, thereby supporting the development of various developmental domains. By engaging in responsive care practices, the caregiver can provide the child with healthy stimulation, which can foster secure attachment and positive child outcomes. For the remainder of this thesis, the term "responsive care" will be used to mean both responsive and sensitive parenting.

While responsive care has been embraced as fundamental to the formation of secure attachment relationships, it has also been shown to be important for other areas of child development (Rodrigues et al., 2021). Higher levels of responsive parenting have been found to be associated with optimal brain development, including larger brain volume and larger gray matter volume (Kok et al., 2015). In addition, research on neglect and deprivation has shown that a lack of supportive relationships can have negative impacts on cognitive development, suggesting responsive and sensitive relationships are necessary for healthy cognitive development (Nelson et al., 2007). Responsive parenting has also been shown to be important for language development, with higher levels of responsiveness predicting stronger language skills, which are fundamental for later school readiness and academic achievement (Madigan et al., 2019). Furthermore, responsive caregiving has shown to be important for the development of emotional and physiological regulation which are important for overall well-being (Halligan et al., 2013; Tarullo

& Gunnar, 2006). Because evidence shows that responsive relationships with a caring adult are central to many areas of child development, and because responsive parenting is a readily accessible and easily modifiable risk factor, responsive parenting has therefore become the core component of many interventions.

For example, the Attachment Biobehavioral Catch-up intervention (ABC) is a widely used evidence- and strength-based parent coaching intervention that was developed by Mary Dozier at the University of Delaware. Randomized controlled trial studies have proven ABC to be effective in improving attachment, executive functioning, language development, and cortisol regulation in at-risk populations (Korom & Dozier, 2021). Another example is the Video-feedback Intervention to Promote Positive Parenting Sensitive Discipline (VIPPP-SD), which is a parent coaching program developed by researchers at Leiden University in the Netherlands that uses video feedback to enhance parent sensitivity. Across 12 randomized controlled trials, VIPPP-SD was found to be significantly effective in a number of positive parent and child outcomes including promoting sensitive caregiving, decreasing harsh parenting, promoting attachment security, and reducing child behavior problems (Juffer et al., 2017). Research on these interventions has typically focused on the impact of responsive parenting on multiple child outcomes, such as attachment, cognitive, and language development.

However, all of this evidence on the importance of responsive care for healthy child development has been developed using Western research. Although attachment has been found to be a universal need, its manifestation is often different in various cultures (Keller, 2016). Therefore, it should not be assumed that Western forms of parenting will universally support the

formation of a secure attachment. In other words, the effectiveness of responsive parenting programs in non-Westernized, educated, industrialized, rich, democratic (i.e., non-WEIRD) countries remains unclear, and more research is needed to fill this gap in the literature.

Expanding Research on Responsive Parenting Programs

Since responsive parenting programs have become an increasingly popular tool to support ECD and well-being, especially with at-risk populations, a number of concurrent research studies have been conducted in various countries to help understand the effectiveness of these programs (Aboud & Yousafzai, 2015; Baker-Henningham & López Bóo, 2010; Britto et al., 2015; Jeong et al., 2018, 2021; Zhang et al., 2021). In particular, more recent research has focused on implementing and evaluating the effects of responsive parenting programs in LMICs or non-WEIRD countries to understand if these programs, which were derived in Eurocentric areas, can be adapted to work in different cultural contexts.

Child Outcomes

The majority of the responsive care literature tends to put greater focus on effects on child outcomes, which are the main targets of these programs (Aboud & Yousafzai, 2015; Baker-Henningham & López Bóo, 2010; Jeong et al., 2018; Zhang et al., 2021). The current literature shows that responsive parenting programs do have a positive impact on multiple areas of child development across many countries.

Research has found strong evidence that responsive parenting programs can be effective in supporting cognitive development for young children in Rwanda (Abimpaye et al., 2020), India

(Andrew et al., 2020; Nair et al., 2009), Colombia (Attanasio et al., 2014), Uganda (Boivin et al., 2013; Singla et al., 2015), Jamaica (Chang et al., 2015; Gardner et al., 2005; Powell et al., 2004; Walker et al., 2004), Bangladesh (Hamadani et al., 2006; Nahar et al., 2012), Peru (Hartinger et al., 2017), Hong Kong (Leung, Tsang, & Li, 2017), Chile (Lozoff et al., 2010), South Africa (Magwaza & Edwards, 1991), and Pakistan (Yousafzai et al., 2014). A systematic review and meta-analysis of nutrition and stimulation interventions found that stimulation interventions had a medium effect on cognitive development ($d = 0.42$), while nutrition interventions had a small effect ($d = 0.09$) (Aboud & Yousafzai, 2015). This suggests that responsive stimulation programs may be just as essential as nutrition programs for cognitive development.

Responsive parenting programs have also been shown to have statistically significant effects on language development in Rwanda (Abimpaye et al., 2020), India (Andrew et al., 2020), Colombia (Attanasio et al., 2014), Uganda (Boivin et al., 2013; Singla et al., 2015), Jamaica (Gardner et al., 2005; Powell et al., 2004), Bangladesh (Hamadani et al., 2006), Peru (Hartinger et al., 2017), Hong Kong (Leung, Tsang, & Li, 2017), China (Jin et al., 2007), and Pakistan (Yousafzai et al., 2014). Subscales of language and communication showed greater effects on receptive language (Andrew et al., 2020; Attanasio et al., 2014; Boivin et al., 2013; Singla et al., 2015) than expressive language (Andrew et al., 2020; Boivin et al., 2013).

As parents engage in responsive child-adult interactions, they encourage the child to move and explore, which helps them exercise more muscles and may support motor development. Research findings have also shown some significant effects on motor development in Rwanda (Abimpaye et al., 2020), Jamaica (Powell et al., 2004), Bangladesh (Hamadani et al., 2006), Peru

(Hartinger et al., 2017), India (Nair et al., 2009), and Pakistan (Yousafzai et al., 2014), but not as strong effects as with cognitive and language devleopment. In addition, research has shown that responsive stimulation programs may have some significant effects on early social and emotional development (Abimpaye et al., 2020; Hartinger et al., 2017; Jin et al., 2007; Lozoff et al., 2010; Magwaza & Edwards, 1991; Yousafzai et al., 2014), but the findings are less consistent. Social and emotional development can be harder to measure, as it can be difficult to find culturally adapted tools to measure it.

Overall, a growing body of evidence demonstrates the effects of responsive parenting programs on multiple areas of children's development, suggesting that these programs are an effective intervention for supporting child development across multiple countries.

Parent Outcomes

While the main target of responsive parenting programs is to improve child outcomes, it is through parent mechanisms (e.g., parent knowledge, attitudes, and behaviors) that these changes are fostered and supported (Jeong et al., 2021). However, less research has been done to examine parent outcomes.

In the current literature on parent outcomes of responsive caregiving programs, parenting behaviors are often examined as they generally have a more direct influence on the child. Various studies have found: 1) increases in parental sensitivity through responsive parenting programs in Brazil (Alvarenga et al., 2020) and Lithuania (Kalinauskiene et al., 2009); 2) decreases in harsh parenting behaviors through programs in Rwanda (Abimpaye et al., 2020) and Jamaica (Walker et al., 2004); 3) increases in learning/play activities and materials in the home through programs in

Rwanda (Abimpaye et al., 2020), India (Andrew et al., 2020), Colombia (Attanasio et al., 2014), and Bangladesh (Nahar et al., 2012; Tofail et al., 2013); and 4) increases in nurturing care behaviors through programs in Rwanda (Abimpaye et al., 2020), Uganda (Boivin et al., 2013), and Brazil (Wendland-Carro et al., 1999). Thus, responsive parenting programs have been shown to effect positive changes in parenting behaviors and practices in different cultural contexts.

Studies have also shown that responsive parenting programs have improved parent knowledge in Jamaica (Chang et al., 2015; Powell et al., 2004), Bangladesh (Hamadani et al., 2006, 2019), and Uganda (Chang et al., 2015; Hamadani et al., 2006, 2019; Powell et al., 2004; Singla et al., 2015). These studies demonstrated increases in knowledge of ECD (Chang et al., 2015; Singla et al., 2015) and child rearing (Hamadani et al., 2006, 2019; Powell et al., 2004). This suggests that parents with greater knowledge are equipped with greater understanding and skills, enabling them to better support their child's development or mitigate risk.

Lastly, there is mixed evidence showing effects of responsive parenting programs on parent attitudes (Fujiwara et al., 2011; Fukkink, 2008a; Leung et al., 2003; Leung, Tsang, & Li, 2017), although this may be at least partially due to less research in this area. Parent attitudes are commonly measured using parent self-perceptions of perceived stress and self-efficacy (Fukkink, 2008a; Juffer et al., 2017). Parent attitudes may also be an important mechanism by which responsive programs can improve the parenting behaviors that influence ECD outcomes, and therefore, this topic should be further explored in responsive care research (Jones & Prinz, 2005).

Despite the comparatively limited body of literature, current research shows changes to parent outcomes may be attributed to responsive parenting programs. It is therefore important to

further investigate the various mechanisms through which responsive care can influence child development in order to develop successful programs for more diverse populations.

Implementation Outcomes

Implementation outcomes are another growing area of research. When implementing a responsive parenting program in a new country, it is important to document and measure the strengths and challenges of the program. Several common implementation indicators (e.g., acceptability, appropriateness, feasibility, adoption, fidelity, implementation cost, coverage, sustainability) can be studied to determine the extent to which a program was successfully implemented (Peters et al., 2014). Traditionally, implementation indicators have often been chosen based on specific program and research objectives. Acceptability refers to the perception by stakeholders that the program is acceptable for their goals, while appropriateness is the perceived fit of the intervention within the local context, and feasibility is the practicality of the program within the local context. Adoption is the uptake of the intervention, fidelity is the degree the intervention was implemented as planned, coverage is the extent to which the intended population actually received the intervention, and sustainability is the extent to which the intervention can be maintained in a giving setting. In addition to the indicators described here, many other indicators and measurements can be used for implementation research.

A variety of qualitative, quantitative, and mixed methods can be used to evaluate implementation indicators. For example, fidelity could be measured by tracking completion of milestones, fidelity checklists, facilitator logs, or observations of program components. The study of implementation outcomes remains a relatively new field of research, so there is a general lack

of standardization in defining and applying implementation indicators. However, there has been a push to develop more standardized methods and measures. For example, the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM) are tested psychometric assessments of three implementation outcomes and can be adapted for specific organizations or populations (Weiner et al., 2017).

Understanding some of the main implementation challenges can provide a better understanding of the research-to-practice process and transferability of interventions, which can inform future program development and implementation in a more diverse range of settings. Implementation research has been studied for a number of global ECD programs and has been shown to be a useful tool for supporting successful programs (Britto et al., 2018; Richter et al., 2017). Therefore, implementation research should be applied to responsive parenting programs, particularly when considering implementing them in a new context.

The Present Study

The growing push for responsive caregiving programs has begun prompting new research studies on the importance and impact of responsive parenting programs on children's development in more diverse populations (Aboud & Yousafzai, 2015; Baker-Henningham & López Bóo, 2010; Britto et al., 2015; Jeong et al., 2018, 2021; Zhang et al., 2021). More research is needed on the effectiveness of these programs in different cultural contexts, in order to support the growing interest in implementing these programs and to better understand how to adapt programming to fit the needs of the intended children and families. The present work focuses on one example of this

type of research, an evaluation of a responsive parenting program currently being implemented in Hong Kong by an organization called “OneSky for all Children.”

Hong Kong

Hong Kong has a unique cultural background, encompassing both traditional Chinese history (due to its proximity and historical ties to China) and also Western influences (due to the colonization by the British Empire from 1842 to 1997). The melting pot of these cultural values has had a strong influence on the parenting practices of current day Hong Kong families. While the parenting style in Hong Kong is predominantly derived from traditional Chinese beliefs of filiality, piety, and academic achievement, there is also acceptance of some of the more Western parenting beliefs that focus on holistic development and independence (Shek & Law, 2020). However, there is also an overarching focus on academic achievement which comes from traditional Chinese beliefs, and this tends to lead to a more parent-centered approach that places greater emphasis on the parent’s needs and expectations. This often leads to a more goal- and result-oriented parenting style. These parenting practices, rooted in both Eastern and Western values, therefore make Hong Kong a unique place to study the implementation of a responsive caregiving program that was developed based on Western theories but must be adapted to an East Asian cultural context.

Despite Hong Kong’s status as a large global city, with a population of over 7 million people, major inequities persist throughout the city. One area in particular, Sham Shui Po (SSP), stands out as one of the poorest and oldest districts in Hong Kong (Census and Statistics Department, 2023). SSP has several challenges, including high unemployment, low-income, and

high concentrations of immigrants, single parents, and elderly residents. With a population of approximately 430,000 people living in under 10 square kilometers, SSP has one of the highest population densities in Hong Kong. Combined with an extremely high cost of living, this has resulted in high rates of subdivided unit living conditions. Many of these residents are families with young children, leaving them in often unhealthy living conditions, in addition to extremely limited space and resources to raise their children.

While primary education is free and compulsory throughout Hong Kong, it does not begin until age 6. Early pre-primary care services are competitively sought after and very costly, creating a huge burden for families with young children in poor regions like SSP, who would potentially benefit most from the extra support. While there are some government-sponsored family and child services, there still remains a significant gap in support for struggling families. The Hong Kong government has even publicly expressed the need for programs that specifically support parent-child relationships, as they have been shown to improve overall child development in Hong Kong families. A 2017 government report on parenting practices in Hong Kong, prepared in consultation with the Hong Kong Polytechnic University, found that higher warmth parenting and better parent-child relationships were associated with a number of positive child and parent outcomes in Hong Kong families (Chan et al., 2017). Recommendations from that report included providing more child-centered, evidence-based parent education and parenting programs in order to support at-risk families.

OneSky for all Children

OneSky for all Children (OneSky) is an international nonprofit organization that partners with communities throughout Asia to provide quality responsive care and early education training to caregivers with young children. In 2016, OneSky conducted a needs assessment and hosted a series of roundtables to understand the wants and needs of families living in Hong Kong. Through that work, OneSky identified several growing needs in Hong Kong and the Sham Shui Po district in particular, including childcare services, more play space for families with young children, greater social support, and more affordable parent training.

Following this assessment, OneSky created the P. C. Lee OneSky Global Center for Early Childhood Development which provides support and services for families with young children living in SSP. To qualify for membership at the center, families must: 1) have a child between the ages of 0 and 6 years old; 2) live in Hong Kong (with priority going to SSP residents); and 3) receive any government subsidy, be a low-income family, or be referred by social worker from a school, other NGO, or healthcare setting. Families with social needs (e.g., families with caregiving issues, single parents, new arrival families, families living in subdivided units, families with children with special educational needs) are also given priority.

The center includes two components, a Community Hub and a Training Hub. The Community Hub provides a safe space for children to play and families to connect with others in the community, while the Training Hub provides caregiver education programs for parent and professional caregivers. One of Training Hub's education programs includes a free parent training course on responsive caregiving. The training is led by skilled trainers over the course of 4 or 8

weeks. Participating families either meet twice a week for 2-hour sessions (for the 4-week training) or once a week for 2-hour session (for the 8-week training), so all families receive a total of 16 hours of training. During the course, trainers cover topics that focus on responsive care and supporting parent-child interactions, including brain and child development, responsive care, attachment, children's fears and anxieties, home safety, big behaviors, importance of play, supporting independence, and building language through reading. Trainers use a combination of lectures, discussions, activities, and role play to facilitate learning objectives.

Because government and funding stakeholders have demonstrated growing interest in adopting and scaling the center's parent training program in the future, a detailed program evaluation was needed to provide evidence of its effectiveness in the context of Hong Kong caregivers.

Aims

In collaboration with OneSky staff and management, an evaluation study was developed in order to address the needs of the organization and better support the participating families. Through consultation with OneSky, it became apparent that evaluating parent and implementation outcomes would be most beneficial, and understanding the program's effectiveness in these areas would help OneSky make a bigger impact with participating families. Therefore, the overall objective of this study was to test the effectiveness of OneSky's responsive parenting program in Hong Kong on changing short-term parent outcomes, thereby supporting parent-child relationships and child development. A quasi-experimental pre-post-design was used to test the following aims,

with an intervention group of parents with young children undergoing the OneSky responsive parenting program and a comparison group who did not.

***Aim 1*: Test whether the OneSky responsive parent training changes parent attitudes.** Participant self-perceptions of parenting confidence and stress were evaluated between intervention and control groups before and after the parent training. By supporting responsive parenting, the program would help equip parents with skills and knowledge and that would therefore relieve some of the stress related to parenting and improve their confidence in their parenting abilities (Fukkink, 2008b; Tehrani et al., 2024a). *Hypothesis*: The intervention group would report increases in confidence in their caregiving abilities and decreases in stress related to caregiving after the training, compared to the comparison group.

***Aim 2*: Test whether the OneSky responsive parent training changes parent knowledge.** Changes in parent knowledge were evaluated between intervention and control groups before and after the parent training. Trainings are educational and therefore, the program aimed to increase parent knowledge on certain topics. Research has found responsive parenting interventions to have a large effect on improving parent knowledge ($d = 0.91$) (Jeong et al., 2018). *Hypothesis:* The intervention group would report increases in knowledge on child development and parenting practices after the training, compared to the comparison group.

***Aim 3*: Test whether the OneSky responsive parent training changes parent behaviors.** Parent-child interactions were filmed and coded for levels of responsiveness to examine changes in parent behavior between intervention and control groups before and after the parent training. The current literature has shown responsive parenting interventions to have a medium effect on

changing parenting practices ($d = 0.57$) and mother-child interactions ($d = 0.44$) (Jeong et al., 2018). *Hypothesis:* The intervention group will demonstrate an increase in observed responsive interactions with their children after the training, compared to the comparison group.

***Aim 4*: Examine the implementation of the OneSky responsive parent training.** Implementation indicators included participant engagement, feasibility, acceptability, and appropriateness. Post-training surveys assessed these indicators to describe parent and trainer satisfaction, perceived usefulness, and the practical feasibility of the program. Additionally, data on attendance and participation was collected to assess the overall engagement with the training.

Chapter 2: Methods

Participants

This study recruited 138 parent-child dyads, with children 6 years old and under ($n_{intervention} = 66$). Parents were recruited through the OneSky center participant pool. Participants for the intervention group were recruited when they enrolled in the parent training program. Participants for the comparison group were recruited by reaching out to families in the OneSky participant pool using the study flyer via WhatsApp.

Descriptives were similar across groups, with no major differences between the parents in the comparison and intervention group (see Table 1 for t-test comparisons). A chi-square test for independence revealed no significant difference between group and parent sex, $X^2(1, n = 138) = 1.61, p = 0.20$. The majority of parents in both groups were mothers (intervention: 90.9%; comparison: 94.4%), identified as Chinese (intervention: 92.4%; comparison: 97.2%), were married (intervention: 87.9%; comparison: 83.3%), were low-income (intervention: 74.2%; control: 81.9%), and had completed secondary education or lower (intervention: 71.2%; comparison: 66.6%).

The majority of children that participated were also Chinese (intervention: 90.9%; comparison: 95.8%). The intervention group had slightly more female children (51.5%) than the comparison group (48.6%). A chi-square test revealed no significant difference between group and child sex, $X^2\ (1, n = 138) = 0.12, p = 0.73$. Table 2 provides additional detail on participant descriptives.

Procedure

Recruitment and enrollment of participants was performed on a rolling basis across an 11-month period of data collection in 2024. Participant eligibility was determined by the inclusion criteria, which required: 1) a parent to be participating in the parent training for the intervention group or to not be participating for the comparison group; 2) a child to be 6 years old or under; and 3) the parent to speak English, Mandarin, or Cantonese in order to provide informed consent. In addition, participants were excluded if their children were diagnosed with congenital and/or chromosomal disorders (e.g., cerebral palsy, FAS, mental retardation, Turner Syndrome, Down Syndrome, Fragile X), or autism spectrum disorders that could affect their social and behavioral interactions.

Once the participant was deemed eligible, the parent and child would attend an in-person 45-minute session at the center, during which a research assistant would collect consent, administer surveys, and film a 15-minute free play session. All participating parents gave written informed consent in one of the three required languages, and all study procedures were approved by the Institutional Review Board at the University of Minnesota.

Participants then scheduled a follow-up session 4-8 weeks later (depending on their schedule and which training they signed up for). The follow-up session included a set of post-surveys and another 15-minute filmed free play session. After each session, participants were compensated with an age-appropriate children's book in either English or Chinese and a 50 HKD coupon to a local grocery store chain.

Measures

Surveys were translated and back-translated by individuals fluent in English and Chinese. All materials were tested and approved by the OneSky staff to ensure they would be culturally appropriate as well as fit the family's levels of understanding. All surveys, with the exception of the demographic survey (only at the beginning) and implementation survey (only at the end), were administered at enrollment into the study to collect baseline scores and then administered again at the participants' follow-up sessions. Surveys were completed online using mobile devices. The administered surveys are detailed as follows:

Demographic Questionnaire: Participants answered descriptive questions on themselves (e.g., age, gender, income, race), which were used to describe the sample and for possible covariates in the analysis.

Parent Competence: The parenting sense of competence (PSOC) scale (Gibaud-Wallston & Wandersman, 1978) is a free tool used to measure parent self-esteem. The PSOC is administered through a survey of 17 items, which parents respond to on a 4-point scale. The 17 items make up two subscale scores: efficacy and satisfaction (Johnston & Mash, 1989). Together, the subscales create a total score of parents' perceived competence. Total scores were calculated by reverse scoring negative items and creating a sum score of the 17 items. Total sum scores could range from 12 (low competence) to 68 (high competence). Sum scores were also created for parent efficacy and parent satisfaction. Parent satisfaction refers to the parent's frustration, anxiety, and motivation, while efficacy refers to the parent's competence and parenting capability. A validated Chinese version of the PSOC (Ngai et al., 2007) was used. Additionally, several open-ended

questions were added to the survey to allow parents to provide greater detail on their level of caregiver competence. The scale had good reliability for both the baseline ($\alpha = 0.820$) and the post-assessment ($\alpha = 0.805$).

Parent Stress: The parent stress scale (PSS; Berry & Jones, 1995) is another free tool and is used to assess parents' stress concerning their role as a parent. The PSS is an 18-item survey in which parents respond on a 5-point scale. Total stress scores were calculated by reverse scoring negative items and creating a sum score of the 18 items. The items were used to calculate an overall parent stress score ranging from 18 (low stress) to 90 (high stress) for each parent. The PSS has been used and tested in many countries around the world, and it has been specifically validated in both China and Hong Kong (Cheung, 2000). Additionally, several open-ended questions were added to the survey to allow parents to provide greater detail on their level of parenting stress. The scale had good reliability for both the baseline ($\alpha = 0.865$) and the post-assessment ($\alpha = 0.866$).

Parent Knowledge: Parent knowledge was assessed with a survey developed for this study by the research team and OneSky staff, based on the specific topics in the OneSky curriculum. The survey measured parents' perceived understanding of topics (e.g., "*What is your current understanding of how children develop?*" and "*What is your current understanding of best practices you can use to support your child's development?*"), which participants rated on a 7-point scale from 1 ("no knowledge") to 7 ("very knowledgeable"). In addition, participants were tested on their knowledge of the topics with 10 multiple choice questions (e.g., "*What are the 3 steps of the responsive cycle?*" See Table 14 for list of questions). Total knowledge scores were calculated by summing the number of correct responses out of 10.

Parent-Child Interactions: Responsive parent-child interactions were measured through coded observations. Parents scheduled an approximately 15-minute session at the OneSky center. In a private room, the parent and child were given a set of toys (e.g., ball, puzzle, blocks, toy animals, books) and instructed to play as they normally would. The free play interaction was video recorded. The footage was then uploaded to a secure server and analyzed by trained coders who used the Coding Interactive Behavior Scheme (CIB; Feldman, 1998) to code the level of parent responsiveness. The CIB is a global rating system for analyzing social interactions between children (newborns to adolescents) and adults. The CIB has been shown to have good psychometric properties, including good reliability and validity with healthy and at-risk populations (Stuart et al., 2023; Viaux-Savelon et al., 2014).

This study focused on the parent code of sensitivity and responsiveness. Parent sensitivity and responsiveness is a composite score that includes codes on parent acknowledging, imitating, elaborating, gaze, positive affect, vocal appropriateness, range of affect, resourcefulness, praising, affectionate touch, enthusiasm, and parent supportive presence ($\alpha = 0.925$). Coding was done during the middle 5 minutes of the video (5:00-10:00) in order to observe the most natural behaviors. Each code was given a rating on a scale from 1-5 and then all behavior codes were averaged to create overall parent sensitivity and responsiveness score.

Three coders attended an intensive weeklong training and were trained to >80% agreement within 1 point difference across all categories. Following the training, coders showed good reliability ($ICC = 0.82 - 0.84$). Coders were blind to the participant group and to avoid rater bias,

post- and pre-test videos were coded by different coders. Approximately 25% of each coder's data was double coded for reliability.

Implementation Outcomes: Implementation outcomes, such as participant engagement, acceptability, appropriateness, and feasibility, were measured as secondary outcomes. Participant engagement was measured by recording training attendance. The other implementation outcomes were measured with the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM) (Weiner et al., 2017). Each of these measures has shown good psychometric properties ($\alpha = 0.95 - 0.96$). Participants rated 4 items on a 5-point scale from 1 ("completely disagree") to 5 ("completely agree") for each measure. Items were then averaged to create a mean score for each implementation outcome. This was administered only to the intervention group and the trainers at the end of the training.

Data Analysis

All analysis were conducted in R or SPSS. A data-driven approach was used to determine covariates to include in the models. For each potential covariate, correlations and t-tests with group variables and dependent variables were performed. No covariates were found to be associated with these variables and therefore not included in the primary analyses. See Table 1 for t-tests and Table 3 for correlations.

Means and standard deviations were examined for all variables (Table 4). Variables were examined for outliers and skew. All dependent variables were determined to be normally

distributed except for pre- and post-knowledge scores, which were slightly negatively skewed. Log and square root transformation showed no improvement in skew and therefore were not used. Outliers were determined to be any scores outside of 3 standard deviations away from the mean. Pre-knowledge scores had 3 outliers, pre-parent sensitivity scores had 2 outliers, and post-parent sensitivity, pre-PSS, post-PSS, pre-PSOC, and post-PSOC all had 1 outlier each. All outlier values were winsorized to 3 z-scores away from the mean preserving rank.

To determine if there were clustered data due to the inclusion of multiple intervention cohorts, occurring in different months, an intraclass correlation (ICC) with training month was conducted. Most cohort ICCs were near or below 0.05, suggesting the data were independent. Some ICC scores were negative, reflecting more similarities with individuals outside the cohort than within. Parent knowledge was the only score that showed possible clustering ($ICC = 0.43$). Further examination of the knowledge scores revealed the cohort differences were due to one cohort, in March (the first cohort), which only had two participants and therefore may have misrepresented the true ICC. When the two participants were excluded, the ICC dropped to near 0.05 ($ICC = 0.07$). Further checks with analysis of variance tests (ANOVAs) showed no statistical significance of training month on post-PSS ($F(8,56) = 0.28,\ p = 0.97$), post-PSOC ($F(8,56) = 0.57,\ p = 0.79$), post-PSOC efficacy ($F(8,56) = 1.02, p = 0.43$), post-PSOC satisfaction ($F(8,56) = 0.49, p = 0.87$), post-understanding of child development ($F(8,56) = 1.63,\ p = 0.13$), post-understanding of parenting practices ($F(8,56) = 1.07,\ p = 0.39$), post-parent sensitivity ($F(8,56) = 1.35,\ p = 0.24$), and post-knowledge scores without the March cohort

($F(7,55) = 1.65,\ p = .14$). Therefore, the data was determined to be independent, and the analysis methodology was not modified to account for clustering.

To test Aims 1, 2, and 3, analysis of covariance (ANCOVA) models were used to test impact of the parent training on dependent outcomes (e.g., parent stress, parent competence, parent knowledge, parent sensitivity and responsiveness). This was done by running two separate ANCOVA models. The first model included pre-test scores as the predictor on dependent outcomes, serving as a baseline. The second model included pre-test scores and the condition effect (parent training vs. comparison group), allowing for the evaluation of the condition effect while adjusting for the baseline scores. These models were then compared using an ANOVA to determine if the inclusion of the treatment condition significantly improved the model fit.

To test Aim 4, percent of training attendance was reviewed to determine participant engagement. In addition, descriptives for acceptability (AIM), appropriateness (IAM), and feasibility (FIM) were examined to evaluate implementation of the parent training.

Power Analysis

An a priori power analysis was conducted using G*Power version 3.1 (Faul et al., 2009) for sample size estimation based on data from a meta-analysis on the impact of responsive parenting programs on parent outcomes (Jeong et al., 2018). With a significance criterion of $\alpha = 0.05$ and $power = 0.80$, the minimum sample size needed to detect a medium effect size ($f = 0.25$) was $n = 128$ for the ANCOVA statistical analysis used for this study. Therefore, the obtained sample size of $n = 138$ was well powered to test the study hypotheses.

Missing Data

Two participants out of the 138 parent-child dyads (1.5%) had missing post-assessment data as they dropped out of the study halfway through. Of these two participants, one was in the intervention group, and one was in the comparison group. T-tests were run with key variables of interest and a binary missingness variable to determine if the data were missing at random. No variables were significantly correlated with missingness, and the data was determined to be missing at random. Missing post-assessment data were multiply imputed using the mice R package (Van Buuren & Groothuis-Oudshoorn, 2011) to impute missing values. The imputed dataset was created following best practices, utilizing key variables in all imputation models to adopt the missing at random assumption (Young & Johnson, 2015). Models were fit to 10 imputed data sets and the results were then pooled across the 10 datasets using Rubin's Rules (Little & Rubin, 1987). Sensitivity analyses showed that imputing the missing data did not substantively change the results. Therefore, the final results are presented without imputation.

Chapter 3: Results

Aim 1: Effect of Parent Training on Parent Attitudes

Parent Competence

Parent competence scores were not significantly different across groups at baseline (Table 5). Model 1, which included just the pre-test PSOC scores, showed that it explained about 49% of the variance ($R^2 = 0.49,\ F(1,134) = 127.2,\ p < 0.001$), while Model 2, which included the group variable, explained about 51% of the variance ($R^2 = 0.51,\ F(2,133) = 70.47,\ p < 0.001$). The group variable in Model 2 showed a significant effect ($\beta = 3.03,\ t(133) = 2.74,\ p = 0.007$, suggesting participants in the intervention group reported higher competence scores compared to the comparison group after adjusting for pre-PSOC scores. An ANOVA test comparing the two models showed that including the group variable significantly improved the model fit ($F(1,133) = 7.51,\ p = 0.007$; Table 6). These results suggest that the parent training (group) significantly improved the parenting competence scores, after controlling for baseline scores.

Similar ANCOVA models were run for PSOC subscales of efficacy and satisfaction. Results for parent satisfaction showed that Model 2 with group variable ($R^2 = 0.51,\ F(2,133) = 68.05,\ p < 0.001$) explained more variance than Model 1 without the group variable ($R^2 = 0.49,\ F(1,134) = 127.8,\ p < 0.001$). The group variable also had a significant effect on parent satisfaction ($\beta = 1.81,\ t(133) = 2.18,\ p = 0.031$), which improved the model fit ($F(1,133) =$

$4.75,\ p = 0.03$; Table 7). Results for parent efficacy showed that Model 2 explained more variance ($R^2 = 0.41,\ F(2,133) = 45.57,\ p < 0.001$) than Model 1 ($R^2 = 0.39,\ F(1,134) = 85.55,\ p < 0.001$). However, group only had a marginally significant effect on parent efficacy ($\beta = 1.11,\ t(133) = 1.95,\ p = 0.053$), and comparison of the models showed that including group only slightly improved the model ($F(1,133) = 3.79,\ p = 0.05$; Table 8). These results suggest that parents in the intervention group were more satisfied with their parenting role compared to the comparison group (satisfaction) and marginally differed on their perceived competence in their ability to handle parenting challenges (efficacy).

Parent Stress

Pre-parent stress scores were not significantly different across groups (Table 5). Results showed that Model 2 (with group variable) explained more variance ($R^2 = 0.72,\ F(2,133) = 168.9,\ p < 0.001$) than Model 1 ($R^2 = 0.68,\ F(1,134) = 278.3,\ p < 0.001$). Comparison of the two models also showed that inclusion of the group variable improved the model fit ($F(1,133) = 19.99,\ p < 0.001$; Table 9). Examination of the group variable in Model 2 showed that participants in the intervention group reported lower stress compared to those in the comparison group after adjusting for baseline stress score ($\beta = -3.68,\ t(133) = -4.47,\ p < 0.001$), suggesting that the parent training helped lower parenting stress.

Aim 2: Effect of Parent Training on Parent Knowledge

Knowledge Test

Parents were given a short 10-question exam to test their knowledge of the topics learned in the parent training. Pre-parent knowledge scores were not significantly different across groups (Table 5). Results showed that Model 2 explained more variance ($R^2 = 0.12,\ F(2,133) = 8.81,\ p < 0.001$) than Model 1 ($R^2 = 0.04,\ F(1,134) = 4.99,\ p = 0.027$). Comparison of the two models also showed that inclusion of the group variable improved the model fit ($F(1,133) = 12.20,\ p < 0.001$; Table 10). Examination of the group variable in Model 2 showed that participants in the intervention group reported gaining more knowledge compared to those in the comparison group after adjusting for baseline stress scores ($\beta = 1.15,\ t(133) = 3.49,\ p < 0.001$).

A closer look at specific test questions showed the intervention group specifically improved on question 1 ("*What are the 3 steps of the responsive cycle?*"), from 72.7% answering correctly before the training to 92.4% answering correctly after the training. In addition, the intervention group demonstrated large improvement on question 3 ("*What are the 3 actions of a play partner?*"), improving from 43.9% to 71.2% answering correctly. The comparison group either stayed the same or dropped in scores for these questions. Interestingly, less than 50% of both groups answered question 2 correctly ("*What are the 4 actions of responsive parenting?*"). At the beginning of the training, 42.4% of the intervention group answered correctly, and 44.4% of the comparison group answered correctly. After the training, the comparison group improved slightly

to 50%, and the intervention group dropped down to 30.3%. All other questions had relatively high scores (>70%), showing good knowledge on the topics. A breakdown of test question scores can be found in Table 14.

Perceived Knowledge

Results for parents' perceived understanding of child development showed that Model 2 explained more variance ($R^2 = 0.17,\ F(2,133) = 13.97,\ p < 0.01$) than Model 1 ($R^2 = 0.12,\ F(1,134) = 17.55,\ p < 0.01$). Comparison of the two models also showed that inclusion of the group variable improved the model fit ($F(1,133) = 9.29,\ p = 0.002$; Table 11). The group variable in Model 2 showed an increase in perceived understanding of child development for parents in the intervention group compared to the comparison group ($\beta = 0.55,\ t(133) = 3.05,\ p = 0.003$), suggesting that parents who participated in the training felt that they had a better understanding of child development topics than the comparison group.

When examining parents' perceptions of their knowledge on best practices to support child development, similar results were found. Model 2 explained more variance ($R^2 = 0.18,\ F(2,133) = 14.56,\ p < 0.001$) than Model 1 ($R^2 = 0.12,\ F(1,134) = 18.5,\ p < 0.001$). Comparison of the two models also showed that inclusion of the group variable improved the model fit ($F(1,133) = 9.44,\ p = 0.003$; Table 12). These findings support the knowledge test results, suggesting that parents who participated in the parent training felt they have a better understanding of best practices to support child development compared to the comparison group.

Aim 3: Effect of Parent Training on Parent Behaviors

Pre-parent sensitivity scores were not significantly different across groups at baseline (Table 5). Results for parent sensitivity showed that the inclusion of the group variable did not improve the model fit ($F(1,133) = 0.0005,\ p = 0.98$; Table 13) and did not improve the variance between Model 1 ($R^2 = 0.06,\ F(1,134) = 9.15,\ p = 0.003$) and Model 2 ($R^2 = 0.06,\ F(2,133) = 4.54,\ p = 0.01$; Table 14). Examination of the group variable in Model 2 showed no significant changes to parent sensitivity due to group ($\beta = -0.002,\ t(133) = -0.023,\ p = 0.98$), suggesting the parent training did not influence short term parenting behaviors of sensitivity and responsiveness. Exploratory analysis also showed no significant different between the 8-week and 4-week training on parent sensitivity ($F(1,63) = 2.06,\ p = 0.156$).

Aim 4: Implementation Outcomes

Training attendance showed high participant engagement ($M = 6.83,\ SD = 1.63,\ range = 1 - 8,\ n = 66$). About 95% completed over 50% of the trainings, with about half of those (i.e., 43%) completing the entire training. Only 1 participant only completed 1 session before dropping out. This suggests that the majority of the participants got relatively high dosage of the training. Figure 1 demonstrates the number of sessions completed, and Figure 2 demonstrates percentage of attendance for each session.

Participants ($n = 66$) reported on average high acceptability ($M = 4.56,\ SD = 0.47,\ range = 4 - 5$), appropriateness ($M = 4.54,\ SD = 0.48,\ range = 4 - 5$), and feasibility ($M = 4.43,\ SD = 0.52,\ range = 3 - 5$) of the training. Trainers ($n = 4$) also reported high

acceptability ($M = 4.5,\ SD = 0.61,\ range = 3.75 - 5$), appropriateness ($M = 4.43,\ SD = 0.65,\ range = 3.75 - 5$), and feasibility ($M = 4.43,\ SD = 0.72,\ range = 3.75 - 5$) of the training. This suggests highly positive perceptions of the parent training, which sets the program up for successful implementation.

Chapter 4: Discussion

The main goal of this dissertation was to test the effectiveness of the OneSky responsive training on changing short-term parenting outcomes. The study addressed this by testing the effect of the responsive parent training on: 1) parent knowledge; 2) parent attitudes of stress and competence; and 3) parenting behaviors of sensitivity and responsiveness in low-income parents with young children in Hong Kong. A secondary aim included examining implementation outcomes to determine the level of engagement and perceived acceptability, appropriateness, and feasibility of the program by participants and trainers. This study addressed a growing interest in the literature to expand beyond typical western and wealthy samples and understand the adaptability of responsive parenting programs in different, non-WEIRD cultural contexts.

As hypothesized, parents in the intervention group showed reduction in levels of self-perceived stress related to parenting. This is likely due to the training providing knowledge and support that equips parents to foster more supportive parent-child relationships, which could lead to less stressful family environments. These results add to the current literature that shows associations between supportive parent-child relationships and reduced parental stress (Fukkink, 2008a; Tehrani et al., 2024b). In addition, parents mentioned in the open-ended responses of the post-surveys that their stress came from juggling a variety of factors, including finances, work, family responsibilities, and concerns for their child's well-being and education, to name a few. Many of them also mentioned dealing with these different stress factors on their own. Previous research has shown that parent support groups can be an effective way to help reduce stress

(Bennett et al., 2013; Sharma et al., 2022). Therefore, changes in levels of stress may be due to the support received from the trainers and the community created as a result of the training sessions.

Results of parent competence also supported our hypothesis. Parents in the intervention group were found to have higher levels of perceived competence in their caregiving abilities than the comparison group after the parent training. These findings are likely due to the focus of the training on providing not just information, but strategies that parents can use at home with their children. In addition, parents were allowed to bring their children to training sessions, and trainers could provide case studies and role plays to allow parents to practice their skills and build their levels of confidence in applying the knowledge. Further examination of competence subscales showed that parents in the intervention group had higher levels of perceived satisfaction and marginally higher levels of efficacy with their parenting abilities after the responsive parent training, compared to the comparison group. This suggests parents felt like they were more content with their parenting and believed themselves to be more capable parents. Increases in competence could also support the reduction in parent stress findings, as parents who have more confidence in themselves may feel less stressed when they believe they have the skills and resources to handle parenting concerns and challenges.

Results of this study showed improvements in both perceived and actual knowledge after the responsive parent training. Participants in the intervention group showed significant improvements in self-perceived understanding of child development and practices to support their child. In agreement with the participants' perceived understanding, knowledge test scores also showed improvements for the intervention group after the responsive parent training, compared to

the comparison group. This is in line with our hypothesis and the existing literature that suggests responsive parenting programs have a medium to large effect on strengthening parent knowledge (Jeong et al., 2018). Interestingly a closer look at the specific questions showed that question 2 ("*What are the 4 actions of responsive parenting?*") showed a decline for the intervention group ($pre = 42.4\%$ correct, $post = 30.3\%$ correct). This highlights the need for further investigation into the corresponding training session (Session 1) as a possible area for improvement, as it seems to have created some confusion among parents. Nevertheless, these findings suggest that the parent training had a successful educational component overall and that parents who attended the training learned training-specific concepts and knowledge.

Contrary to our hypothesis and the literature, results of the parenting behavior scores showed that the parent training did not improve observed parenting sensitivity and responsiveness in the short term compared to the comparison group. These results may be due to not leaving enough time after the completion of the training to see application of the skills learned. This study only focused on short-term outcomes, and therefore, future research should further investigate the long-term effects as behavioral changes may take more time to appear. Further examination of pre-test parent sensitivity scores showed relatively high levels of parent sensitivity ($M = 4.03$; Table 4) to begin with and therefore may not leave much room for improvement. In addition, future studies could consider looking at parent sensitivity among parents with initial low sensitivity to allow more opportunity for change.

Another contributing factor for these results may be due to the length of the training. A 4-week or even 8-week intervention is considered a bit short. A literature review on parenting

programs show that high frequency and more intensive training are often needed in order to see changes to parenting behaviors (Britto et al., 2015). For example, an RCT in Turkey found that the brief intervention of Care for Development Intervention developed by the WHO and UNICEF only had impacts on the availability of simulating environments but did not show improvement in caregivers responsive behaviors (Ertem et al., 2006). It may be that the dosage of the OneSky parent training given in this time span was not enough to elicit immediate changes in parenting behaviors. In addition, it could be that in order to more rapidly change parent behavior, an in-moment component with direct feedback is needed. Interventions such as ABC or VIPPP-SD include a more individualized intensive coaching component that can provide real-time positive feedback and support, which may encourage more responsive caregiving behaviors (Juffer et al., 2017; Korom & Dozier, 2021). While parents are allowed to bring their children to the OneSky training sessions, it is not required. Therefore, participating parents may receive inconsistent in-moment support when practicing applying their skills. Exploration on incorporating more consistent opportunities for direct coaching may reveal more rapid developments in parenting behaviors.

Lastly, examination of the implementation of the training showed relatively high perceived levels of acceptability, appropriateness, and feasibility of the program by both trainers and participants. Feedback from parents in the open-ended response sections of the surveys support the implementation scores. Parents reported that having childcare services (e.g., respite care) or allowing them to bring their child to class made it easier to attend the sessions. They found the trainers very accommodating and enjoyed the various approaches that were taken to teach the

content, especially the use of examples and case studies to facilitate discussions. Multiple parents expressed that they made friends or enjoyed sharing in the group discussions and would like to stay connected with the other parents that they attended classes with. Overall, parents expressed that they learned a lot about child development and parenting strategies and found the training very helpful. Attendance records support the feedback as there was relatively high attendance throughout the program and a low rate of attrition. This feedback provides strong support for the implementation and uptake of this responsive parent training in this community and can support further implementation of this program in the future.

Strengths & Limitations

This study design has several strengths, one of which is the inclusion of a comparison group that allowed for baseline comparison for the effects of the parent training. The comparison group was not significantly different across any characteristic (Table 1), making it an equivalent control to compare against. Second, the study design collected pre- and post- data, which allowed us to control for baseline scores in the analysis and effectively measure changes in parent outcomes. Third, the study design included multiple methods of data collection. While surveys allowed us to collect more quantitative data, observational data collection allowed for unbiased evaluation of actual parenting behaviors compared to a self-report. The study was able to utilize technology to film the observations in the OneSky center, a natural environment familiar to the families, and then upload the videos to a secure server that could be accessed by trained research assistants at the University of Minnesota for behavioral coding. Fourth, the study included measures that had

previously been validated and translated to Chinese populations, allowing for reliable measurements of parent stress and competence in Hong Kong. Fifth, the community participatory approach to the study ensured the active involvement of local stakeholders, which allowed us to develop a strong study design that addressed relevant and culturally appropriate research questions. Finally, this sample was made up of entirely families that lived in Hong Kong, which allowed us to test the effect of a responsive parent training on a more diverse sample, thereby expanding the literature beyond the WEIRD samples that research typically focuses on.

This study also had several limitations that are important to recognize along with the study findings. While the study was able to have a comparison group, it was not a true control group as the sample was not randomized. That lack of randomization limits the ability to establish causal relationships. However, due to OneSky's mission and current form of implementation, it would be unethical to alter or withhold the parent training from any family in order to conduct a randomized control trial. Second, the study focused on short-term parent outcomes but was unable to collect more than two data points at different times, thereby preventing it from being able to address long term effects of the training. Third, the knowledge test used in the study was created by the study researchers and OneSky staff and therefore was not a validated measure of parent knowledge. However, the aim of the knowledge test was to evaluate specific concepts and terms used in the OneSky training, which are included in many general parent knowledge tests. Lastly, while the use of parent surveys is an effective form of data collection, they are self-reported and therefore always subject to possible reporter bias, especially for surveys on stress, competence, and perceived knowledge. While we incorporated multiple measures for knowledge (self-reported understanding

and knowledge test), future studies may consider incorporating multiple measures for the other parent outcomes in order to get a more complete picture.

Future Directions

This study demonstrates the effectiveness of a responsive parent program at improving parent knowledge, self-perceived competence and reducing parental stress for at-risk families with young children in Hong Kong. Importantly, this study shows evidence that this program is successful and can help address the gap in childcare services in Hong Kong. In addition, the study was able to expand the current literature beyond the typical WEIRD samples. While this study adds to the growing literature, a great deal of research can still be done.

This study's purpose was to test the effectiveness of the training; however, there are other important factors to understand to have a successful program. For example, a program must be sustainable in the long run. One important way to promote program sustainability is conducting implementation research. This study investigated a few implementation indicators as a secondary outcome but did not specifically focus on them as a primary outcome. A full implementation study may provide more information on the program's strengths and areas in need of improvement in order to support the long-term sustainability of the program. In addition, being proactive by collecting more implementation data can support the scaling or exporting of the training to a wider population without losing the initial quality of the program. As programs go to scale, the monitoring and supervision infrastructure are often at risk, and the fidelity of implementation can become more challenging (Baker-Henningham & López Bóo, 2010). The risk is higher if there is

less data to help understand the implementation of the program. Therefore, it is important to consider conducting more implementation research to complement the efficacy research findings in this study, which could help strengthen the application and scaling of responsive parenting programs.

While the program showed effects on parent outcomes, studying the direct effects on child outcomes would also be an important area to investigate. A study of the Fun to Learn for the Young (FLY) program in Hong Kong that has a child learning and parent training component found improved language skills, school readiness and motivation compared to the control group (Leung, Tsang, & Li, 2017). Another local Hong Kong parenting program called the Parent and Child Enhancement program (PACE) also showed improved child learning outcomes in a randomized control trial (Leung, Tsang, & Lo, 2017). While the studies revealed important insights into the effects of parenting programs on child learning, extending the focus of research to other aspects of child development could yield deeper understanding. The wider literature has shown strong effects of responsive parenting programs impacting children's cognitive, language, motor, and social emotional development (Aboud & Yousafzai, 2015; Baker-Henningham & López Bóo, 2010; Jeong et al., 2018; Zhang et al., 2021). It would be important to see if those findings are sustained with families who undergo the OneSky responsive parent training. Studying child outcomes would also help provide evidence on whether the changes seen in parent outcomes from the OneSky training translate to benefits in child development. Understanding the effects of the parent training on both parents and children would provide a more comprehensive picture of the program's overall impact.

Other important areas to focus on for future research would be studying longer term impacts of the training. While short-term outcomes can provide valuable data, understanding the sustainability of the effects provides stronger evidence of the effectiveness of the program. There are many barriers to conducting longitudinal studies; however, future research that can take this approach will be better able to examine how participants apply their training and assess the lasting impacts of the training.

These results have important local policy implications for including responsive parenting training as a successful component into developing more childcare programs in the future. In addition, this study provides evidence of the effectiveness of the program, which can support its continuation and facilitate further buy-in from other stakeholders. This study also has larger global implications by adding to the existing literatures and expanding the current body of research to include more diverse samples. The study provides evidence for the successful implementation of a responsive parenting program in an East Asian context and suggests that it may be a feasible intervention to support parents in other, similar cultural contexts.

Conclusions

Having a responsive, loving parent early in life is important for promoting healthy child development and can be an important protective factor (Masten, 2001). Therefore, it is critical that we understand the best ways we can support parent-child relationships, especially in different countries where families may benefit greatly from these interventions but have the least amount of research in understanding how to do so. This study has addressed this gap in understanding,

specifically for at-risk families in Hong Kong. While the present study did not find evidence for changes in sensitive parenting behaviors, it did find significant effects on parenting attitudes and knowledge, which are consistent with past research (Fujiwara et al., 2011; Fukkink, 2008b; Jeong et al., 2021). Results of this study help advance the literature on responsive parent programs in different countries and demonstrates the success and efficacy of the studied intervention for at-risk families in Hong Kong.

Illustrations

Table 1. Results of independent t-tests comparing descriptives between the intervention and comparison group.

Descriptive	t	df	p-value
Marital status	-0.28	126.21	0.77
Parent age	-1.05	88.16	0.29
Parent race	-1.55	93.79	0.12
Parent education	0.14	135.96	0.89
Number of adults in the household	-0.03	132.15	0.97
Low income	1.08	129.99	0.27
Employment	-1.61	133.78	0.11
Number of children in the household	-0.88	128.72	0.37
Child race	-1.26	112.45	0.21
Child age	0.95	135.14	0.34
OneSky participation at the center	-0.13	134.16	0.89
Years of membership	-0.54	76.36	0.59

Notes: df = degrees of freedom

Table 2. Descriptives of parent and child participants.

Descriptive	Intervention ($n = 66$)	Comparison ($n = 72$)
Parent age in years, M (SD)	38.31 (10.06)	36.61 (6.81)
Parent sex, n_{female} (%)	65 (98.5)	68 (94.4)
Parent race, n (%)		
Chinese	61 (92.4)	70 (97.2)
Indian	0 (0.0)	1 (1.4)
Filipino	2 (3.0)	0 (0.0)
Other	3 (4.5)	1 (1.4)
Marital status, n (%)		
Single	1 (1.5)	2 (2.8)
Married	58 (87.9)	60 (83.3)
Divorced	4 (6.1)	9 (12.5)
Widowed	1 (1.5)	0 (0.0)
Other (e.g., co-habitation)	2 (3.0)	1 (1.4)
Parent relation, n (%)		
Mother	60 (90.9)	68 (94.4)
Father	1 (1.5)	3 (4.2)
Grandparent	5 (7.6)	1 (1.4)
Parent education, n (%)		
Primary	3 (4.5)	6 (8.3)
Secondary	44 (66.7)	42 (58.3)
Bachelor's degree	15 (22.7)	19 (26.4)
Other	4 (6.1)	5 (6.9)
Low income, n (%)	49 (74.2)	59 (81.9)
Employment, n (%)		
Full-time	3 (4.5)	14 (19.4)

Descriptive	Intervention ($n = 66$)	Comparison ($n = 72$)
Part-time	10 (15.2)	9 (12.5)
Unemployed	41 (62.1)	38 (52.8)
Retired	3 (4.5)	1 (1.4)
Other	9 (13.6)	10 (13.9)
Household adults, M (SD)	2.92 (1.36)	2.92 (1.25)
Household children, M (SD)	1.88 (1.01)	1.74 (.87)
Eligibility criterion met, n (%)		
Government grants/programs recipient	28 (42.4)	46 (63.9)
Meets Income Requirement for Public Housing	22 (33.3)	18 (25)
Referred by Social Worker	19 (28.8)	15 (20.8)
Years of membership, M (SD)	1.15 (1.07)	1.04 (.94)
Prior Participation at the OneSky Center, n (%)		
0 classes	29 (43.9)	23 (31.9)
1-5 classes	15 (22.8)	30 (41.7)
6-10 classes	10 (15.1)	11 (15.3)
> 10 classes	12 (18.2)	8 (11.1)
Child age in years, M (SD)	2.91 (1.66)	3.17 (1.67)
Child sex, n_{female} (%)	34 (51.5)	35 (48.6)
Child race, n (%)		
Chinese	60 (90.9)	69 (95.8)
Indian	0 (0.0)	1 (1.4)
Filipino	2 (3.0)	0 (0.0)
Pakistani	1 (1.5)	0 (0.0)
Other	3 (4.5)	2 (2.8)
Child diagnosis, n (%)	8 (12.12)	6 (8.3)
ADHD, n (% of child diagnoses)	1 (12.5)	2 (33.3)

Descriptive	Intervention ($n = 66$)	Comparison ($n = 72$)
Language disorder, n (% of child diagnoses)	5 (62.5)	3 (50.0)
Learning difficulties, n (% of child diagnoses)	1 (12.5)	0 (0.0)
Other, n (% of child diagnoses)	1 (12.5)	1 (16.7)

Notes: M = mean, SD = standard deviation

Table 3. Correlations, means, and standard deviations.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Group	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2. Know	.28**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3. PSS	-.34**	-.09	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4. PSOC	.27**	.11	-.77**	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5. Sensitive	.04	.06	-.02	.10	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6. P Age	.10	-.02	.01	-.12	-.30**	–	–	–	–	–	–	–	–	–	–	–	–	–
7. P Sex	.11	.14	.01	-.02	-.08	0.03	–	–	–	–	–	–	–	–	–	–	–	–
8. Marital	.03	.02	-.01	-.02	-.02	.02	-.15	–	–	–	–	–	–	–	–	–	–	–
9. P Race	.14	-.09	-.08	-.01	-.13	-.04	-.10	.23*	–	–	–	–	–	–	–	–	–	–
10. P Edu	-.01	.08	-.12	.02	.14	-.18	-.03	.01	-.09	–	–	–	–	–	–	–	–	–
11. House A	.00	.00	-.04	.01	-.05	.06	.05	-.22**	-.06	-.14	–	–	–	–	–	–	–	–
12. Employ	.14	.15	.07	-.04	-.14	.15	.27**	.03	-.01	-.11	-.3	–	–	–	–	–	–	–
13. House C	.08	.01	.09	-.09	-.15	.14	.04	.21*	.37**	-.23**	.20*	.22**	–	–	–	–	–	–
14. C Race	.11	-.08	-.14	.02	-.11	.05	-.08	.37**	.88**	-.01	-.04	-.02	.31**	–	–	–	–	–
15. C Age	-.08	.01	.13	-.02	-.04	.19*	.06	.06	-.05	.00	-.23**	-.04	.01	-.09	–	–	–	–
16. C Sex	.03	.10	.14	-.12	.08	-.01	.12	-.09	-.01	.03	-.02	.14	.07	-.06	.03	–	–	–
17. Member	.05	.17	.12	-.03	.04	.09	.11	.06	-.04	-.16	.01	.03	.10	-.04	.34**	.02	–	–
18. LI	-.09	-.01	.20*	-.07	-.07	.05	.18*	-.05	-.22**	-.12	.10	.11	.04	-.17*	.17*	.14	.16	–
Mean	.48	7.68	46.97	62.60	3.95	37.38	1.96	2.15	1.52	2.31	2.92	2.91	1.80	1.67	3.05	1.5	1.08	.78
SD	.50	2.02	8.83	9.06	.59	8.43	.19	.56	2.42	.69	1.30	1.10	.94	.272	1.67	.50	.99	.41

Notes: Abbreviations: “Know” = Post knowledge, “PSS” = Post Parenting Stress Scale score, “PSOC” = Post Parenting Sense of Competence score, “Sensitive” = Post parenting sensitivity score, “P” = parent, “Marital” = marital status, “Edu” = education level, “House” = household, “A” = adult, “Employ” = employment status, “C” = child, “Member” = years of membership at OneSky center, “LI” = low income. * $p < 0.05$; ** $p < 0.01$

Table 4. Means and standard deviations for pre- and post-test measures (parent stress, parent competence, parent knowledge, and parent sensitivity) by group.

Descriptive	Intervention $n = 66$		Comparison $n = 72$	
	M	SD	M	SD
Pre-PSOC	62.80	9.17	59.95	8.92
Post-PSOC	65.18	9.10	60.22	8.41
Pre-PSOC (Satisfaction)	28.09	6.57	26.34	6.99
Post-PSOC (Satisfaction)	29.61	6.21	26.67	7.03
Pre-PSOC (Efficacy)	30.75	4.05	29.77	3.92
Post-PSOC (Efficacy)	31.44	4.20	29.63	4.10
Pre-PSS	46.38	8.16	49.32	9.29
Post-PSS	43.85	8.09	49.83	8.54
Pre-Knowledge Score	7.70	1.55	7.56	1.65
Post-Knowledge Score	8.29	1.64	7.13	2.19
Pre-Perceived Understand CD	4.14	1.22	4.15	1.22
Post-Perceived Understand CD	4.80	1.21	4.25	1.01
Pre-Perceived Understand Practices	4.08	1.34	4.28	1.19
Post-Perceived Understand Practices	4.74	1.19	4.24	1.08
Pre-Parent Sensitivity / Responsiveness	4.03	0.57	3.81	0.81
Post-Parent Sensitivity / Responsiveness	3.97	0.56	3.92	0.62

Notes: M = mean, SD = standard deviation. Abbreviations: "PSOC" = Parenting Sense of Competence score, "PSS" = Parenting Stress Scale score, "CD" = child development

Table 5. Results of independent t-tests comparing pre-test scores between the intervention and comparison group.

Descriptive	t	df	p-value
Pre-PSOC	-1.84	134.22	0.07
Pre-PSOC (Satisfaction)	-1.51	135.92	0.13
Pre- PSOC (Efficacy)	-1.44	134.08	0.15
Pre-PSS	1.98	135.76	0.05
Pre-Knowledge Score	-0.52	135.93	0.60
Pre-Knowledge Perceived Understand CD	0.08	134.79	0.94
Pre-Knowledge Perceived Understand Practice	0.93	130.07	0.35
Pre-Parent Sensitivity / Responsiveness	-1.91	127.58	0.06

Note: df = degrees of freedom. Abbreviations: “PSS” = Parenting Stress Scale score, “PSOC” = Parenting Sense of Competence score, “CD” = child development

Table 6. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting sense of competence (PSOC).

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-PSOC	–	0.49	0.48	899.7	5687.7	–	–	–
Model 2	Pre-PSOC + Group	1	0.51	0.51	894.2	5383.7	304.06	7.51	0.006

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 7. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting sense of competence (PSOC) subscale satisfaction.

Model	**Predictor**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-Satisfaction	–	0.49	0.48	820.9	3187.1	–	–	–
Model 2	Pre-Satisfaction + Group	1	0.51	0.50	818.1	3077.1	110.02	4.76	0.03

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 8. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting sense of competence (PSOC) subscale efficacy.

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-Efficacy	–	0.39	0.38	716.3	1477	–	–	–
Model 2	Pre-Efficacy + Group	1	0.41	0.40	714.5	1436	41.01	3.79	0.05

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 9. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting stress (PSS).

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-PSS	–	0.68	0.67	830.5	3419.4	–	–	–
Model 2	Pre-PSS+ Group	1	0.72	0.71	813.4	2972.5	446.89	19.99	< 0.001

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 10. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting knowledge.

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-Knowledge	–	0.04	0.03	578.3	535.43	–	–	–
Model 2	Pre-Knowledge + Group	1	0.12	0.10	568.4	490.43	45	12.20	< 0.001

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 11. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parent perceived knowledge of child development.

Model	Predictors	df	R^2	Adjusted R^2	AIC	RSS	SS	F	p-value
Model 1	Pre-Under CD	–	0.12	0.12	410.3	155.59	–	–	–
Model 2	Pre-Under CD + Group	1	0.17	0.16	403.1	145.43	10.16	9.29	0.002

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares, "Under CD" = understanding of child development

Table 12. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parent perceived knowledge parenting practices.

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-Under Practices	–	0.12	0.11	412.4	158.10	–	–	–
Model 2	Pre-Under Practices + Group	1	0.18	0.17	405.1	147.62	10.48	9.44	0.003

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares, "Under Practices" = understanding of parenting practices

Table 13. Results of Comparison Criteria and ANOVA analysis comparing ANCOVA models predicting parenting behaviors of sensitivity and responsiveness.

Model	**Predictors**	df	R^2	**Adjusted** R^2	AIC	RSS	SS	F	**p-value**
Model 1	Pre-Sensitive	–	0.06	0.06	237.6	43.72	–	–	–
Model 2	Pre-Sensitive + Group	1	0.06	0.05	239.6	43.72	0.0002	0.0005	0.98

Notes: $n = 136$, df= degrees of freedom, AIC= Akaike's Information Criterion, RSS = residual sum of squares, SS = sum of squares

Table 14. Percent of participants that answered each knowledge test question correctly by group.

Test Question	Corresponding Training Session	Intervention		Comparison	
		Pre	Post	Pre	Post
1. What are the 3 steps of the responsive cycle?	Session 1	72.7%	92.4%	77.8%	81.9%
2. What are the 4 actions of responsive parenting?	Session 1	42.4%	30.3%	44.4%	50.0%
3. What are the 4 main areas of child development?	Session 2	80.3%	83.3%	80.6%	68.1%
4. What are the 3 actions of a play partner?	Session 6 & 8	43.9%	71.2%	34.7%	44.4%
5. To prevent child suffocation and other injuries while playing, we can	Session 3	74.2%	81.1%	83.3%	75%
6. Trusting relationships help….	Session 1 &2	86.4%	89.4%	79.2%	79.2%
7. Your child hits another child. You should respond by…	Session 4	97%	93.9%	91.7%	77.8%
8. What should you do when your child experiences fear?	Session 3	87.9%	90.9%	87.5%	80.6%
9. We provide more help to a younger child while walking up stairs, while for an older child we give less help because they are more capable of walking up the stairs on their own. Adjusting our help to the child's needs supports _____	Session 5	90.9%	90.9%	80.6%	76.4%
10. You can help support your child's language development by…	Session 7	93.9%	90.9%	91.7%	69.4%

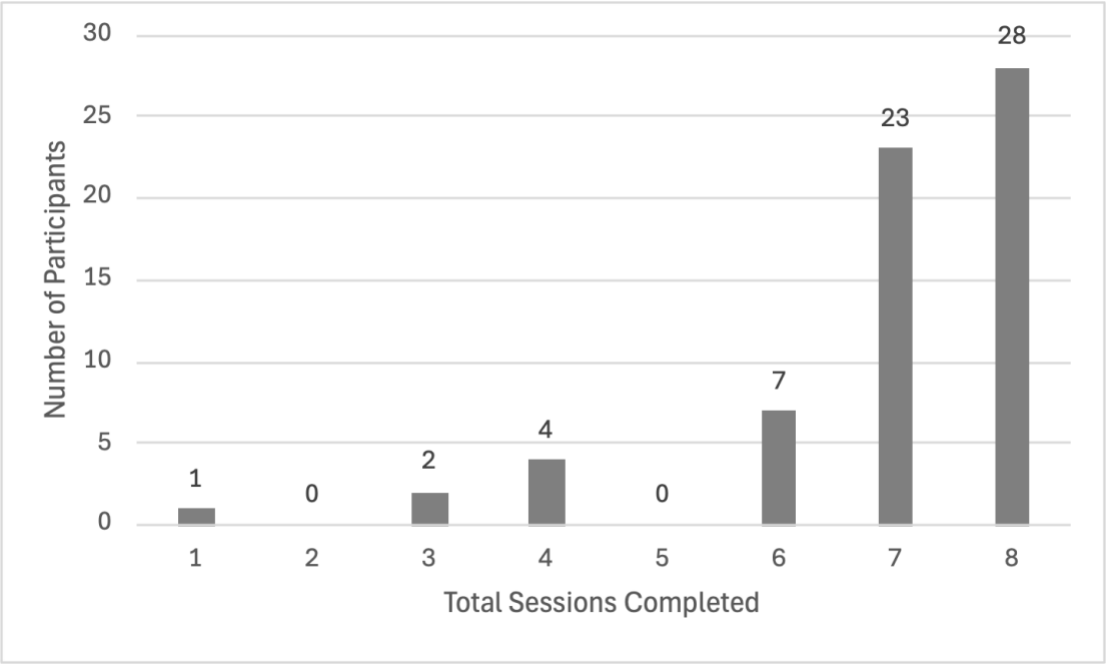

Figure 1. Number of sessions of the parent training completed by participants.

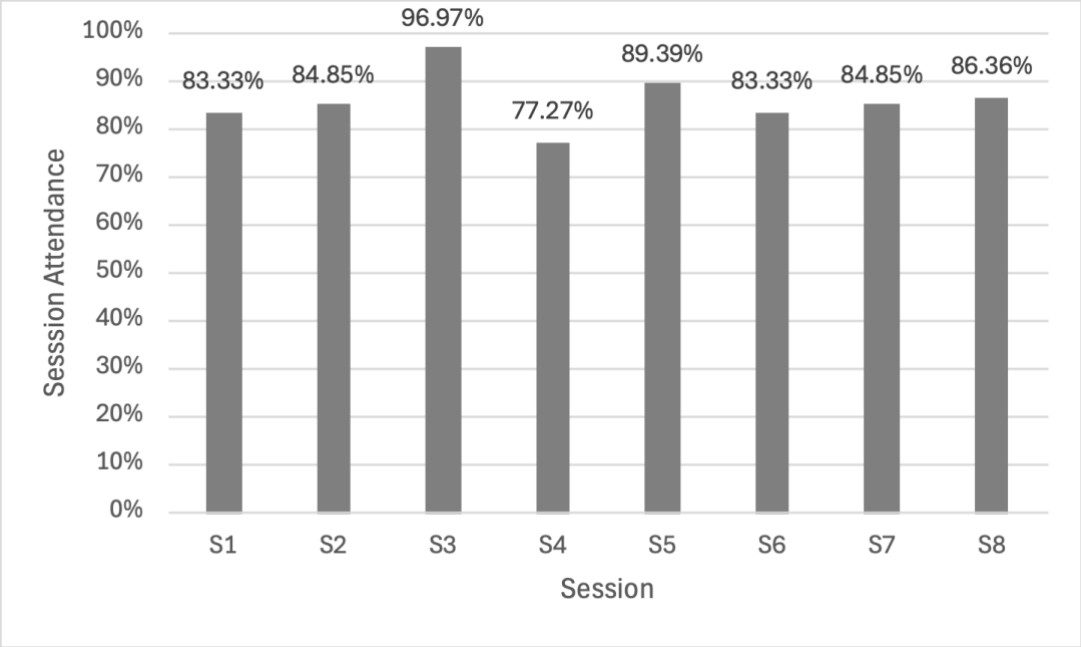

Figure 2. Percent of participants that completed each session of the parent training.

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