An Early Investigation of the Impact of a Digital Health Parenting Intervention for Caregivers with Substance Use Histories During Early Childhood

by:

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DISSERTATION ABSTRACT

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Title: An Early Investigation of the Impact of a Digital Health Parenting Intervention for Caregivers with Substance Use Histories During Early Childhood

The purpose of this study was to evaluate the effectiveness and mechanisms of change of a digital health adaptation of the Family Check-Up (FCU) Online, tailored for parents with a history of substance misuse. The FCU Online is a brief family intervention aimed to improve parenting practices to support their child's healthy development. This dissertation utilized a randomized control trial sample of 356 participants recruited throughout rural and urban areas in the Pacific Northwest. Each participant was a primary caregiver of young children between 18 months to 5 years old and had a history of substance misuse. The study used parent-report data to capture measures of parenting self-efficacy, parent emotion regulation, and positive parenting behaviors. Structural equation models were used to assess the impact on parent self-efficacy, the proposed mechanism of change over time. The analysis revealed a significant increase of sustained parent self-efficacy over time for the intervention group, compared to the control group. Additionally, a mediation model of intervention effects explored the relationship of parenting self-efficacy and emotion regulation and its effect on positive parenting behavior. Results revealed that while there was no mediating effect through parental emotion regulation, the intervention effects on positive parenting behavior were partially mediated by the pathway of parenting self-efficacy. The study's findings highlight the potential of digital health interventions, specifically the FCU Online, as an accessible modality to support parents with

substance misuse in enhancing family functioning and parent behaviors to benefit child well-being and development. This study particularly underscores the significance of addressing parenting self-efficacy in parenting interventions as a significant mechanism to support behavior change in parenting behaviors.

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CHAPTER I

INTRODUCTION

Substance misuse and the alarming rise of substance overdoses in recent years has resulted in a public health crisis (Hall & Miczek, 2019; Leve et al., 2022). Substance misuse not only affects individuals, but it also affects their families and loved ones. Recent research has reported that about 8.7 million, or 1 in 8 children under the age of 18, lived in households with at least one parent with a substance use disorder (Lipari & Van Horn, 2017). Approximately 3.9 million of these children were reportedly 5 years of age or younger, highlighting the significant impact and risk for families and communities across the United States, particularly for the vulnerable population of children affected by their parents' misuse (Cioffi et al., 2019; Dyba et al., 2023). This issue has created an increasing problem for families raising children, particularly for children whose parents are actively misusing substances. Substance misuse in the home can result in unsafe and chaotic environments, creating a risk to children within their home context (Cioffi et al., 2019).

Substance Misuse

The American Psychological Association (2022) defines substance abuse as a compulsive pattern of substance use which results in adverse consequences within occupational, social, and legal areas of life. However, there has been an increasing change in terminology from "abuse" to "misuse" due to the stigma and shame that is attached to the term "abuse," which often creates barriers and prevents individuals from seeking support and treatment when needed (NIDA, 2018). Substance misuse refers to the same compulsive pattern of substance use and indicates that it can cause harm to the individual or their social connections (NIDA, 2018). Within the field of psychology, when substance misuse progresses to dependency, cravings, and addiction, it

is clinically defined as a substance use disorder (SUD) (American Psychiatric Association, 2013). SUDs include three subclassifications of impairment based upon severity, categorized as mild, moderate, and severe (American Psychiatric Association, 2013). The symptoms for an SUD diagnosis are categorized into four major areas of use, which include impaired control of substance use and dependence, social impairment due to use, risky use, and symptoms related to tolerance and withdrawal (NIDA, 2018).

Parenting and Substance Use

In 2018, a report from the Centers for Disease Control and Prevention reported the prevalence of substance use disorders (SUD) has increased among women with children over the past ten years (Haight et al., 2018; Salemi et al., 2020). Additionally, almost 70% of women in substance use dependency treatment have children (Niccols et al., 2012; Peisch et al., 2018). This staggering increase in use among mothers has serious implications for families and communities, as it increases the likelihood of child welfare involvement for families.

Substance misuse throughout pregnancy can result in biological risks for infants (Cioffi et al., 2019). Current literature focuses on the effects on children in early developmental stages, but it is important to note that parents with continued misuse impacts children throughout the lifespan and creates higher risk for children to be more vulnerable to substance misuse themselves and experience adversity and negative psychological effects as they mature (Volkow et al., 2011). Children of parents with substance misuse problems are less likely to meet developmental milestones in early childhood, and show aggressive, hyperactive, and inattentive behaviors upon entering school (Neger & Prinz, 2015). Additionally, adolescents who grow up with substance misuse in the home show higher rates of depression, anxiety and substance misuse themselves (Neger & Prinz, 2015).

Clearly, the long-term outcomes of parental substance misuse greatly affect the wellbeing of families and children. In terms of parenting practices, a parent's poor emotion regulation impacts their ability to respond appropriately to their child or teach them appropriate coping strategies to support their child's emotion regulation development (Cioffi et al., 2019; Rutherford et al., 2015). This may also increase parental stress, as the children's emotion regulation also affects a parent's ability to manage stress appropriately (Rizzo et al., 2014). Additionally, research suggests that mothers with substance misuse experience difficulties interacting with their child, including less sensitivity or responsiveness to their child's behavioral cues, less expression of enjoyment during interactions, and decreased interest in their child's activities (Hill et al., 2011; Paris et al., 2015). As a result, it is not surprising that parental stress, particularly maternal psychological distress, is a more salient predictor of child health outcomes than in utero exposure to substances (Sarfi et al., 2013).

The adverse developmental outcomes for children of parents with substance misuse problems are at least partially linked to parenting practices that more often rise to levels of child abuse compared to parents without substance misuse (Neger & Prinz, 2015). Mothers with substance misuse are also more than twice as likely to lose temporary custody of their children when protectives services become involved and are more likely to permanently lose custody of their children (Grella et al., 2009; Suchman et al., 2010).

Parent Mental Health

Negative effects and outcomes for children and families are especially compounded by the high comorbidity of polysubstance misuse and mental health diagnoses, including depression, anxiety, and personality disorders in individuals with substance misuse, further destabilizing the home environment (Cioffi et al., 2019; SAMSHA, 2019). Individuals with

substance misuse are also 75% likely to have either a co-occurring mood or anxiety disorder (Barry et al., 2016). Both parent mental health and parenting beliefs that impact parenting behaviors contribute to child wellbeing. Given higher incidences of mental health concerns among parents with a history of substance misuse, there are several challenges that these parents face, including issues related to emotion regulation (Cioffi et al., 2019).

Emotion regulation difficulties may be exacerbated as individuals cycle between misuse and withdrawal, introducing a high lability in mood between these states (Pierro et al., 2015). The relationship between substance misuse and emotion regulation is bidirectional. That is, poor emotion regulation has been identified as a significant motivation for substance misuse, and it is also a resultant behavior augmented by substance use (Pierro et al., 2015). From the causal perspective, substance misuse is often sought out as a solution to the experience of negative emotional states to find relief from their current distress (Le Moal, 2009). In exploring the impact of substance use on emotion regulation, individuals often have difficulty with poor emotional awareness, lowered ability to cope with negative emotional states, and low ability to access regulation strategies (Pierro et al., 2015).

Parent Knowledge

Parents with substance misuse often display problematic beliefs and thinking patterns regarding their relationship with their children and their children's behavior. Mothers with substance misuse may lack understanding of child development (Rizzo et al., 2014). This creates higher risk for child abuse or maltreatment, as they hold unrealistic expectations of the capabilities and reasonable responsibilities of their child for their developmental level and age (Dyba et al., 2023; Rizzo et al., 2014). Risk for child abuse increases when parents show low levels of empathy, as parents often lack the skills to nurture their children (Dyba et al., 2023;

Rizzo et al. 2014). Other problematic beliefs parents with substance misuse often include an unclear or blended understanding of parent and child roles and stronger beliefs in corporal punishment, resulting in overly punitive parenting approaches (Rizzo et al., 2014; Suchman & Luthar, 2000). Despite their gaps in parenting foundations and knowledge, however, many parents with substance misuse are unaware of these knowledge gaps, indicating a lack of awareness for the behavioral skills needed to appropriately care for their children (Dyba et al., 2023; Rizzo et al., 2014).

These parenting beliefs also impact the parent-child relationship through parent-child interactions. Research also supports that these negative parent-child interaction patterns are often mirrored in the parents' own childhood experiences (Dyba et al., 2023; Gerra et al., 2021). These perceptions are thought to be a risk factor of psychological maladjustment and high acuity in substance misuse (Suchman et al., 2006). Thus, a parent's views of their early caregivers as uncaring or demanding were associated with higher levels of psychological maladjustment, which is one of the biggest indicators for a child to be removed from their home (Suchman et al., 2006). These early child perceptions for individuals with substance misuse then play a crucial role in informing parenting practices, substance use, and the likelihood of their child being removed from the home and holding similar caregiver beliefs into adulthood (Suchman et al., 2006).

Parenting Interventions

Substance misuse is considered a significant risk factor for caregivers, as parents often struggle with their parenting responsibilities during substance use. In addition to addressing their substance misuse, parenting interventions are available to support the gaps in parenting knowledge and increase effective parenting skills. As evidenced by the increasing prevalence of

substance misuse in parent populations, there is an urgent need for parenting interventions to provide safer and more stable environments for children exposed to risk through their parents' misuse (Cioffi at al. 2019). Currently, however, only a limited number of studies have evaluated interventions for parents with SUDs (Peisch et al., 2018; Suchman et al., 2011).

In a review of treatment programs for parents that integrate substance misuse treatment with a parenting intervention, this combination was associated with improvements in parenting skills, parent mental health problems, and higher levels of parenting competence (Niccols et al., 2012). Parenting interventions that have been developed for parents with substance misuse focus on increasing emotion regulation skills and parenting knowledge to support improvement in family functioning (e.g., Neger & Prinz, 2015). For instance, in a systematic review of research an community samples, interventions focused primarily on parent knowledge of effective parent skills, including behavioral intervention, communication, and healthy development were addressed, as well as maternal emotion regulation (Milligan et al., 2020). Additionally, in a parenting intervention for fathers, results found indirect effects on an increase in parenting self-efficacy (Cioffi & DeGarmo, 2020).

Evidence suggests that parenting interventions are key to facilitating sustained change and improvement in child mental health and reduction of risk factors within the environment (Hawes & Allen, 2016). Most parenting interventions focus on behavioral skills training, providing education about early development, and, at times, connecting to resources to support family needs (Neger & Prinz, 2015; Suchman et al., 2011). Additionally, other parenting interventions might focus on managing children's challenging behaviors, to reduce child problem behaviors (Suchman et al., 2011). Parenting interventions that have been developed for parents with substance misuse focus on increasing emotion regulation skills and parenting knowledge to

support improvement in family functioning (e.g., Neger & Prinz, 2015). In a review of treatment programs for parents that integrate substance misuse treatment with a parenting intervention, this combination was associated with improvements in parenting skills, parent mental health problems, and higher levels of parenting competence (Niccols et al., 2012).

Parenting Self-Efficacy

Parenting beliefs can negatively impact a parents' views on their children's behaviors and the parent-child relationship (Wang et al., 2015). Parenting self-efficacy relates to the beliefs parents hold about their abilities or capacity to parent a child (Jones & Prinz, 2005). It has been demonstrated that parent self-efficacy, parenting behavior, and child behavior interact and influence one another, and recent studies have shown that an improvement in parenting self-efficacy has a positive effect on their children's externalizing behavior (Mouton et al., 2018), indicating parent self-efficacy as a potential mechanism to improve parenting beliefs and parenting behavior. For mothers with substance misuse, intervention has been shown to increase both parent self-efficacy and parenting behaviors, as well as a decrease in stress (Sperlich et al., 2021). It is believed that when caregivers feel they have the knowledge, skills, and support in their parenting, they are more likely to utilize effective parenting skills to support child development (Resnik et al., 2023).

There is ample research that demonstrates targeting parenting practices is an effective approach for intervention to improve and prevent child problem behavior (e.g., Neger & Prinz, 2015; Stormshak et al., 2020). Enhancing parenting practices when children are young can improve problem behaviors and protect against risk factors that impact development and later problem behavior during adolescence (Odgers et al., 2012). However, despite this research, most parents with substance misuse are not receiving treatment for misuse, let alone accessing services

to support improved parenting practices (Lipari & Van Horn, 2017; Stormshak et al., 2021). This inequity is often linked to barriers to treatment, such as transportation and accessible childcare (Stormshak et al., 2021). Additionally, parents with substance misuse face stigma, such as fear of judgment and child welfare involvement, when seeking treatment (Feder et al., 2018; Weber et al., 2021). These issues are exacerbated in rural areas where resources are limited in comparison to urban settings (Patrick & Schiff, 2017).

Recent literature has suggested that efforts to expand treatment for substance use should explore interventions that consider the unique needs of parents and families, addressing both barriers of access in addition to the experienced stigma within community services (Feder et al., 2018; Lipari & Van Horn, 2017). Some of these considerations include expanding access to treatment, as well as flexibility in delivery modality to reduce experiences of stigma for parents when accessing treatment (Stormshak et al., 2021).

The Family Check-Up. One effective parenting intervention for parents with substance misuse histories is the Family Check-Up (FCU), a brief family intervention that targets parenting practices to improve child outcomes (Dishion & Stormshak, 2007). The FCU utilizes an ecological assessment and provides strengths-based feedback to inform family treatment. The feedback aims to foster motivation, help parents understand their strengths and areas of growth, and connect families to appropriate resources (Stormshak & Dishion, 2009). Research has shown that families who receive the FCU intervention see a reduction in child problem behaviors and family conflict, as well as improvements in child self-regulation and parenting by increased use positive behavior strategies (Stormshak et al., 2021). For parents with young children between the ages of 2-4, the FCU showed improvements in positive behavior supports in parents to reduce children's early problem behaviors (Dishion et al., 2008).

The FCU was adapted for online delivery for parents of middle school children to increase accessibility and sustainability of the intervention in community contexts (Danaher et al., 2018). Results from an initial study showed that families with higher risk levels of youth child behavior showed greater improvements than those in the low-risk range (Stormshak et al., 2019). These results suggest that high-risk populations, including parents with substance misuse, can benefit from the FCU Online. Specifically, the FCU Online can address barriers to access for in-person interventions, reaching families more widely (Shelleby, et al., 2018; Stormshak et al., 2019; Stormshak et al., 2020; Stormshak et al., 2021). It is important to note that rural and urban areas have been uniquely affected by substance misuse. Compared to their urban counterparts, parents with substance misuse in rural areas suffer from a lack of resources in parenting support, substance use treatment, and mental health services (Stormshak et al., 2021). Some of factors that have specifically influenced the impact on rural areas include easier access to substances, both prescription and nonprescription, as well as higher levels of socioeconomic stress (Keyes et al., 2014). Additionally, social networks and family structures are more closely connected in social areas, creating an added barrier to treatment and retention due to the stigma of substance misuse and stigma associated to seeking care across settings (Feder et al., 2018). Finally, in-person services create more difficulty for rural families, particularly in the intersectionality of lowered resource access and higher levels of socioeconomic stress, as transportation and travel time create an increased difficulty for parents and families (Stormshak et al., 2021). In both rural and urban locations, an online approach can address these barriers, as its accessibility can reduce the need for transportation, childcare, and stigma as a service that can be accessed from their home via a smartphone or computer (Stormshak et al., 2021). Therefore, adapting the FCU Online to target the needs of parents with substance misuse can create a cost-effective and

accessible intervention to support the health development of children and improve family functioning.

Research Hypotheses

Given the need for prevention and more treatment options of substance misuse for parents to address the unique needs of caregivers, this study aims to investigate the initial impact of an eHealth parenting intervention tailored for parents with a history of substance misuse. This study will provide a better understanding of the mechanisms of change that improve parenting practices and explore the effectiveness of parenting interventions tailored to parents with a history of substance misuse.

The proposed study aimed to (a) examine how the FCU Online impacts parenting self-efficacy and (b) better understand the relationship between parenting self-efficacy and parenting practices as a mechanism of change that improves family functioning. This study will serve as an important addition to existing literature regarding treatment for parents with substance use risk factors and digital health models for parenting interventions.

The first aim examined the impact of the FCU Online on parenting self-efficacy. Based on research and the theoretical model guiding the FCU intervention, the FCU Online directly targets parenting self-efficacy and has been shown to improve self-efficacy in prior studies (Stormshak et al., 2019). Using 3 time points, I hypothesized that the intervention group would increase in parenting self-efficacy over time when compared to the control group.

The second aim was to explore the relationship between the constructs of parenting self-efficacy and parenting behaviors, and how they are affected by the FCU intervention. This analysis utilized a mediation model that explored the effect of the FCU intervention on positive parenting behavior as mediated by parenting self-efficacy. I hypothesized that that the effects of

the intervention on positive parenting behavior at timepoint 3 would be mediated by the increase of parent self-efficacy at timepoint 2.

CHAPTER II

METHODS

Sample

The sample was drawn from an ongoing randomized controlled clinical trial where families were randomly assigned to receive the intervention or wait-list control. The intervention targeted parenting skills, self-efficacy, and parent mental health in parents with a history of substance misuse, which included a history of opioid misuse within their lifetime and alcohol or recreational substance misuse within the last year. (Project 2: Rural Families Affected by Opioid Use; 1P50DA048756). Participants were also included if they endorsed depressive symptoms in the last two weeks, as depressive symptoms were determined to be a risk factor for substance misuse. The participants in this study were parents or caregivers to young children between the ages of 18 months and 5 years old and had at least 50% custody of their child. The sample for this study included 356 participants at timepoint 1, 323 participants at timepoint 2, and 263 at timepoint 3. The study recruitment began in 2022 and was completed in 2023. The sample was recruited from families residing in the Pacific Northwest.

At the first point of data collection, most caregivers who participated in the study identified as female (91.3%). The average age of caregivers was 33.68 and ranged from 19-68 (*SD* = 5.97). The racial makeup of the participants was largely homogenous: 65.7% White/Caucasian, 19.1% Latinx, 9.3% Biracial/Multiracial identity, 1.4% Black/African American, 2.3% Asian or Pacific Islander, and 1.7% Native American/Alaskan Indian.

Procedure

Parents in both rural and urban areas throughout Oregon were invited to participate by community partnerships and through social media recruitment. Inquiries about participation were

contacted through the recruitment team, who distributed consent paperwork. Parents who participated received compensation for the participant surveys that were completed every three months for a total of four waves. Participants had the option to complete the surveys through a phone interview or an online survey and received extra compensation if completed within a quick timeframe.

After the first survey, families were randomized into either an intervention or control group for the study. Participants in the intervention group then received access to the Family Check-Up Online (FCU Online) and a family consultant. The family consultant supported participants in navigating the online intervention to provide a tailored approach to support participants in applying the learned parenting skills to fit their specific family needs. Family consultants provided enhanced intervention support through telephone calls, so that all parts of the program were conducted within a digital health model. Once the intervention was completed, families completed the final three surveys and had access to the program for a full year. For this investigation, the results from the first three time points were examined. Once participants in the control group completed the study and completed all surveys, they were offered access to the FCU Online without coaching.

The FCU Online

The FCU Online was developed as an intervention to reduce problem behavior in middle school children (Stormshak et al., 2019). In the first randomized control trial, the FCU Online was delivered as a stand-alone program, or with supplemental telehealth coaching (Danaher et al., 2018; Stormshak et al., 2019). Because the initial study showed that outcomes showed greater improvement when the intervention was paired with coaching, this version of the FCU Online required coaching as a component for all participants in the intervention trial. This

adaptation of the FCU addresses several barriers to treatment, particularly for high-risk populations, including parents with a history of substance misuse, for a cost-effective and transportable intervention. Additionally, the FCU Online allows participants to engage with the content, pairing parent knowledge with practice to increase parent self-efficacy in utilizing the skills with their families (Stormshak et al., 2019).

The FCU Online has five modules to address parentings issues relevant to substance misuse, including parent wellness, substance use and parenting, positive parenting, proactive parenting, and monitoring/limit setting (Stormshak et al., 2021). The modules of parent wellness and substance use were created through an iterative approach to content development, eliciting feedback from community stakeholders, providers, and families to ensure the early childhood version would adequately address parenting needs (Stormshak et al., 2021). The modules of positive parenting, proactive parenting, and monitoring/limit setting were adapted from the Everyday Parenting curriculum (Dishion et al., 2011), a staple of the FCU intervention.

Specifically, each module includes an assessment, feedback, and interactive skills training content designed to support parental skill building in each module (Stormshak et al., 2021). The parent wellness module focuses on stress management through building skills and creating a self-care plan. The substance use and parenting module provides psychoeducation about substance use, managing cravings, communication, and home safety. Positive parenting focuses on increasing awareness and attention to positive behavior through positive reinforcement, providing clear requests, and skills to engage in child-directed play for healthy development. Proactive parenting provides a structure to help parents identify problem situations and make adjustments so as to avoid these situations and set expectations for their children to minimize problem behaviors. This module also emphasizes the importance of healthy child

routines to build healthy habits and increase structure. Finally, the last module focuses on rules and consequences through creating reasonable and clear rules and well-defined consequences.

The modules are supplemented by the telehealth phone sessions with their family consultant. Each participant assigned to the intervention has an onboarding session where the family consultant completes a brief intake interview and initial goal setting for the intervention. Then, the family consultant schedules follow-up feedback sessions to complement each module, and to tailor the content towards the family's goals. In these sessions, the family consultant reviews the results of the self-assessment from the beginning of the module, engages in skill practice, and sets skill-specific parenting goals that relate to the family's goal from the initial session. The number of sessions ranged to fit the needs and pace of the family, ranging from 1 to 29 feedback sessions. Finally, family consultants had a final session to review and summarize the participant's progress and create a plan for continued skill use upon completion of the telehealth component.

Measures

Positive Parenting

The positive parenting measure is drawn from the Supporting Positive Behavior subscale that is part of the Parenting Young Children (PARYC) scale, a self-report measure designed to assess parenting behaviors relevant for caregivers of young children (McEachern et al, 2012). The measure includes seven items asking about behavior over the previous month: "play with your child in a way that was fun for both of you", "stand back and let your child work through problems s/he might be able to solve", "invite your child to play a game with you or share an enjoyable activity," notice and praise your child's good behavior," "teach your child new skills," "involve your child in household chores," and "reward your child when s/he did something well

or showed a new skill." Participants rated how often they engaged in the behavior on a scale from 1 ("not at all") to 7 ("most of the time"). The Supporting Positive Behavior subscale demonstrated good validity (α = .78).

Parent Self-Efficacy

The parenting self-efficacy measure consists of fourteen items: "providing praise and encouragement for good behavior", "using rewards and incentives", "setting clear rules and expectations for behavior", "setting limits with your child", "applying consequences when rules are broken", "using clear and predictable routines", "listening to your child", "choosing to ignore annoying behavior", and "doing fun activities with your child." These items were created for the middle school version of the FCU Online (Stormshak et al., 2019). This scale assesses both the importance of each parenting skill and the parent's confidence in using the skill. When asking about importance, the possible answers range from 1 ("not important at all") to 5 ("very important") (α = .72). For confidence, the possible responses range from 1 ("not confident at all") to 5 ("very confident"). The scale measuring the sense of parenting confidence has shown good validity (α = .87) (Stormshak et al., 2019).

Emotion Regulation

The measure of emotion regulation is drawn from the Emotional Control (EC) clinical scale from the Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A) (Roth et al., 2005). The EC scale assesses an individual's ability to control their emotional responses appropriately. It includes a total of ten items: "I have angry outbursts," "I overreact emotionally," "I have emotional outbursts for little reason," "I react more emotionally to situations than my friends," "I overreact to small problems," "I get emotionally upset easily," "my anger is intense but ends quickly," "people say that I am too emotional," "my mood changes

frequently," and "I get upset quickly or easily over little thing." Participants responded to each item using a Likert-type frequency scale, where the possible responses are "never," "sometimes," and "often." The EC scale has proven to be a reliable measure with good validity (α = .88) (Black et al., 2020).

Analytic Plan

The goal of the study was to examine the effects of a digital health parenting intervention on the parenting behaviors and self-efficacy of individuals with a substance use or depressive history. The study utilized structural equation modeling (SEM) to address these aims. SEM is an effective analysis due to its ability to explore causal relationships as well as manage repeated measures data (Lowry & Gaskin, 2014). Prior to conducting the analyses, data was tested for any violations of assumptions for normality.

The first proposed aim of the study explored the impact of the intervention on parenting self-efficacy over time. The second aim was to understand the intervention targets and explore a mediation model to understand the relationship between parenting self-efficacy and positive parenting behavior change, controlling for self-efficacy and emotion regulation at timepoint 1. These covariates were included to account for participant differences at the outset of the intervention. The first model used a time series design and growth model to examine the change of parenting self-efficacy over time once given the intervention. The subsequent aim used a mediation model to examine a secondary factor and its effect on the outcome variable. This approach allowed for the identification of causal relationships between parenting self-efficacy and parenting behavior outcomes.

Model fit for these analyses were evaluated using the recommended fit indices of a chi-square minimization *p* value greater than .05; a comparative fit index (CFI) greater than .95; and a root mean square error of approximation (RMSEA) less than .08 (Byrne, 2009; Kline, 2022).

CHAPTER III

RESULTS

Missing Data Analysis

In this study, we analyzed the available data up to March 2024. It is important to note that data collection is still ongoing, and therefore, some data points are currently missing. These missing data points will be included in future analyses once the data collection process is complete. However, it is always important to account for missing data and it is anticipated in the proposed study due to the high-risk sample. Little's missing completely at random (MCAR) test was conducted to assess for mechanisms of missingness. Little's MCAR test was conducted on all variables and indicated that data were missing completely at random, $\chi^2[115] = 167.15$, $p = .65$. Additionally, in examining the pattern for missing data, it was determined that the missing data resulted from ongoing data collection, and assuming that the missingness is dependent on the observed data rather than the missing data itself. As a result of meeting Little's MCAR assumptions, multiple imputation was deemed appropriate to assess linear growth modeling.

Full Information Maximum Likelihood (FIML) and Multiple Imputation (MI) were implemented in the analyses. FIML, which was applied to account for missing data in the growth model of aim 1, is a model-specific approach that estimates model parameters, maximizing the probability of the sample through estimation of the population variance-covariance matrix. While FIML has previously been reported to have convergence issues in small samples, latent covariances can be accurately estimated once N > 70 (Jia et al., 2014). MI is an approach that maximizes statistical power by preserving the original sample size by creating multiple datasets, each with imputed values for the missing data based upon the observed data and estimated relationship between variables. This approach was implemented to account for missing data in

the mediation model of aim 2. For these analyses, 100 datasets were created, using the average of these datasets using Bayesian analyses.

Hypothesis Testing

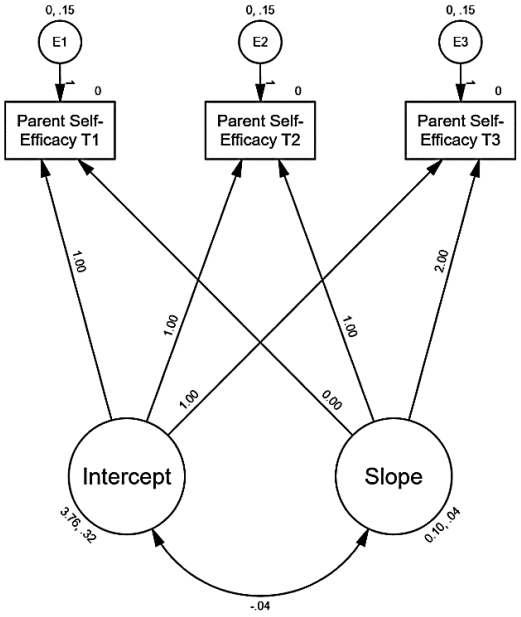
Aim 1

The first aim of the study focused on examining the FCU Online intervention and impacts on parenting self-efficacy, and it was hypothesized that the intervention group would see an increase in parenting self-efficacy in the two timepoints after the intervention was delivered. A growth model using structural equation modeling was used to examine the change over time of three timepoints for Parenting Self-Efficacy (see Figure 1). The Comparative Fit Index (CFI) of 0.86 and the Root Mean Square Error of Approximation (RMSEA) score of 0.20. While the Chi-Square test was significant, $\chi 2$ (3, 356) = 46.779, $p < 0.001$, this measure can be sensitive to sample size, so emphasis should not be placed upon this result (Bollen, 1990). Additionally, while this model did not meet the previously outlined fit indices for good model fit, there is variability in the research that suggests a more flexible interpretation of fit indices may be warranted, indicating that the model appears to be interpretable (Van Laar & Braeken, 2021).

The average score for the first timepoint on parent self-efficacy was 3.76 ($SE = 0.036$, $p < 0.01$; model intercept), and self-efficacy scores increased by an average of 0.10 at each subsequent wave ($SE = 0.02$, $p < 0.01$; model slope). This significant mean slope indicated that the entire sample increased by an average score of 0.1 point on the five-point scale of parent self-efficacy.

Figure 1

Model 1a Diagram

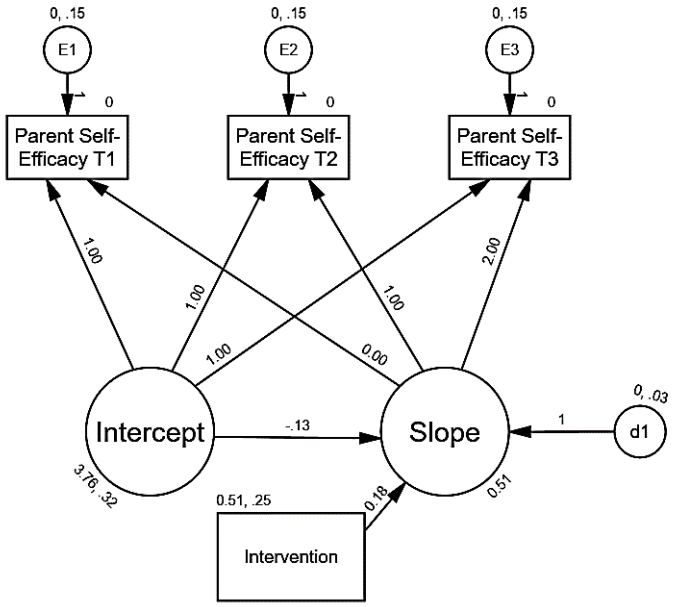


Next, the model was tested to account for the difference between the intervention and control group. The analysis identified a significant variance in slope (Variance 0.04, *SE* = 0.01, *p* = 0.002), indicating that there is significant variance among scores. To further investigate the nature of the variance between the control and intervention group, a secondary analysis that introduces the intervention condition was performed to predict slope variance (see Figure 2).

The CFI of this model was 0.87, and the RMSEA score of 0.16, suggesting a more adequate fit. While the fit indices were still below the previously reported guidelines for good model fit, this model had an increased fit from model 1, indicating it is appropriate to interpret the model given the same suggestion for flexibility in acceptable model fit indices (Van Laar & Braeken, 2021).

Figure 2.

Model 1b Diagram and Estimates.



This analysis revealed a significant mean difference in slope for the intervention (Estimate = 0.18, *SE* = 0.03, $p < 0.001$) and additionally significant variance between the intervention and control groups (Estimate = 0.25, *SE* = 0.02, $p < 0.01$) (See Tabe 1). This means that for each timepoint, the parent self-efficacy for the intervention group increased by an average of 0.51 in their parent self-efficacy score, or half a point, which was a significantly larger increase than the control group. These results suggest that the hypothesis of a significant change with intervention participants in Parent Self-Efficacy over time in comparison to control participants is supported. It is important to note that since variance within groups was again significant (Slope Variance .03, *SE* = 0.01, $p = 0.002$). This suggests that the intervention had differential effects on parent self-efficacy, with some parents showing greater improvements than others within both the intervention group.

Table 1

Model 1b Parameter Estimates

Parameter	Estimate	*SE*	C.R.	*p*-value
Regression Weights				
a. Intervention on Slope	0.18	.03	5.13	< .001
b. Intercept on Slope	-0.13	.04	-3.15	.002
Means				
a. Intercept	3.76	.04	104.30	< .001
b. Intervention	0.51	.03	19.05	< .001
Intercept				
a. Slope	0.51	.16	3.22	.001
Variances				
a. Intercept	0.32	.04	8.89	< .001
b. Intervention	0.03	.01	3.04	.002

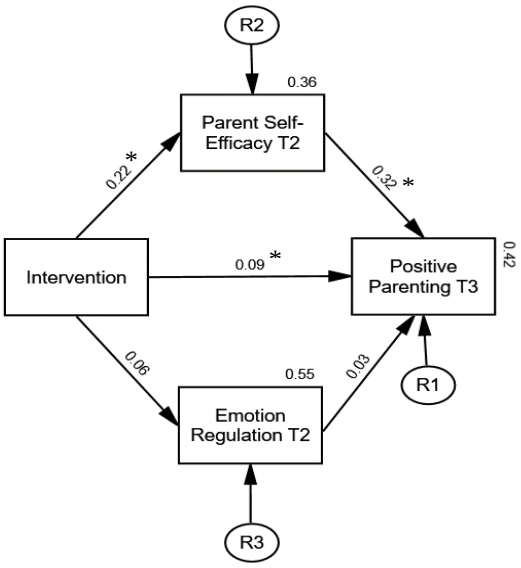
Aim 2

The second aim was to understand the relationship between how the mechanism of change constructs, Parent Self-Efficacy and Emotion Regulation, impacted the intervention outcomes, Positive Parenting Behavior, through a mediation analysis. It was hypothesized that the intervention effects on positive parenting behaviors would be completely mediated by increased parent self-efficacy and emotion regulation skills (see Figure 3). An SEM parallel mediation analysis was conducted to test this hypothesis. A fit analysis demonstrated a significant Chi-Square test $\chi 2$ (10, 356) = 22.395, p = 0.013, however this metric is sensitive to sample size, and other statistics demonstrated good model fit to the data: CFI = 0.98; RMSEA = .05. First, in examining direct effects, the intervention condition had a statistically significant effect on Positive Parenting Behavior at timepoint 3 (b = 1.00, SE = .45, p = .08).

The model mediation analysis showed that the association between the intervention and Parent Self-Efficacy at timepoint 2 was significant (b = 0.27, SE = .06, p < .001, .22), as was the indirect effect of the intervention on Parenting Behaviors at timepoint 3 through Parent Self-Efficacy at timepoint 2 (b = 2.78, SE = .38, p < .001). However, there was no significant association between the intervention and Parent Emotion Regulation (b = 1.20, SE = .76, p = .12, .06). Hayes & Rockwood (2017) suggest that modern criteria for bootstrapping approach include reporting the confidence intervals for the indirect effects. Thus, the specific indirect effect of the intervention on Parenting Behaviors at timepoint 3, through the mediated pathway of Parent Self-Efficacy was significant (b = 0.75, 95% CI = 0.33, 1.17). Lastly, these indirect effects through Parent Emotion Regulation were also non-significant (b = .01, 95% CI = -0.02, 0.13). Thus, our hypothesis was partially supported.

Figure 3.

Model 2 Diagram and Estimates. Estimates were pooled using MI datasets.



CHAPTER IV

DISCUSSION

Substance misuse impacts parents and their ability to care for their children through inappropriate parenting practices, difficulty responding to their child appropriately, and a lack of understanding of reasonable expectations for their child. Therefore, it is vital to develop effective interventions to support the unique needs of these parents and families. Parents with substance misuse, without intervention, have a higher risk of their child experiencing adverse developmental outcomes due to their parenting practices (Neger & Prinz, 2015). To mitigate these risks, it is imperative to develop effective interventions that focus on the specific needs and barriers that parents with substance misuse face in seeking support. The present study aimed to investigate the initial impact of the FCU Online, a digital health parenting intervention, tailored for parents with a history of substance misuse to provide a better understanding of the mechanisms to effectively change parenting practices through the construct of parent self-efficacy. Using structural equation modeling, the study addressed two main aims: (a) explore whether parent self-efficacy in the intervention group increases over three points compared to the control through growth modeling, and (b) test parent self-efficacy and emotion regulation as potential mechanisms of change in positive parenting practices.

The first aim of the study sought to assess the impact of the FCU Online intervention on parenting self-efficacy among parents with a history of substance misuse. The findings indicated that the slope for the growth model was significant, indicating that self-efficacy positively increased over the time. A secondary analysis indicated a significant mean difference between the intervention group and control group, indicating that the intervention group parents significantly increased in parent self-efficacy compared to parents who did not receive the

intervention. This finding aligns with previous research that has demonstrated the effectiveness of the FCU Online in improving parenting self-efficacy (Stormshak et al., 2019). The increase in parenting self-efficacy suggests that the intervention equipped parents with the skills and confidence needed to navigate the challenges of parenting, particularly in the context of substance misuse.

Previous studies have shown that parenting self-efficacy can have a positive impact on intervention engagement, as well as child outcomes (Albanese et al., 2019; Glatz et al., 2023). The improvement in parenting self-efficacy is noteworthy because it has been linked to positive parenting behaviors and child outcomes (Jones & Prinz, 2005). Parents who believe in their ability to effectively parent are more likely to engage in nurturing, responsive, and supportive parenting practices (Mouton et al., 2018). Therefore, the increase in parenting self-efficacy observed in this study suggests that the FCU Online may serve as a valuable tool for enhancing parenting skills and promoting a more positive parenting environment.

The second aim of the study explored the mediating role of parenting self-efficacy and parent emotion regulation plays in the impact of the intervention on positive parenting behavior. First, the results of direct intervention effects showed a statistically significant impact on positive parenting behaviors. Additionally, the results of the mediation analysis revealed that parenting self-efficacy partially mediated the relationship between the FCU Online and positive parenting behavior. In other words, parents who received the FCU Online intervention experienced an increase in parenting self-efficacy and were more likely to report an increase in positive parenting behaviors.

This finding underscores the importance of addressing parenting self-efficacy in interventions targeting parents with a history of misuse as a mechanism of change to improve

parenting behaviors. Improving parents' belief in their ability to effectively parent can lead to more positive interactions with their children, ultimately benefiting child outcomes. However, it is worth noting that the mediation analysis did not find a significant mediating role for emotion regulation in this context, suggesting that parenting self-efficacy may be a more prominent mechanism of change in this population. While research highlights parent emotion regulation as a key intervention target for parents with substance misuse (Pierro et al. 2015; Suchman et al., 2010; Suchman et al. 2011), evidence surrounding the impact of emotion regulation is scarce.

Implications

The results of this study have several implications for research and clinical practice with parents with a history of substance misuse. First, this study provides evidence for the effectiveness of digital health parenting interventions, like the FCU Online, in improving parenting self-efficacy and parenting behaviors to impact child wellbeing. Building upon previous research of the FCU online, this study found that a digital health model with telehealth coaching support was an effective intervention approach (Stormshak et al., 2019). This suggests that digital health platforms can be a valuable tool for reaching and supporting high-risk populations, especially in areas with limited access to in-person services. Moreno-Chaparro and colleagues (2022) highlighted the effectiveness of digital health intervention delivery in supporting families, and the results of this study demonstrate that parental self-efficacy can positively influence parenting behaviors via this model.

The study also highlights the significance of addressing parenting self-efficacy in interventions aimed at parents with substance misuse histories. Enhancing parents' confidence in their parenting abilities can lead to an increase in positive parenting behaviors, which can benefit children's development and well-being (Stormshak et al., 2019). As these parents face many

unique challenges related to parenting and overcoming barriers to treatment, addressing these through tailored treatment to increase both parenting behaviors as well as self-efficacy is essential. Specifically, parents with substance misuse often face increased stress and emotion dysregulation that increase the likelihood of engaging in coercive or harmful parenting practices (Dyba et al., 2023; Rizzo et al., 2014). Interventions that boost parent self-efficacy can help to mitigate these risks and support more engagement in the use of effective parenting strategies, to provide better outcomes for their children.

Given the potential long-term consequences of parental substance misuse on children's development, early intervention and support for families are crucial. The positive impact of the FCU Online on parenting self-efficacy suggests that early intervention efforts can make a difference in the lives of families to support healthy development of children. Specifically, early intervention can help to mitigate developmental risks that children of parents with substance misuse often experience and set them up for more successful adjustment into childhood and adolescence.

Limitations and Recommendations for Future Research

It is important to acknowledge the limitations of this study. First, the study relied on self-report measures due to the digital health model and lack of observable data. However, self-report measures are vulnerable to social desirability bias, potentially impacting the accuracy of reported behaviors and outcomes. To mitigate this limitation, future research could incorporate observational measures of parenting behaviors, as utilized in the traditional FCU intervention, offering a more holistic assessment of intervention effectiveness.

As this was an initial investigation that used a smaller sample of a dataset with ongoing data collection, another limitation is the clarity of the results of this analysis as they apply to the

full sample. For this dissertation, analysis was completed using three of the four datapoints, meaning that the results do not incorporate the long post-intervention effects from a year. Additionally, attrition at the third timepoint was also correlated with the ongoing data collection. Upon completion of data collection, it is important to re-analyze these models to determine the full effect of the intervention through the 12-month timeframe.

Further, the study examined the short-term effects of the intervention, highlighting the impact directly after implementation. For this analysis, data was collected after intervention and at a three-month follow-up post-intervention. While these results are important in intervention evaluation, longitudinal data could provide further insights into understanding if these gains are sustained and maintained for a longer-term impact. Given previous evidence of the long-term impact of traditional FCU model, paired with access to the online program, there is suggestion that behavior improvements could be maintained at the 9-month follow-up. Building on the findings of this study, future research could explore the long-term impact of the FCU Online intervention on both parenting outcomes and child well-being.

Additionally, investigating the experiences and perspectives of parents who participated in the intervention could provide valuable insights into the acceptability and feasibility of digital health parenting interventions in this population. Understanding parental experiences, challenges, and perceptions could inform the refinement of intervention delivery methods, ensuring greater accessibility and effectiveness for diverse populations. This qualitative approach would enrich our understanding of the intervention's real-world applicability and inform future implementation strategies aimed at maximizing its reach and impact.

Finally, this analysis aimed to evaluate the overall effectiveness of the evaluation. In future research, it would be important to further investigate the effectiveness of the FCU Online

for diverse populations, to better understand for whom the intervention is effective. This next step would be important for potential needed cultural adaptations that may be needed to support a wider effect across diverse communities.

Conclusion

This study examined the initial impact of a digital health parenting intervention tailored for parents with a history of substance misuse through the key outcomes of self-efficacy and positive parenting behaviors. The results contribute to our understanding of how digital health parenting interventions can support parents with substance misuse. The positive effects on parenting self-efficacy and the mediation of positive parenting behaviors suggest that interventions like the FCU Online hold promise for improving family functioning and ultimately benefiting the well-being of children in these high-risk families.

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