

Parents' Perceptions of Adherence to Pediatric Physical Therapy Home Exercise Program

Submitted by

Richard C. Narvadez

A Dissertation Presented in Partial Fulfillment  
of the Requirements for the Degree  
Doctorate of Philosophy

Grand Canyon University

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Approved

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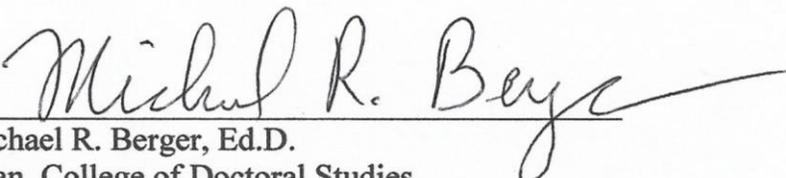
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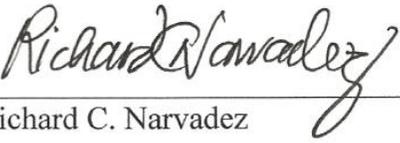
  
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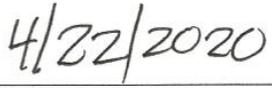
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## Abstract

In pediatric physical therapy, parents' adherence to home exercise programs (HEPs) for their children is suboptimal. The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. Rizzo's mental models of physical therapy patient adherence to HEP served as the theoretical foundation for this study. Ten adult parents of children aged 18 months to 11 years old who were under outpatient physical therapy in a suburban region in a southern state of the United States participated in semi-structured phone interviews and written sentence completion tasks. Data analysis employed qualitative content analysis according to Schreier's approach. The four concept-driven primary categories of the study's coding frame were knowledge of adherence to HEP, beliefs about adherence to HEP, attitudes about adherence to HEP, and prior experience. The results of this study support the exploration of parents' mental models of adherence to HEPs and consideration of prior adherence experiences. Improved HEP education and prescription, and support to make HEP adherence a routine may improve parents' adherence to HEPs.

*Keywords:* Home exercise program, exercise adherence, pediatric physical therapy, mental models, prior experience

## Dedication

I dedicate this dissertation to my grandmother Encarnacion, who passed away before I graduated from high school. My grandma had always wanted for at least one of her six grandchildren to become a doctor someday. In her memory, I made a promise to myself that I will be the one to give her the title of a doctor in the family. Years after, I tried but failed to become a medical doctor. In 2009, I earned my clinical doctorate in physical therapy. In 2020, I obtained my academic doctorate in performance psychology. I dedicate both doctoral degrees to her, my loving grandmother. Lola, I miss you, I love you, I hope I made you proud, and I wish you happiness and peace in eternity.

## Acknowledgments

To all the members of my dissertation committee, thank you for making this dissertation the best that it could. Dr. Seymour, I wholeheartedly appreciate your unwavering support, guidance, and expertise. You stayed as my Chair from start to finish, and your kind words and encouragement helped me keep moving forward in this journey. Dr. Rizzo, you are the best Content Expert for my study, and I genuinely appreciate your time and talent shared in this project. Your original work made this dissertation possible, and I am proud to follow your footsteps in addressing the home exercise program adherence issue in physical therapy. Dr. Johnson, thank you for being the Methodologist of this study. Your approval of the study methods is appreciated. Thank you, Dr. Newman-Lee, my Academic Quality Reviewer, for believing in my study and for helping me overcome the obstacles that came my way.

Thank you, Rick, my understanding and supportive husband and best friend, who stayed with me through the ups and downs of this long journey. Thank you for allowing me to take this challenge. I know it was a lot on you, too. Your love and company helped me make it through. My success is yours, and yours is mine. We made it!

To all the clinic administrators/directors, thank you for your help in repetitively writing the site authorization letters and for supporting this study by allowing me access to the study participants. Finally, thank you to all the participants of this study. Your voluntary participation helped make this dissertation possible, and your precious words allowed me to add new knowledge to the field of pediatric physical therapy.

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## Chapter 1: Introduction to the Study

### Introduction

A home exercise program (HEP) is an essential component of an effective physical therapy intervention (Ashari, Hamid, Hussain, & Hill, 2016). In the field of physical rehabilitation, physical therapists believe in the benefits of HEPs, and most prescribe HEPs to their patients as a standard of care to complement face-to-face direct interventions (Picha & Howell, 2018; Serpanou, Sakellari, Psychogiou, Zyga, & Sapountzi-Krepia, 2019). Provision of HEPs fits the modern healthcare system which emphasizes cost-effective delivery of services and measurable improvements in clinical outcomes (World Confederation for Physical Therapy, 2017). Strong evidence supports the positive effects of HEPs to adult patients who need physical rehabilitation (Anwer, Alghadir, & Brismée, 2016). In the pediatric population, home-based exercises promote improvement in functional performance among children with disabilities (Ferre et al., 2017). Optimal adherence to the prescribed HEPs is important so that patients may receive the full benefits of physical therapy.

Despite the value of HEPs to rehabilitation outcome, the level of adherence to HEPs is unsatisfactory in the general adult patient population (Azevedo et al., 2018; Miller, Porter, DeBaun-Sprague, Van Puymbroeck, & Schmid, 2017). Likewise, the level of adherence to HEPs in the pediatric population is unsatisfactory as parents of children receiving physical therapy routinely fail to complete the prescribed duration and frequency of exercises necessary to obtain the best outcome for their children (Houghton et al., 2018; Medina-Mirapeix et al., 2017). Tanner, Sencer, and Hooke (2017) stated that a significant gap in empirical knowledge exists in understanding adherence to physical

therapy HEPs in the pediatric population. Similarly, Medina-Mirapeix et al. (2017) recommended that more research is needed to understand factors determining adherence to physical therapy HEPs in children with disabilities. The studies of Medina-Mirapeix et al. (2017) and Tanner et al. (2017) support the need for empirical studies that aim to understand adherence to HEPs among parents of children receiving physical therapy.

Patients who present to physical therapy for the treatment of existing physical conditions also present with behavioral predispositions as a result of their prior experiences. According to John-Henderson (2015), prior life experiences shape patients' cognitions and exert a strong influence on the treatment decisions they make. In physical therapy, these decisions relate to whether to adhere to advice and HEPs they received from physical therapists (Rizzo, 2015). Exploration of patients' prior adherence behaviors is one of Bachmann, Oesch, and Bachmann's (2018) recommendations to physical therapists who wish to improve their patients' level of adherence to HEPs. Moreover, Rizzo and Bell (2018) recommended that further research is needed to support physical therapy HEP adherence interventions in ways that target perceptions, values, and expectations based on prior adherence experiences. A synthesis of the above-stated recommendations for future research (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017) reveals a gap in the pediatric physical therapy HEP adherence literature exploring parents' perceptions of adherence with an emphasis on their prior adherence experiences. This dissertation study aimed to fill this gap by exploring perceptions of adherence to HEPs from parents of children who receive physical therapy. Addressing this gap will contribute to the promotion of HEP adherence among parents of

children with physical therapy needs which may lead ultimately to the improvement of clinical outcomes for this physical therapy patient population.

This dissertation study used a qualitative methodology with a descriptive design to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences in a suburban region in a southern state of the United States. The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). This study explored the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using a theoretical model that highlights the role of prior experiences on exercise adherence (Rizzo, 2015). This phenomenon was important in the promotion of parent HEP adherence behaviors which might translate to the improvement of clinical outcomes among pediatric patients receiving physical therapy. This study was positioned to be the first to apply Rizzo's (2015) theoretical model in the field of pediatric physical therapy.

Chapter 1 presents the summative description of this study to give readers a focused understanding of the background information and gap in the literature that led to the study. It also delineates the study's problem statement, purpose statement, research questions, and methodology. Furthermore, it presents a concise overview of the significance of this study to the society given its limitations and delimitations. This

chapter is a prelude to the detailed discussion of the literature review in Chapter 2 and methodology in Chapter 3.

### **Background of the Study**

Adherence is a key concept to the success of medical interventions, including physical therapy. According to the World Health Organization (2003), patient adherence to healthcare recommendations is “the extent to which a person’s behaviour ... corresponds with agreed recommendations from a health care provider.” For children with long-term medical conditions, non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure (WHO, 2003). In pediatric physical therapy, evidence shows that parents’ adherence to the prescribed HEPs is suboptimal (Başaran, Karadavut, Üneri, Balbaloğlu, & Atasoy, 2014; Medina-Mirapeix et al., 2017; Rone-Adams, Stern, & Walker, 2004). This societal problem achieves a heightened significance when considering that failure to achieve optimal outcomes in pediatric physical therapy now may have negative repercussions on the quality of life of these children in the future. Thus, exercise adherence has been a topic of research in the field of physical therapy.

Research on the important role of prior experiences in patients’ healthcare behaviors is emerging in physical therapy. In the adult literature regarding factors that influence adherence to physical therapy home exercises, Bachmann et al. (2018) recommended that physical therapists explore patients’ prior adherence to home exercises to understand their current and future adherence behaviors. In another study, Ormel et al. (2018) identified previous exercise experience as one of the predictors of current adherence to prescribed exercises. Earlier studies on physical therapy HEP adherence

found that prior adherence behavior predicted future adherence behaviors (Alewijne, Mesters, Metsemakers, & Van Den Borne, 2003; Schoo, Morris, & Bui, 2005). In 2015, Rizzo created the mental models of physical therapy patient adherence to HEP—an application of the concept of mental models from social sciences to physical therapy in the area of exercise adherence. According to Rizzo (2015), patients hold mental models of how physical therapy intervention works and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. Mental models of adherence to HEP are patients' perceptions, values, and expectations about the exercises they received as recommendations from physical therapists (Rizzo, 2015). Figure 1 below illustrates Rizzo's model showing the mental model formation and its influence on decision-making (Rizzo, 2015). Rizzo and Bell (2018) used Rizzo's (2015) theoretical model to describe the parallels between physical therapy patients' experience with adherence to HEP and prior adherence experiences in personal routines or regimens. To date, the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) has been applied to adult physical therapy and yet to find application in the field of pediatric physical therapy.

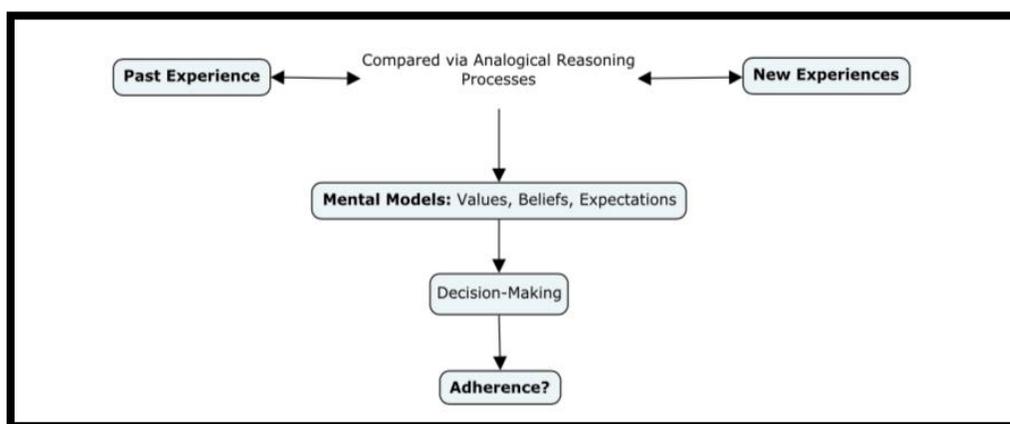


Figure 1. Mental model formation and influence on decision-making.

In the pediatric population, researchers have explored the reasons for general medical treatment non-adherence from the perspectives of caregivers of children with long-term conditions (Santer, Ring, Yardley, Geraghty, & Wyke, 2014). Evidence shows that parents' adherence to the prescribed HEPs is suboptimal in pediatric physical therapy (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004).

According to Tanner et al. (2017), a significant gap in knowledge exists in understanding parent adherence to pediatric physical therapy HEPs. On the other hand, Medina-Mirapeix et al. (2017) recommended that more research is needed to understand factors determining adherence to physical therapy HEPs in children with disabilities (Medina-Mirapeix et al., 2017). Given the emerging interest on the role of prior experiences in patients' treatment behaviors in physical therapy and the existing gap on understanding parent adherence to pediatric physical therapy HEPs, a pathway exists to understanding parent adherence to HEPs with consideration of parents' prior adherence experiences. Using Rizzo's (2015) theoretical framework, this study was poised to address the existing gap in the pediatric physical therapy HEP adherence literature by exploring parents' perceptions of adherence to pediatric physical therapy HEPs with an emphasis on their prior adherence experiences. This endeavor aimed to benefit the promotion of parent adherence to HEPs that might potentially improve clinical rehabilitation outcomes for children receiving physical therapy.

### **Problem Statement**

The problem this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to

understand parent perceptions to ultimately improve parent adherence to HEPs. The parents' perceptions (i.e., knowledge, beliefs, and attitudes) about adherence to HEPs are their mental models of adherence to HEPs which influence their adherence decisions and behavior. Following the tenets of Rizzo's (2015) theoretical model, it was a primary goal of this study to explore parents' prior experiences which led to these perceptions. This problem emerged from the gap in the literature on physical therapy HEP adherence. Despite the numerous studies on the topic of exercise adherence, more information is needed to know how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). The general population affected by this problem consisted of all parents of children receiving physical therapy in the United States. Addressing this problem will contribute to the promotion of HEP adherence among parents of children with physical therapy needs which may lead to the improvement of clinical outcomes for this physical therapy patient population.

The individual parents of children receiving physical therapy were the unit of analysis of this study. Family-centered care is at the heart of healthcare interventions on children (Coyne, Holmström, & Söderbäck, 2018). In this healthcare model, the family is central in the child's life, and parents assume the important caregiving role for their children. Healthcare providers, including physical therapists, design intervention plans according to the priorities of the parents (Coyne et al., 2018). Exercise prescription following a family-centered model considers the perspectives of parents in all healthcare interventions (Coyne et al., 2018). In the context of pediatric physical therapy, parents are

responsible for performing the HEPs that physical therapists prescribe to children (Picha & Howell, 2018). Having parents as the unit of analysis for this study aligned well with the problem that this study aimed to address and the purpose it wanted to achieve.

The purpose of this study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. Based on this aim, this study was unique as it joined the growing interest on the role of prior experiences in patients' treatment behaviors in physical therapy by adopting a new theoretical framework (Rizzo, 2015) which considers prior adherence experiences. Non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure in children with long-term medical conditions (WHO, 2003). In pediatric physical therapy, evidence shows that parents' adherence to the prescribed HEPs is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). This study was timely and significant, as it took the opportunity to contribute to filling a significant gap in knowledge in understanding adherence to physical therapy HEPs in the pediatric population (Tanner et al., 2017). As discussed, there is evidence that parents do not adhere optimally to physical therapy HEPs and it is worthwhile to learn more about this problem to improve parents' HEP adherence levels. In addressing this problem, this study contributed to the field of pediatric physical therapy concerning the improvement of the assessment of parents' adherence behavior, and the development of effective strategies to improve this parent behavior to ultimately improve the clinical rehabilitation outcomes for their children.

## **Purpose of the Study**

The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of the United States. This purpose directly reflected the problem that this study aimed to address. A gap in the literature exists in how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). This study explored the phenomenon of understanding parents' perceptions, in the form of knowledge, beliefs, attitudes about adherence to pediatric physical therapy HEPs, which might benefit the promotion of HEP adherence among parents, and ultimately lead to the improvement of clinical outcomes for their children.

This study used a qualitative methodology to explore the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. According to Patton (2015), researchers use qualitative research methodology to explore and understand the meaning and perspectives that people construct of their experiences and the context within which these experiences unfold. A qualitative research approach served the purpose of this study as it aimed for a detailed description of parents' perceptions of adherence to HEPs. This study explored the phenomenon of understanding parents' perceptions of adherence to pediatric

physical therapy HEPs using a theoretical model that considers the role of prior experiences on exercise adherence (Rizzo, 2015).

The goal of this study was detailed exploration of important parent perceptions of adherence to HEPs that might explain their adherence behaviors to the prescribed HEPs. More specifically, it was interesting to know how parents describe their knowledge and understanding of adherence to the prescribed HEPs and the HEP itself, as adequate knowledge of the details of the HEPs and how to perform the exercises properly relates to better adherence to such regimen (Saner, Bergman, de Bie, & Sieben, 2018). It was also the goal of this study to explore parents' beliefs about the HEPs, its importance and benefits to the physical rehabilitation of their children, and whether these beliefs were conducive or not to optimum adherence to HEPs. It was equally important to understand whether parents had positive or negative attitudes about the prescribed HEPs, which might explain their HEP adherence. The parents' knowledge, beliefs, and attitudes about adherence to the HEPs were their mental models of adherence to the HEPs, which influence their adherence decisions and behaviors (Rizzo, 2015). Following the tenets of Rizzo's (2015) theoretical model, it was a primary goal of this study to explore parents' prior experiences which led to these perceptions. Understanding parents' mental models of adherence to pediatric physical therapy HEPs based on prior experiences might contribute important knowledge to the existing literature on rehabilitation strategies aimed to improve parent adherence in the pediatric physical therapy patient population.

From the general population of all parents of children receiving physical therapy in the United States, this study focused on parents of children who had been prescribed a HEP by physical therapists and living in a suburban region in a southern state of the

United States. This target population provided the qualitative data needed to understand the phenomenon of this study. This study used a convenience sampling strategy (Patton, 2015) to find participants who represented the target population appropriately and met the purpose of this study sufficiently. Given its purpose and target population, this study aimed to contribute to the field of pediatric physical therapy by improving clinical strategies that might affect positively the clinical rehabilitation outcomes among children with physical therapy needs.

### **Research Questions**

This study asked two research questions to explore the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. The researcher used these research questions to address what was yet unknown on how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). In this study, the parents' perceptions were their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs for their children. The following research questions guided this qualitative descriptive study:

RQ1: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

RQ2: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

The theoretical foundation that grounded this study was the mental models of physical therapy patient adherence to HEP (Rizzo, 2015). According to Rizzo (2015), patients hold mental models of how physical therapy intervention works and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. In the context of this study, the physical therapy recommendation of interest was to adhere to the physical therapist-prescribed HEPs. Based on Rizzo's framework, prior adherence experiences help shape patients' mental models which influence their adherence behavior to the prescribed HEPs. Mental models refer to a collection of implicit knowledge, beliefs, attitudes, values, and expectations that people have about the world around them (Johnson-Laird, 1983). Johnson-Laird (1983) conceptualized mental models as a human cognitive process which is dynamic and wholly formed by prior learning experiences. According to Rizzo (2015), when a new experience presents in life, an individual seeks memories of prior experiences of the similar event, implicitly compares the present and prior experiences via analogical reasoning, and then forms a mental model of that new experience. This new mental model will then become the basis for one's thinking and decision-making about the new experience. For this study, the mental model of interest was adherence to physical therapy HEPs.

The research questions of this study reflected the constructs of the mental models of physical therapy patient adherence to HEP (Rizzo, 2015). This theoretical model links patients' mental models, prior experiences, and current physical therapy exercise adherence behavior. The first research question asked about parents' knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. Knowledge, beliefs,

and attitudes are cognitive constructs that comprise mental models (Johnson-Laird, 1983). The second research question asked about parents' prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. The parents' prior adherence experiences represented the prior experiences component of the Rizzo's (2015) theoretical model.

In this study, the parents' perceptions were in the form of knowledge, beliefs, and attitudes about adherence to prescribed exercises for their children. This study used qualitative description to gain an in-depth understanding of parents' knowledge, beliefs, and attitudes about adherence to the HEPs that physical therapists prescribed. The research questions guided the selection of the sources of data for this study. The sources of data were individual, semi-structured phone interviews with open-ended questions and written sentence completion tasks.

### **Advancing Scientific Knowledge and Significance of the Study**

This study addressed the existing gap in exercise adherence literature by exploring parents' perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. A gap in the literature on exercise adherence exists in how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). This study addressed this gap using a qualitative descriptive design that collected data from semi-structured phone interviews and sentence completion tasks. The stated gap in the literature informed the research problem which this study addressed using two

research questions framed by the mental models of physical therapy patient adherence to HEP (Rizzo, 2015).

Researchers in the field of pediatric physical therapy have explored parents' perspectives of adherence to HEPs in various ways (Birt, Pfeil, MacGregor, Armon, & Poland, 2014; Lillo-Navarro et al., 2015; Santer et al., 2014). For example, Lillo-Navarro et al. (2015) explored parents' perceptions of adherence to the physical therapist-prescribed HEPs using focus groups and reported findings limited to the characteristics of the HEPs and the teaching style of the physical therapists. Other researchers have explored the predictors of adherence to HEPs (Medina-Mirapeix et al., 2017), caregiver stress and burn-out (Başaran et al., 2014), parental well-being (Williams & Burnfield, 2019), parents' preferences (Gal & Steinberg, 2018; Lillo-Navarro et al., 2015), and psychosocial factors related to motivation (Bérubé, Cloutier-Bergeron, Amesse, & Sultan, 2017). Despite existing research on adherence to HEPs, Tanner et al. (2017) believed that a lot is still unknown about adherence to pediatric physical therapy. The results of this study contributed to the existing body of literature on pediatric HEP adherence by considering the role of prior experiences on parents' adherence behavior according to the new theoretical model of physical therapy patient HEP adherence (Rizzo, 2015).

Non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure in children with long-term medical conditions (WHO, 2003). In pediatric physical therapy, evidence shows that parents' adherence to the prescribed HEPs is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). This healthcare problem achieves a heightened societal

significance when considering that failure to achieve optimal outcomes in pediatric physical therapy now may have negative repercussions on the quality of life of these children in the future. This study is timely and significant, given the emerging interest on the important role of prior experiences in patients' adherence behaviors in physical therapy (Alewijnse et al., 2003; Bachmann et al., 2018; Ormel et al., 2018; Rizzo & Bell, 2018; Schoo et al., 2005), providing an opportunity to contribute to filling a significant gap in knowledge in understanding adherence to physical therapy HEPs in the pediatric population (Tanner et al., 2017). As discussed, there is evidence that parents do not adhere optimally to physical therapy HEPs and it is worthwhile to learn more about this problem to improve parents' HEP adherence levels. By addressing this problem, this study contributed to the field of pediatric physical therapy concerning the improvement of the assessment of parents' adherence behavior, and the development of effective strategies to improve this parent behavior. Subsequently, this study had the potential to contribute to the promotion of quality of life for children with physical therapy needs.

In 2015, Rizzo created the mental models of physical therapy patient adherence to HEP—an application of the concept of mental models from social sciences to physical therapy in the area of exercise adherence. According to Rizzo (2015), patients hold mental models of how physical therapy intervention works and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. Mental models of adherence to HEPs are patients' perceptions, values, and expectations about the exercises they received as recommendations from physical therapists (Rizzo, 2015). Rizzo and Bell (2018) used Rizzo's (2015) theoretical model to understand HEP adherence among adult physical therapy patients with acute orthopedic

conditions. To date, the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) has been applied to adult physical therapy and yet to find application in the field of pediatric physical therapy. This study was the first study to extend the application of Rizzo's (2015) theoretical model in pediatric physical therapy.

### **Rationale for Methodology**

A qualitative methodology is a suitable research methodology to achieve the goal of understanding a phenomenon (Patton, 2015). For this study, the phenomenon of interest was understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. Qualitative methodology guides researchers who pursue the goal of understanding the meaning of human actions (Schwandt, 2007). The human action of interest for this study is adherence to the prescribed HEPs. Parents' adherence to the prescribed HEPs reflected in the study's two research questions: (a) How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?, and (b) How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? A qualitative methodology fitted this study based on the phenomenon and the research questions it wanted to address.

According to Patton (2015), researchers use qualitative research methodology to explore and understand the meaning and perspectives that people construct of their experiences and the context within which these experiences unfold. The problem this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with

an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. This study explored, understood, interpreted, and described in detail the parents' perceptions of adherence to pediatric physical therapy HEPs to address the stated problem statement. Whereas a quantitative methodology employs statistical calculations on numbers and variables, a qualitative methodology gives credence on the meaning of participants' words (Schwandt, 2007). Schwandt (2007) described qualitative data as data which take the form of words, and which researchers acquire using qualitative methods. For this study, the nonnumerical qualitative data came from semi-structured phone interviews with open-ended questions and sentence completion tasks. Future quantitative survey studies might build upon the results of this qualitative study as the key parent perceptions of adherence to HEPs were identified, in the form of knowledge, beliefs, and attitudes. A qualitative methodology suited this study based on its problem statement and the types of data it used to address this problem.

This study did not pursue a quantitative methodology for several reasons. It was not the intent of this study to collect numerical data to answer the study's research questions (Guest, Namey, & Mitchell, 2013). The focus of this study was to understand a phenomenon and not to conduct an experiment nor test a hypothesis requiring the strict control of participant behaviors (Yin, 2014). Furthermore, this study focused on description and interpretation of the meaning of participants' words as a reflection of their experience of adherence to HEPs, and not on knowing the effects of adherence interventions (Gal & Steinberg, 2018), quantifying adherence levels (Kruger et al., 2018), nor finding relationships between adherence-related variables (Başaran et al., 2014;

Lonsdale et al., 2017; Nava-Bringas, Roeniger-Desatnik, Arellano-Hernández, & Cruz-Medina, 2016). These reasons justified that qualitative methodology was, indeed, the appropriate methodology to explore and understand parents' perceptions of adherence to pediatric physical therapy HEPs.

### **Nature of the Research Design for the Study**

This study used a qualitative descriptive design. This research design combines the balance between description and interpretation sought by researchers who seek to describe an individual's perceptions of an experience or a phenomenon (Sandelowski, 2000). Qualitative description is a valuable method of accurately presenting the facts of an event, a case, or a phenomenon in a naturalistic manner (Sandelowski, 2000).

Qualitative researchers who employ this design render the meanings that participants express in words in a manner that matches everyday language (Sandelowski, 2000).

Likewise, qualitative descriptive researchers filter the description and interpretation of data according to a preset theoretical framework. In this study, this framework was Rizzo's (2015) mental models of physical therapy patient adherence to HEP.

Qualitative description allows a straightforward yet comprehensive description of participants' views (Sandelowski, 2000). Researchers in the healthcare field have used qualitative description to explore patient and clinician experiences, perceptions, and beliefs (Cheng, Klainin-Yobas, Holyroyd, & Lopez, 2018; Marshall, Forgeron, Harrison, & Young, 2018). Although this study is within the field of physical therapy, it was not healthcare clinical study. The purpose of this study was to explore parents' description of their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately

improve parent adherence to HEPs. The target population of interest for this study consisted of parents or legal guardians of children who had been prescribed a HEP by physical therapists or physical therapist assistants and living in a suburban region in a southern state of the United States. Accordingly, the individual parents or legal guardians of children receiving physical therapy were the unit of observation for this study. Qualitative description allowed for a comprehensive analysis of parents' description of their perceptions about HEP adherence.

Ten parents of children aged between 18 months old to 11 years old who were under outpatient physical therapy services who had been prescribed a HEP by physical therapists or physical therapist assistants and living in a suburban region in a southern state of the United States comprised the final sample for this study. The goal of this qualitative study was to describe parents' perceptions of adherence to the prescribed pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. A sample of 10 participants met GCU guidelines on the minimum final sample size for a qualitative study with a descriptive design.

In this study, the parents' perceptions were in the form of knowledge, beliefs, and attitudes about adherence to the prescribed HEPs for their children. This study collected qualitative data on parents' perceptions of adherence to HEPs from semi-structured phone interviews using an interview guide and written sentence completion tasks to answer the research questions. Data collection proceeded after GCU IRB approval of study. Using convenience sampling strategy (Patton, 2015), the researcher recruited participants from six outpatient rehabilitation facilities in the target location. With written

informed consent, all respondents to invitations to participate in research using recruitment posters were interviewed by phone while at home or in their preferred environment to prevent undue hardships of attending interview somewhere else. Audio-recorded semi-structured phone interviews with open-ended questions were the first source of data for this study. In addition, participants completed a written sentence completion task as the second source of data to describe their opinions and experiences in writing.

Qualitative description of parents' perceptions of adherence to the prescribed HEPs was the aim of this study. This study did not explore the essence of the lived experience of the participants as in phenomenology (Merriam & Tisdell, 2016). This study did not explore the narrative stories of parents' life events and episodes as in narrative inquiry (Merriam & Tisdell, 2016). Still, this study did not take a case study design approach to evaluate a physical therapy process or program in-depth using multiple sources of data (Yin, 2014). Nor this study aimed to develop a theory or model using iterative data collection techniques to describe the phenomenon of adherence to HEPs as in grounded theory inquiries (Merriam & Tisdell, 2016). Rather, this study aimed to describe the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using a framework that considers the role of prior experiences on exercise adherence (Rizzo, 2015). Therefore, the qualitative descriptive design was the appropriate research design for this study according to the goal that it hoped to achieve.

## Definition of Terms

This section details the important terms and phrases to provide a common understanding of how the researcher used these terms and phrases within the scope of this study.

**Adherence.** Adherence is the extent to which a patient's behavior coincides with the healthcare provider's recommendations which the patient agrees to follow (WHO, 2003). Adherence is synonymous with compliance (Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). However, compliance has negative connotations as it denotes submission of a patient to a healthcare provider (Vermeire et al., 2001). Adherence is the preferred term over compliance as it emphasizes that adherence involves an active partnership between the healthcare provider and the patient, and reduces attribution of greater power to the clinician in a patient-clinician relationship (Vermeire et al., 2001).

**Exercise.** Exercise refers to any planned, structured, and repetitive body movements that an individual performs to relieve symptoms, improve function or physical fitness, or minimize the deterioration of health (Voinea, 2018). Exercise is not synonymous with physical activity, but a subset of physical activity (Rivera-Torres, Fahey, & Rivera, 2019).

**Home exercise program.** Home exercise program (home-based exercise program, home-based program, or home program) refers to a set of exercise instructions or routines that rehabilitation professionals such as physical therapists and physical therapist assistants prescribe patients to perform outside of the therapy setting or therapy visit (Bachmann et al., 2018; Nava-Bringas et al., 2016). Each program is different for every patient, and consists of exercises with specific instructions on the type and number of

exercises to perform, how often and how long during a given time such as per day or per week. A patient may perform the HEP at home during and after the rehabilitation episode with or without the supervision of the rehabilitation provider (Bachmann et al., 2018).

***Mental models theory.*** Mental models theory, as proposed by Johnson-Laird (1983), posits that human beings understand the world by creating representations or models of objects and events of the world in their minds. According to Johnson-Laird (1983), mental models are simple, often incomplete, dynamic cognitive structures which contain identical elements of the phenomenon or reality that they represent. This theory is a reasoning theory which explains that human beings understand the meaning of everyday phenomenon or reality by creating and manipulating the mental models of the same phenomenon or reality in their minds.

***Pediatric physical therapy.*** Pediatric physical therapy is a specialized area of practice within the field of physical therapy which focuses on children (Anderson, Furze, & Moore, 2019). Pediatric physical therapists and physical therapist assistants are healthcare providers who work with children and their families so that children can reach their full functional potential in participation in home, school, and community activities (Academy of Pediatric Physical Therapy, 2009).

### **Assumptions, Limitations, Delimitations**

This qualitative descriptive study acknowledged important assumptions, limitations, and delimitations related to methodology. This section delineates these assumptions, limitations, and delimitations and explains the rationale for each of them.

**Assumptions.** Assumptions are beliefs that researchers assume as true in the conduct of research (Armstrong & Kepler, 2018). In this study, the researcher assumed

that the participants answered all interview questions and completed the sentence completion task form honestly. Participants in this study signed an informed consent, which was an attestation to their understanding that participation in this study was voluntary and confidential. In addition, the researcher assumed that the interview guide and sentence completion task form were effective in extracting participant responses that answered the research questions of this study sufficiently. The interview guide and sentence completion task form underwent prior credibility testing procedures before use for data collection.

**Limitations.** Limitations in research refer to systematic biases that are beyond the control of the researcher and have the potential to affect the results of the study (Price & Murnan, 2004). Based on research methodology, the findings of this qualitative study were not expected to generalize to the general population of parents or legal guardians of children who receive physical therapy in the United States as statistical generalization is not a goal of qualitative inquiries (Yin, 2014). The characteristics and motivations of the participants were another limitation of this study. It is possible that the parents who agreed to participate in this study were the ones who were highly adherent to the prescribed HEPs. In such case, the resultant corpus of data for this study, therefore, may not have included the views of those who were less adherent to the HEPs.

A major part of the collected data in this study were products of participants' recall of events and situations which occurred in the past. Therefore, participant recall bias was another limitation, which was beyond the control of the researcher. Social desirability bias among interviewees exists (Guest et al., 2013) and may have led to dishonest responses during the phone interviews. In this study, collecting another source

of qualitative data using a sentence completion task completed on a different day as the interview helped to mitigate social desirability bias to add credibility in understanding parents' perceptions of adherence to the HEPs. Finally, the sample size of this qualitative study was small. With 10 participants in the final sample, this study met the minimum GCU requirement for sample size but did not benefit from the richness and depth of data that could have come from having a larger sample size. This limitation, however, was mitigated by a large volume of data collected in the phone interviews, which far exceeded the GCU minimum requirement.

**Delimitations.** Delimitations refer to systematic biases that researchers introduce into the research design and instruments intentionally and therefore have control over (Price & Murnan, 2004). Participant selection was a source of delimitation for this study as only parents who speak, read, and write English participated, missing the views of those who do not speak, read, and write the language well. The use of qualitative content analysis (QCA) approach in data analysis was another source of delimitation. According to Schreier (2012), QCA discards irrelevant parts of the data as it focuses only on relevant parts of the data that answer the research questions. This study followed the guidelines of Schreier (2012) in conducting QCA to maintain focus only on contents that answered the study's research questions.

Data collection in the form of phone interviews was another delimitation of this study. By using the telephone to gather interview data, this study limited the researcher's access to participants' body language and cues, which may have limited the creation and maintenance of rapport and use of inductive probes. The researcher mitigated this issue

by following the strategies recommended by Farooq and De Villiers (2017) on effective communication using the telephone in qualitative research.

The sentence completion task as a form of data collection was a significant delimitation of this study in several ways. Unlike the high volume of data collected from the phone interviews, the amount of data collected from sentence completion tasks was small due primarily to the instrument developed and used for the study. The form contained only three sentence stems. Although the direction on the form was clear, the direction prompted participants to reply quickly, which may have limited the depth and richness of written responses. The name of the data collection itself carried a connotation favoring single-sentence replies. Furthermore, although additional lines followed every sentence stem to encourage participants to express themselves more in writing, the structure of the form may have significantly limited the volume of participant responses.

Researcher bias was a source of delimitation in this study in data collection and analysis. As instruments of research, researchers influence the quality of participant responding and the quality of the resultant data (Patton, 2015). In this study, the researcher adopted the attitude of emphatic neutrality to maintain a watchful awareness of personal biases and selective perceptions (Patton, 2015) and allowed participants to express their views as naturally as possible. Clinical experience enabled the researcher to understand and interpret the perceptions of parents of children with disabilities in such depth and complexity which may differ from the understanding and interpretation of researchers who do not have the same experience with this patient population. Finally, the rigor of data analysis depends on the skills of the researchers (Patton (2015). The researcher made the best effort to achieve proficiency in conducting QCA according to

the guidelines of Schreier (2012) and in using MAXQDA to assist with data coding and organization. Despite adherence to guidelines and sufficient preparation to conduct data analysis, the researcher was a beginner in QCA and analyzed the data on his own.

### **Summary and Organization of the Remainder of the Study**

This chapter presented background information, including the gap in the literature, to support the merit of pursuing a study on parents' perceptions of adherence to pediatric physical therapy HEPs. This study explored how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences. The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017).

In pediatric physical therapy, evidence shows that parents' adherence to the prescribed HEPs is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). This study addressed this societal problem by exploring the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) as a theoretical framework. The parents' perceptions (i.e., knowledge, beliefs, and attitudes) about adherence to HEPs were their mental models of adherence to the HEPs, which influence their adherence decisions and behavior. In pursuing this phenomenon, this study aimed to contribute to

the field of pediatric physical therapy concerning the improvement of the assessment of parents' adherence behavior, and the development of effective strategies to improve this parent behavior. In this regard, this study contributed to the promotion of parent adherence to HEPs that might translate to the improvement of clinical outcomes for pediatric patients receiving physical therapy. Furthermore, this study was the first to apply Rizzo's (2015) theoretical model in the field of pediatric physical therapy.

Chapter 1 included a description of the methodology of this study. This study used a qualitative methodology with a descriptive design to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of the United States. This study asked the following research questions: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? and How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? Furthermore, this study collected qualitative data using semi-structured phone interviews and sentence completion tasks to answer the stated research questions. Given its limitations and delimitations, this study offered an exciting opportunity to address HEP adherence in the pediatric physical therapy population using a qualitative methodology.

This chapter transitions to Chapter 2 which presents a comprehensive review of the literature on important topics related to pediatric physical therapy HEP adherence, as well as a discussion of the study's theoretical foundation. Chapter 3 describes the

methodology, including the research design, target population, sample, sources of data, data collection, data analysis, and ethical considerations. Chapter 4 provides a detailed account of data analysis procedures and the summary of the results of this study. Finally, this study culminates in Chapter 5 with an interpretation and discussion of the results. The researcher of this study aimed to complete this dissertation research within one year from the time of approval of the study's proposal.

## Chapter 2: Literature Review

### Introduction to the Chapter and Background to the Problem

The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy home exercise programs (HEPs) with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of United States. The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). This study explored the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using a framework that highlights the role of prior experiences on exercise adherence (Rizzo, 2015). This phenomenon was important in the promotion of parent adherence to HEPs to ultimately improve the clinical outcomes for pediatric patients receiving physical therapy. Chapter 2 of this paper presents the review of existing literature relevant to the topic of adherence to physical therapy HEPs to provide the evidence base supporting the merit of this study in contributing to the body of knowledge on adherence to physical therapy HEPs.

A home exercise program (HEP) is an essential component of an effective physical therapy rehabilitation (Ashari et al., 2016). It is a standard of clinical practice for physical therapists to prescribe HEPs to their patients during the treatment episode to

complement face-to-face direct interventions (Picha & Howell, 2018). Physical therapists educate their patients and, if necessary, their primary caregivers, on the benefits of compliance to the HEPs. Adherence to the prescribed HEPs allows the patients to receive the optimal benefit of physical therapy. Despite the value of HEPs to rehabilitation outcome, the level of adherence to HEPs is unsatisfactory in the general patient population (Azevedo et al., 2018; Houghton et al., 2018; Medina-Mirapeix et al., 2017; Miller et al., 2017).

Researchers have found that adherence to physical therapy HEPs is generally poor (Anar, 2016; Azevedo et al., 2018; Houghton et al., 2018; Medina-Mirapeix et al., 2017; Miller et al., 2017). Miller et al. (2017) surveyed post-stroke patients six months after completion of formal rehabilitation and found that of those who received a HEP at discharge, only 65% reported adherence to a part of the HEP. In a quantitative study on the effect of a 4-week home-based exercise program for adults with chronic low back pain, Anar (2016) found an inadequate adherence rate of 54.10%. Azevedo et al. (2018) measured treatment adherence based on the number of completed clinic treatment sessions and the number of days of performing the HEP. In this study, Azevedo et al. (2018) found an average adherence rate of 58% among patients with chronic low back pain. In the pediatric population, Medina-Mirapeix et al. (2017) found that only 38.7% of parents adhered completely to the prescribed HEPs. Furthermore, Houghton et al. (2018) found that only 47% of children with juvenile arthritis were adherent to HEPs and this number decreased over time. Indeed, poor adherence to HEPs exists among different physical therapy patient populations.

Among children with long-term medical conditions, non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure (WHO, 2003). For young children with developmental disabilities who receive physical therapy, parents are primarily responsible for performing the prescribed HEPs on their children (Medina-Mirapeix et al., 2017). Pediatric physical therapists prescribe HEPs to the parents of their pediatric patients as a standard of care (Picha & Howell, 2018). However, adherence to HEPs among parents of pediatric physical therapy patients is unsatisfactory (Medina-Mirapeix et al., 2017).

This chapter presents next the gap in the literature and the theoretical model that served as the foundation for this study. Thereafter follows the largest section of the chapter presenting the review of literature on several themes relevant to the topic of adherence to physical therapy HEP, which include: (a) physical therapy practice and HEP, (b) adherence to physical therapy HEP, (c) predictors of adherence, (d) factors associated with adherence to HEP, (e) trajectory of adherence to HEP, (f) interventions to improve adherence to HEP, (g) measuring level of adherence, (h) adherence in pediatric physical therapy, and (i) prior experiences and adherence.

The search strategy for relevant literature for this study used the following databases: PubMed, CINAHL Complete, Cochrane Library, Proquest's Nursing & Allied Health Database, Ovid Nursing Essential Collection, ProQuest Dissertation & Theses Global, Sage Premier, ScienceDirect College Edition, SPORTDiscus with Full Text, EBSCOhost, PEDro, and Web of Science. This study used the following keywords to find the studies for the literature review: home exercise program, home program, home

rehabilitation, exercise adherence, exercise compliance, pediatric physical therapy, physical therapy, and mental models.

### **Identification of the Gap**

In the adult literature on adherence to physical therapy HEPs, Bachmann et al. (2018) recommended that physical therapists explore patients' prior adherence to home exercises to understand their current and future adherence behaviors. This recommendation is congruent with the findings of Ormel et al. (2018), which identified previous exercise experience as one of the predictors of present adherence to prescribed exercises. Rizzo and Bell (2018) stated that physical therapy HEP adherence interventions could benefit from exploration of patients' prior experiences in adhering to personal regimens (e.g., going to church, walking the dog regularly) and medical advice (e.g., taking prescribed medications, following a diet plan) which contribute to their mental models of physical therapy adherence.

In the pediatric literature on adherence to physical therapy HEPs, researchers have explored reasons for general medical treatment non-adherence from the perspectives of caregivers of children with long-term conditions (Santer et al., 2014). However, a significant knowledge gap remains in understanding adherence to physical therapy HEPs in the pediatric population (Tanner et al., 2017). In support of this gap, Medina-Mirapeix et al. (2017) expressed that the literature needs more research to understand the factors which determine adherence to physical therapy HEPs in children with disabilities. A synthesis of the given studies supports a gap in the literature on pediatric physical therapy HEP adherence. This study addressed this gap by exploring parents' perceptions of adherence with an emphasis on their prior adherence experiences.

## Theoretical Foundation

The theoretical foundation that grounded this study is the mental models of physical therapy patient adherence to HEP (Rizzo, 2015). According to Rizzo (2015), patients hold mental models-beliefs, values, expectations, and assumptions-of how physical therapy intervention works and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. In the context of this study, the physical therapy recommendation of interest was to adhere to physical therapist-prescribed HEPs. Based on Rizzo's framework, prior adherence experiences help shape patients' mental models which influence their adherence behavior to prescribed HEPs (Rizzo, 2015).

In cognitive psychology, the term mental model refers to a collection of implicit assumptions, beliefs, values, and expectations that people have about the world (Johnson-Laird, 1983). Johnson-Laird (1983) conceptualized mental models as an innate human cognitive process which is dynamic and wholly formed by experiences. Thus, prior experiences establish one's mental models. When a new experience presents in life, an individual seeks memories of prior experiences of the same event, implicitly compares the present and prior experiences via analogical reasoning, and then forms a mental model of that new experience (Rizzo, 2015). This new mental model will then become the basis for one's thinking about the new experience. Subsequently, this new mental model will influence the individual's way of making decisions and future behavioral responses to the new experience (Rizzo, 2015).

Although prior experiences may have a positive influence on mental models, they may also constrain them in a negative fashion (Rizzo, 2015). Therefore, physical therapy

patients may hold mental models of adherence that do not match the ideal mental models of adherence that physical therapists hold. According to Rizzo (2015), it is important that patients articulate their mental models of adherence so that the physical therapist can assess the quality of these mental models. Physical therapists who find that their patients' mental models of adherence are discrepant with the ideal mental models of adherence will then have the opportunity to revise these mental models so that patient's adherence to HEPs can improve (Rizzo, 2015).

According to Rizzo (2015), physical therapists must elucidate their patients' mental models of adherence to HEP. Rizzo (2015) explains that the process of uncovering patients' mental models provides the physical therapists an opportunity to know their patients' beliefs, values, expectations, and assumptions about physical therapy HEP adherence. Knowledge of the patients' mental models may allow the physical therapists to understand their patients' perceptions of the importance of the HEPs in the rehabilitation process and its influence on outcomes, as well as their perceived personal responsibility for performing the HEPs (Rizzo, 2015). More importantly, physical therapists can use this information in planning an educational intervention that may improve their patient's mental models for the main purpose of improving adherence to HEPs (Rizzo, 2015).

When patients' mental models of adherence become explicit to both the patient and to the physical therapist, mental model assessment can begin. Patients may hold erroneous mental models of the physical therapy intervention and the required adherence to HEPs (Rizzo, 2015). Erroneous perceptions may come from prior experiences of failed medical treatments, poor rehabilitation outcomes, insufficient knowledge gained from

previous therapy episodes, or a basic lack of experience with physical therapy in general. Patients may also hold incomplete mental models of the physical therapy interventions (Rizzo, 2015). For example, patients may think that physical rehabilitation and optimal recovery is the main responsibility of the clinician and their roles as patients in the recovery are only secondary (Flora, McMahon, Locke, & Brawley, 2018). Both the erroneous and incomplete types of mental models are different from the physical therapists' ideal mental models. In such cases, physical therapists must identify the discrepant patient mental models and revise them accordingly (Rizzo, 2015).

Rizzo (2015) offered several strategies that physical therapists can use to revise patients' mental model of adherence. A gradual modification is the preferred means of modifying an individual's mental models as resistance may occur when the new mental model conflicts with the individual's existing mental models (Lin & Reigeluth, 2019). Small successes in performing a limited number of exercises can be motivating to patients. Physical therapists can build upon these motivating experiences to reshape the patients' attitude towards HEP adherence. Moreover, physical therapists can highlight the explicit evidence of clinical improvement during successive visits to make the patient more aware of the benefit of adherence. When patients realize the importance of adherence based on objective clinical outcomes, they are likely to adopt new and improved mental models of adherence to physical therapy HEPs (Rizzo, 2015).

Rizzo's (2015) mental models of physical therapy patient adherence to HEP provides a novel means of understanding patient adherence to HEPs. While the basis of the traditional approach to understanding adherence has been on personal and psychological reasons such as self-efficacy, motivation, knowledge, and skills, Rizzo's

model considers the sources of these factors from prior experiences. When physical therapists know where poor adherence behaviors stem from, they become empowered to modify these behaviors by applying individualized strategies that can reshape the patients' mental models of adherence. As a result, patients can build new mental models of adherence which can have a positive impact on their recovery and progress in physical therapy (Rizzo, 2015).

The theoretical foundation for this study links mental models, prior experiences, and current physical therapy exercise adherence behavior (Rizzo, 2015). This theoretical model grounded the two research questions of this study. The first question inquired on parents' description of their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. On the other hand, the second question probed on parents' description of prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. These research questions illuminated the connection between parents' mental models (i.e., knowledge, beliefs, and attitudes), prior experiences, and adherence behaviors according to Rizzo's (2015) model. Therefore, the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) was the fitting theoretical foundation for this study.

### **Review of the Literature**

**Physical therapy practice and HEP.** Physical therapy is a healthcare profession that applies evidence-based knowledge and practices in the rehabilitation of patients of all ages. Physical therapists and physical therapist assistants are healthcare professionals who represent this profession and are involved in the promotion of optimal physical functioning in individuals who have activity limitations and participation restrictions due

to physical impairments and disabilities (APTA, 2014). Physical therapists and physical therapist assistants prescribe and implement individualized interventions based on the needs of every patient. Patient instruction is at the forefront of all interventions that physical therapists and physical therapist assistants provide to their patients regardless of conditions. According to the Guide for Physical Therapist Practice (APTA, 2014), “patient or client instruction is the process of informing, educating, or training patients or clients, families, significant others, and caregivers with the intent to promote and optimize the physical therapist episode of care.” In clinical settings, patient or client instruction often takes the form of a home program, or more commonly called a home exercise program.

A HEP is a vital component of all physical therapy plan of care (APTA, 2014). It is one of the self-management strategies which physical therapists educate their patients on so that patients can take care of themselves outside of a clinical setting independently (Peek, Carey, Mackenzie, & Sanson-Fisher, 2018). HEPs are important in all physical therapy plan of care because formal physical therapy interventions are episodic by nature. Provision of physical therapy services with a HEP reflects quality patient care that is cost-efficient with a balanced utilization of patient, government, and insurance agency resources (World Confederation for Physical Therapy, 2017). According to the policy statement of the World Confederation for Physical Therapy (2017), HEPs are active strategies and techniques that comprise an important part of the clinical practice of physical therapy. This policy statement requires that physical therapists educate their patients on the proper technique, frequency, duration, and any safety concerns associated with the HEPs to ensure that patients can adequately perform the exercises on their own

at home. Accordingly, physical therapists routinely prescribe HEPs to their patients from the first visit and routinely updates the HEPs as treatment proceeds and as patients' function progresses. The HEPs are equally important at the culmination of the physical therapy episode to ensure the maintenance of the progress that the patient achieved (Miller et al., 2017). Regardless of the timing of HEP prescription, physical therapists prescribe HEPs in many forms.

Physical therapists believe in the benefits of the HEPs, and most prescribe HEPs to their patients (Serpanou et al., 2019). HEPs rank as the main self-management strategy that physical therapists prescribe to their patients, followed by advice to perform physical activity, use of heat or ice, use of braces or equipment's, or self-taping (Peek et al., 2018). The traditional means of HEP education takes the form of verbal instructions, discussion, demonstration, paper hand-out, or video (Bassett, 2015). Of these, a paper-handout is the most common. Recently, electronic media in the form of e-mail, mobile phone apps, and text messaging are becoming more common in physical therapy practice for HEP prescription (Gal & Steinberg, 2018; Lambert et al., 2017; Ouegnin & Valdes, 2020). A recent study on the mode of HEP delivery found that patients preferred seeing a recorded video of themselves on their mobile phones performing the exercises over paper handout instructions (Ouegnin & Valdes, 2020). A HEP is feasible for all types of physical therapy patients, from adult patients scheduled to have surgery for pancreatic cancer (Ngo-Huang et al., 2017) to critically ill pediatric patients with sickle anemia (Liem, Akinosun, Muntz, & Thompson, 2017). Regardless of patient population and mode of HEP delivery, physical therapists educate their patients on the benefits of HEPs.

***Benefits and limitations of HEP.*** Patients benefit from HEPs in numerous ways. HEPs complement the limited face-to-face treatment time that patients have with the physical therapists. According to Ferre et al. (2017), performing the HEP on nontherapy days or as extra sessions on therapy days increases the overall treatment intensity in a given week. For children with cerebral palsy, a caregiver-provided high-intensity exercise training is feasible and beneficial in promoting improvement in the performance of functional goals (Ferre et al., 2017). In addition, HEPs provide a means for patients to perform exercises that are purposeful and beneficial for their present physical condition (Miller et al., 2017). For example, in a qualitative mixed-method cross-sectional survey study on individuals who had a stroke, Miller et al. (2017) found that majority of participants acknowledged that a post-rehabilitation HEP provided a means to adopt good exercise habits that were beneficial to their recovery after a stroke. Furthermore, HEPs encourage independent self-management of one's physical condition (Peek, Carey, Sanson-Fisher, & Mackenzie, 2016). HEPs serve as an additional tool that patients can use to take care of themselves in meaningful and goal-oriented ways independently.

By far, improvement in clinical outcomes is the most important benefit of HEPs to patients. Ashari et al. (2016) found that an individualized HEP led to an increase in balance performance in community-dwelling adults with balance impairments. For a similar patient population, Hill, Hunter, Batchelor, Cavalheri, and Burton (2015) found that HEPs helped increase physical performance and reduce the occurrence of falls. In addition, minimally supervised HEPs with an emphasis on functional skills resulted in significant improvement in physical function six months after completion of formal rehabilitation in patients who sustained hip fractures (Latham et al., 2014). Furthermore,

Anwer et al. (2016) found in a systematic review that strong evidence exists supporting the positive effects of both supervised and unsupervised HEPs in patients with knee osteoarthritis. While HEPs are undoubtedly beneficial to patients, physical therapists know that there are important limitations inherent to HEP prescription.

Successful completion of the exercises and advice contained in a HEP is often difficult for many reasons. First, patients must possess a level of independence to adhere to the prescribed HEPs since supervision of the physical therapist is not present in home-based programs (Jansons, Haines, & O'Brien, 2017). Second, patients must have sufficient self-efficacy to perform the HEPs (Picha & Howell, 2018). In other words, patients must have self-confidence that they can do the exercises on their own as a means to manage their conditions (Picha & Howell, 2018). Third, HEPs require patients to devote extra time of their day to perform the exercises regularly (Husebø, Karlsen, Allan, Søreide, & Bru, 2015). This is a major drawback for individuals who are busy and lack the extra time needed to perform the HEPs. Finally, patients must possess a thorough knowledge of the HEPs (Saner et al., 2018). Patients must have adequate knowledge of how to perform the exercises properly to obtain the most benefit from the exercises (Saner et al., 2018). Based on the evidence on the benefits and limitations of HEPs, it is evident that the benefits of HEPs outweigh its drawbacks. Moreover, for patients to receive the full benefits of HEPs, optimal adherence to HEPs is necessary.

This section highlights the importance of HEP prescription in physical therapy practice for all physical therapy patients. While HEPs have numerous benefits (Ferre et al., 2017; Miller et al., 2017; Peek et al., 2016), effective performance and adherence to the prescribed HEPs can be challenging to physical therapy patients (Husebø et al., 2015;

Jansons, Haines, et al., 2017; Picha & Howell, 2018; Saner et al., 2018). Although strong evidence exists on the benefits of HEPs on better clinical outcomes for physical therapy patients (Anwer et al., 2016; Ashari et al., 2016; Hill et al., 2015; Latham et al., 2014), not many patients will reap these benefits if adherence to the prescribed HEPs is suboptimal. The problem of poor adherence to the prescribed HEPs in physical therapy was influential to the conceptualization of this dissertation study.

**Adherence to physical therapy HEP.** Adherence is the key concept to the success of most medical interventions, including physical therapy. The WHO provides the gold-standard definition of patient adherence to health care recommendations. According to WHO (2003), adherence is “the extent to which a person’s behaviour ... corresponds with agreed recommendations from a health care provider” (p. 17). This definition emphasizes that adherence involves an active partnership between the healthcare provider and the patient, and distinguishes adherence from compliance which denotes following advice regardless of the patient’s agreement to it. Argent, Daly, and Caulfield (2018) adopted the WHO definition to focus specifically on exercise recommendations and defined exercise adherence as “the extent to which an individual corresponds with the quantity and quality of exercise, as prescribed by their healthcare professional” (p. 2). This definition emphasizes that true adherence involves the completion of exercises following both required frequency and duration, and quality of performance of each exercise. According to Rivera-Torres et al. (2019), exercise adherence is an individual’s bond to an exercise program. Regardless of the foundational definition that health care providers use to inform their practice, the providers’ best efforts to manage their patients’ conditions are wasted without patient adherence, causing

an increase in healthcare expenditure and poor long-term clinical outcomes (WHO, 2003). Physical therapists must know their patient's level of adherence to HEPs so that they can evaluate the sufficiency of the services they provide and promote optimum clinical outcomes.

***Measurement of adherence.*** Measurement of the extent to which patients follow the instructions they received from their physical therapists is an important component of the physical therapy intervention process. Patient adherence in physical therapy can manifest in three ways, which include attendance to scheduled visits, following self-care instructions, and performing the prescribed HEPs (Peek et al., 2016; Rizzo, 2015). Individuals may show adherence to a prescribed exercise program by completing the required attendance over a follow-up period (Rivera-Torres et al., 2019), amount of effort required (i.e., intensity) (Rivera-Torres et al., 2019), or frequency and duration component of the program (Medina-Mirapeix et al., 2009; Rivera-Torres et al., 2019). According to El-Kotob and Giangregorio (2018), clinicians and researchers must employ rigorous assessment of adherence in intervention studies where adherence is a part of the clinical outcomes. Accurate measurement of patient adherence informs clinical decision-making and should be a priority in research studies on patient adherence (Bollen, Dean, Siegert, Howe, & Goodwin, 2014).

Studies that measured patient adherence to prescribed home exercises used a variety of measurement tools. These tools include exercise diaries (Gunnes et al., 2018; Kruger et al., 2018; Nava-Bringas et al., 2016; Nicolson, Hinman, Wrigley, Stratford, & Bennell, 2018), exercise calendar (Suzuki et al., 2019), paper logbooks (Jansons, Robins, O'Brien, L., & Haines, 2017; Kuehl et al., 2016; Liem et al., 2017; Nielsen, Duncan, &

Pozehl, 2019; Nyrop et al., 2018; Sims-Gould et al., 2018), online logbooks (Sims-Gould et al., 2018), wearable HR monitors (Liem et al., 2017), self-report questionnaires or rating scales (Lambert et al., 2017; Nicolson et al., 2017; Nielsen et al., 2019; Peek, Carey, Mackenzie, & Sanson-Fisher, 2019), and electronic activity monitors (Nicolson et al., 2017; Nyrop et al., 2018; Zandwijk et al., 2015). Recent systematic reviews have found that diaries and questionnaires were the most commonly used tool to measure home exercise adherence in adult patients with chronic low back pain (Uzawa & Davis, 2018), while diaries and logbooks were the most frequently utilized tools in patients with stroke (Levy, Laver, Killington, Lannin, & Crotty, 2019). However, according to Zandwijk et al. (2015), the use of self-reporting in the measurement of exercise adherence has limited accuracy.

For example, one study demonstrates the disconnect between self-report and actual adherence. Nicolson et al. (2018) measured adherence to a program of knee strengthening exercises using patient-completed paper diaries and self-rated 11-point numeric rating scale. They then compared these findings with data obtained from triaxial accelerometers concealed in the ankle cuff weights which patients used for exercises. In this study, Nicolson et al. (2018) discovered that diary reports overestimated patients' actual adherence by 20% over the 12-week intervention period when compared with accelerometer data. On the other hand, self-rated adherence failed to reach acceptable correlations with accelerometry data. In this study, Nicolson et al. (2018) revealed that exercise diaries and self-rated scale provided a limited and inaccurate picture of actual patient adherence to the prescribed HEPs when compared to accelerometers. Bias

inherent in self-reporting poses as one of the limitations of diaries and self-rated scales in the accurate measurement of adherence.

Ezzat, MacPherson, Leese, and Li (2015) echoed the same limitation in self-reporting of adherence. According to Ezzat et al. (2015) and Gunnes et al. (2018), self-report tools are susceptible to patient reporting bias related to recall and self-presentation. The patients' cognitive ability to accurately report adherence level will also need consideration (Gunnes et al., 2018). Self-report measures may not reflect the quality of performance of prescribed exercises, and the same is true for objective measures such as accelerometers and activity monitors (Bollen et al., 2014). While connected health technology using wearable sensors and monitors have the potential to provide a more objective method of measuring adherence as well accuracy of exercise performance (Argent et al., 2018), electronic devices have their share of drawbacks in exercise adherence reporting. Electronic monitors can only record movements when worn and can monitor simple repetitive limb movements and activities such as walking (Bollen et al., 2014). In addition to cost, accelerometers may artificially inflate adherence because their presence acts as reminders for patients to perform their exercises (Bollen et al., 2014). In this regard, these devices succumb to the same self-presentation bias inherent in self-reports and diaries. Therefore, the results of studies which measured adherence to HEPs using self-reporting and electronic monitors may not provide a true reflection of actual patient adherence. This dilemma prompted researchers to look into validated questionnaires on exercise adherence.

***Validated questionnaires of exercise adherence.*** There have been recent attempts to improve measurement of exercise adherence using validated questionnaires in response

to the gap in the literature on measurement of adherence level. Bollen et al. (2014) conducted a systematic review of self-report measures of adherence to HEPs and found that the majority of the measures used in exercise adherence studies lacked proper psychometric testing. McLean et al. (2016) supported this finding when they concluded that no adequate measure of exercise adherence exists which physical therapists can use in musculoskeletal clinical settings. Furthermore, Uzawa and Davis (2018) found in a systematic review that no valid questionnaires exist for measurement of adherence to HEPs in terms of frequency, duration, and intensity among patients with chronic low back pain. Uzawa and Davis (2018) offered a different point of view that the simultaneous use of three outcome measures is a better method of assessment of adherence to home exercises—one each for frequency, performance accuracy, and the use of a validated questionnaire. Evidently, a significant gap in the literature exists on adherence measurement to unsupervised HEPs.

In response to this gap in the literature, Newman-Beinart et al. (2017) developed the exercise adherence rating scale (EARS), which the authors claim as the first validated self-report measure of HEP adherence in adults with chronic low back pain. According to Meade, Bearne, and Godfrey (2018), EARS is a robust measure of HEP adherence with good face validity and comprehensibility. More recently out of China, Wang et al. (2018) constructed the adherence rating scale to measure therapeutic exercise adherence in patients with osteoarthritis of the knee. For the pediatric population, April, Higgins, and Feldman (2016) used Rasch analysis to evaluate the psychometric properties of the first validated questionnaire on adherence to juvenile rheumatoid arthritis treatments and home exercises, in addition to parents' beliefs and attitudes about these treatments.

Although these validated questionnaires of patient exercise adherence have the same limitations inherent in self-reporting of exercise behaviors (Newman-Beinart et al., 2017), they are evidence of recent progress in exercise adherence measurement.

*Classification of adherence levels.* Researchers differ in the criteria they set in classifying the acceptable level of patient adherence as much as they differ in the tools they used in measuring adherence level. In a study on young patients with juvenile idiopathic arthritis, Sims-Gould et al. (2018) designated the rate of 60% or higher to classify patients as high in the completion of prescribed exercises. However, they did not provide further information on how they classified those who did not meet this level of adherence. Other authors used 75% as the cut-off level to meet the required exercise adherence level in their studies (O'Brien, Finlayson, Kerr, Shortridge-Baggett, & Edwards, 2018; van Het Reve, Silveira, Daniel, Casati, & De Bruin, 2014).

Meanwhile, Kruger et al. (2018) used 80% completion of assigned training sessions to separate patients into adherers and non-adherers. Still, some authors used study protocols to classify patients' adherence levels to home exercises, such as meeting an established number of minutes of exercise per week (Gunnes et al., 2018). On the other hand, according to Durlak and DuPre (2008), a rate of 80% is difficult to achieve in intervention studies and contended with the rate of 60% as the level of adherence at which positive intervention results are obtainable. Thus, it is apparent that a gold standard in the measurement and classification of patient adherence to a prescribed exercise program is nonexistent. Despite these limitations in measurement and classification of adherence, a consensus exists that adherence to the prescribed HEPs is suboptimal.

***Low level of adherence.*** Researchers have found that adherence to physical therapy HEPs is generally poor (Anar, 2016; Azevedo et al., 2018; Houghton et al., 2018; Medina-Mirapeix et al., 2017; Miller et al., 2017). In a quantitative study on the effect of a 4-week home-based exercise program for adults with chronic low back pain, Anar (2016) found an inadequate adherence rate of 54.10%. Miller et al. (2017) surveyed post-stroke patients who completed rehabilitation within the previous six months and found that in those who received a HEP at discharge, only 65% reported adherence and only to a portion of the prescribed HEPs. In another study, Azevedo et al. (2018) measured treatment adherence based on the number of in-clinic treatment sessions completed and the number of days of performing the HEPs, and found an average adherence rate of 58% among patients with chronic low back pain. In the pediatric population, Medina-Mirapeix et al. (2017) found that only 38.7% of parents adhered completely to the prescribed HEPs. Furthermore, Houghton et al. (2018) found that only 47% of children with juvenile arthritis were adherent to the HEPs and this number decreased over time. Evidently, poor adherence to HEPs exists among different physical therapy patient populations. The low level of adherence to the prescribed HEPs in physical therapy mimics the WHO (2003) findings of 50% adherence level in long-term medical treatment of chronic diseases.

This section on adherence to physical therapy HEPs revealed that poor adherence to physical therapy HEPs is a significant societal problem. Non-adherence results in higher healthcare spending and poor long-term clinical outcomes (WHO, 2003). Many patients are not receiving the full benefit of treatment interventions due to poor adherence (Jordan, Holden, Mason, & Foster, 2010; Peek et al., 2016), and physical therapists face

the challenge of inconsistency in clinical practice on the measurement of adherence (Levy et al., 2019; Uzawa & Davis, 2018), as well as the limited validity of existing measurement tools (Bollen et al., 2014; El-Kotob & Giangregorio, 2018; Ezzat et al., 2015; Zandwijk et al., 2015). To date, the EARS stands as the most promising instrument which physical therapists can use to measure patient adherence to HEPs (Meade, Bearne, & Godfrey, 2018; Newman-Beinart et al., 2017). However, the EARS does not offer a solution to problem of inconsistency in the classification of exercise adherence levels (Kruger et al., 2018; O'Brien et al., 2018; Sims-Gould et al., 2018; van Het Reve et al., 2014) and measurement of home exercise performance accuracy (Uzawa & Davis, 2018). Furthermore, given that mental models influence adherence decisions to HEPs (Rizzo, 2015), the EARS does not elucidate maladaptive beliefs that constrain mental models of adherence to HEPs. Therefore, valid measurement of patient adherence to physical therapy HEPs remains as a gap in physical therapy literature. As this section highlights the inconsistencies in the practice of physical therapy in the field of HEP adherence measurement, poor adherence remains a problem and supports the need for more research such as this study on the topic of HEP adherence.

**Predictors of adherence to physical therapy interventions.** The literature is abundant on factors that influence adherence to physical therapy treatment in general, and HEP specifically. These factors can serve as predictors, facilitators, or inhibitors of adherence. Rivera-Torres et al. (2019) recommended that healthcare professionals who prescribe exercises should understand the multiple biopsychosocial factors that influence exercise adherence and their effect on outcomes. The discussion below on numerous

factors related to adherence elucidates the different reasons that patients may have for adhering or not to physical therapy HEP prescription.

Numerous studies have revealed many predictors of adherence to physical therapy interventions for the adult population. Aartolahti, Tolppanen, Lönnroos, Hartikainen, and Häkkinen (2015) measured adherence to long-term group-based strength and balance training among a large sample of community-dwelling older adults and classified them into three categories: low, moderate, and high adherers. In this study, Aartolahti et al. (2015) defined adherence as the proportion of training sessions that the subjects attended. The factors which predicted the participants' adherence to the program were as follows: age, sex, cognitive status, functional limitations, physical impairments, and perceptions of health status. The older adults who were high adherers were mostly female, younger, with better cognition and functional independence, and less physical impairments. On the other hand, those individuals who perceived their health status as poor and used an assistive device for walking adhered the lowest to the program. While Aartolahti et al. (2015) believed that long-term adherence was feasible in this population, they strongly advised that low adhering individuals need additional support to promote better exercise adherence.

Other researchers found support for the perception of well-being as a predictor of exercise adherence. Baima, Omer, Varlotto, and Yunus (2017) conducted a short-term longitudinal study to evaluate adherence to a HEP among adult patients with high-grade brain tumors. The HEP in this quantitative study included daily strength and balance exercises for one month. In line with the findings of Aartolahti et al. (2015), Baima et al. (2017) found that short-term exercise adherence in this patient population highly

correlated with a higher sense of physical well-being. In addition, Baima et al. (2017) found that patients were more adherent if they were married and had a higher personal income. Together, the findings of Aartolahti et al. (2015) and Baima et al. (2017) lend support for quality of life parameters as good predictors of exercise adherence.

More researchers contributed additional findings to the literature on predictors of exercise adherence. Essery, Geraghty, Kirby, and Yardley (2017) examined in a systematic review the factors which predicted adherence to home-based physical therapies and found that these factors include the intention to participate in treatment, motivation, self-efficacy, social support, and prior experience of adherence to exercises. In another review on adherence to exercise interventions for adult individuals on cancer treatments, Ormel et al. (2018) identified the predictors of adherence to exercise interventions. These predictors include distance to the rehabilitation center, prior experience of adherence to exercises, motivation, functional limitations, severity of medical condition, alcohol consumption, family support, healthcare provider support, and exercise knowledge and skills. These two systematic reviews share common findings on the predictors of adherence to exercise interventions, which include motivation, social support, and prior experience of exercise adherence. Furthermore, Ormel et al. (2018) and Aartolahti et al. (2015) share similar findings on the predictors of adherence, which consists of functional limitations and severity of the medical condition.

It is evident in the literature that the predictors of patient adherence to physical therapy HEPs have been well-researched. However, research on this topic has been conducted on adult participants (Aartolahti et al., 2015; Ormel et al., 2018), with minimal inclusion of participants below the age of 18 years (Essery et al., 2017). While the

literature has provided explanations for the factors which can predict exercise adherence in adults, information is lacking for the pediatric population on this topic.

**Factors associated with adherence to HEP.** Ample evidence exists on factors which influence patient adherence to HEPs. According to Beinart, Goodchild, Weinman, Ayis, and Godfrey (2013), the factors which influence patients' adherence to HEPs are either patient-related or intervention-related. Also, these factors can serve to facilitate or hinder adherence (Bassett, 2015). Facilitating factors are those that support adherence, while barriers are those that hinder adherence. This section presents the summary of studies on barriers and facilitators of adherence to HEPs following Beinart et al.'s (2013) categories. Patient-related factors that influence adherence to HEPs are those which represent the personal and psychological characteristics of the patient, which may include one's skills, knowledge, and cognition (Beinart et al., 2013). In addition, this category encompasses the patient's social and condition-related clinical factors (Beinart et al., 2013). On the other hand, intervention-related factors which influence adherence to HEPs are those that represent the characteristics of the physical therapists, the treatment regimen they prescribe, and the effects of these treatments. This category also includes the professional relationship which develops between the patient and the physical therapist (Beinart et al., 2013).

***Patient-related factors.*** This sub-section presents the patient-related category of factors which influence exercise adherence. In a qualitative study on 29 adult patients with chronic low back pain, Palazzo et al. (2016) explored patient perspectives on barriers to HEP adherence. According to Palazzo et al. (2016), patients were less adherent to HEPs when they perceived uncertainty in their condition and when they had negative

perceptions of the exercises. They were also less likely to adhere to HEP prescriptions when they felt depressed or unmotivated. Negative perceptions and emotions appeared as main barriers to exercise adherence in this study.

Negative cognitions were also one of the findings of Stilwell and Harman (2017). Stilwell and Harman (2017) explored the perspectives of adherence to HEPs among chiropractors and adult patients who received treatment for chronic low back pain. Using a focused qualitative ethnographic design, Stilwell and Harman (2017) found that fear-avoidance, negative beliefs about pain, and poor perception of their condition hindered adherence to home exercises. Thus, negative perceptions and emotions are established barriers to HEP adherence.

Other researchers made contributions to the literature on patient-related factors which influence exercise adherence. According to Husebø et al. (2015), patients who failed to adhere to HEPs were those who perceived a lack in social support and a lack of time to devote to exercises (Husebø et al., 2015). In a qualitative study, Husebø et al. (2015) found that adult cancer patients on chemotherapy preferred to allocate the extra time they had to other valued life activities other than doing their exercises. This study added lack of time as a patient-related barrier to exercise adherence.

Lack of time continued to appear in the studies discussed below. Among adults who received physical therapy in private practice, lack of time is the most frequently described barrier to adherence to physical therapist-prescribed self-management strategies (Peek et al., 2018). In another study on adults with chronic low back pain, Nava-Bringas et al. (2016) examined the factors which influenced adherence to an unsupervised home program of stretching and stabilization strengthening exercises. In

this prospective observational study with six monthly clinic follow-ups, Nava-Bringas et al. (2016) found that patients with chronic lower back pain were unable to complete their exercises due to lack of time, pain, and fatigue. A similar finding showed in the study of Saner et al. (2018) on patients with non-specific low back pain. As a follow-up qualitative study to a clinical trial study on the effectiveness of two distinct exercise programs for low back pain, Saner et al. (2018) explored the patients' perspectives on long-term adherence to physical therapy home-based exercise programs. Participants expressed that the patient-specific factors which served as barriers to long-term adherence include lack of time to do the exercises, low motivation, poor recall of exercise routine, and poor ability to adapt exercises as part of the daily routine. Furthermore, knowledge of the correct performance of the exercises and perception of the benefit of the exercises facilitated long-term adherence. In addition to lack of time, this study added knowledge of the exercises, perception of benefits, and motivation as patient-related factors which influence exercise adherence.

Motivation to do the exercises showed in another study as a factor related to exercise adherence. Bachmann et al. (2018) aimed to summarize empirical studies and existing systematic reviews on factors which influence HEP adherence. These authors analyzed 14 quantitative studies, four of which were systematic reviews, that investigated home-based exercise adherence regardless of participant age and illness. Chronic low back pain and osteoarthritis were the primary diagnoses of the patients in this review. Bachmann et al. (2018) found that social support, motivation, self-efficacy, and negative psychological conditions (i.e., helplessness, depression, and anxiety) influenced exercise adherence. In conjunction with the studies discussed earlier, this review solidified the

notion that negative cognitions and emotions, motivation, and social support are important patient-related factors related to exercise adherence.

Self-efficacy is another patient-related factor which influences exercise adherence. It is one of the factors which Bachmann et al. (2018) found as related to HEP adherence in adult patient populations with chronic low back pain and osteoarthritis. Picha and Howell (2018) supported this finding. These authors introduced a self-efficacy model for improvement of adherence to HEPs which posits that self-efficacy is an important patient-related barrier to HEP adherence. Picha and Howell (2018) argued that of the many barriers to exercise adherence, research supports self-efficacy as one that is amenable to clinician influence through individualized intervention. Medina-Mirapeix et al. (2017) also found support for self-efficacy as an important factor in HEP adherence in children with developmental disabilities. In a survey study with large sample size, Medina-Mirapeix et al. (2017) examined the factors which predicted parents' adherence to HEPs. They found that the predictors of adherence to the frequency component of the HEPs include the perception of barriers, self-efficacy, exercise knowledge and skills, social support, functional limitations of the child, and specific adherence-enhancing strategies of the healthcare providers. Perception of barriers and self-efficacy, on the other hand, predicted the parents' adherence to the duration component of the HEPs. Taken together, these studies established self-efficacy as a distinct patient-related factor to adherence to HEPs.

*Caregivers' perceptions of patient-related factors.* Perception of factors affecting exercise adherence can also come from caregivers of patients who receive HEP prescriptions. According to Scorrano, Ntsiea, and Maleka (2018), the stress of caregiving

significantly influenced HEP adherence among caregivers of patients with chronic conditions. Scorrano et al. (2018) interviewed seven family caregivers of adults who had a stroke to explore their perceptions of the factors which enabled or hindered their adherence to a prescribed HEP after discharge from a formal stroke rehabilitation. In this qualitative study, Scorrano et al. (2018) found that according to the caregivers, patients who survived a stroke were more adherent to a HEP if they were self-motivated to get better, received motivation from friends and family, adopted the HEPs as part of their daily routine, had high spirituality, and had caregivers who were knowledgeable of the HEPs. In addition, caregivers' willingness to help the patient get better enabled patient adherence to HEPs. On the other hand, health problems, fear of falling, and stress-related mood problems hindered the stroke survivors' adherence to HEPs. From the caregivers' point of view, physical and emotional stress related to caregiving and lack of family social support limited their adherence to HEPs.

The stress of caregiving continued to show in other studies. For caregivers of children with chronic disabilities, Rone-Adams et al. (2004) examined the relationship between caregiver stress and adherence to HEPs. The participants in this study included the primary caregivers of children with chronic disabilities due to muscular dystrophy diagnoses. In this correlational study with survey design, Rone-Adams et al. (2004) found a significant relationship between exercise adherence and caregivers' stress and family problems.

Another study made an important addition to the stress of caregiving as a patient-related factor to exercise adherence according to caregivers' perceptions. Başaran et al. (2014) examined the factors affecting adherence to HEPs in caregivers of children with

cerebral palsy. Başaran et al. (2014) surveyed 147 caregivers of children who were attending an outpatient rehabilitation and received a daily HEP prescription. In this study, Başaran et al. (2014) concluded that the severity of the child's functional limitation and caregiver's emotional exhaustion from long-term caregiving correlated with caregiver's level of adherence to HEPs. In other words, caregivers were more adherent to HEPs if their children had severe functional limitations. On the other hand, the experience of burn-out among caregivers inhibited optimum adherence. Başaran et al. (2014) advised that physical therapists identify and support caregivers who are experiencing exhaustion and burn-out to improve their adherence to HEPs. Taken together, studies on the views of caregivers revealed that caregiving stress, lack of support from family, and the severity of the patients' condition were the important factors which influenced caregivers' adherence to HEPs.

***Intervention-related factors.*** This sub-section now presents the intervention-related category of factors which influence exercise adherence. Palazzo et al. (2016) conducted a qualitative study on 29 adults with chronic low back pain to examine their perspectives of barriers to HEP adherence. In this study, Palazzo et al. (2016) identified two intervention-related barriers to HEP adherence, which were either related to the prescribed exercise program or the healthcare journey. According to Pallazo et al. (2016), patients failed to adhere to their HEPs when they experienced difficulties communicating with their healthcare providers and when they did not receive proper supervision. Similarly, patients were less adherent to HEPs when they perceived that the exercise program was ineffective, too complex to perform, boring, and had many exercises in it.

The quantity of exercises in a HEP is a consistent intervention-related factor which influences adherence. Agreeing with one of Pallazo et al.'s (2016) findings, Bachmann et al. (2018) found the same findings that the number of prescribed exercises was an intervention-related factor which influenced exercise adherence. In their review, Bachmann et al. (2018) found that adherence rate is higher when the number of prescribed exercises in a HEP is lower, and concluded that, for better adherence, a HEP should only consist of a maximum of four exercises. These researchers (Bachmann et al., 2018; Palazzo et al., 2016) found strong support for exercise overload in a HEP as a major intervention-related factor which influences exercise adherence.

Other researchers contributed other intervention-related factors in addition to exercise overload. In a focused qualitative ethnographic design, Stilwell and Harman (2017) explored the factors which facilitated or hindered adherence to prescribed home exercises from the perspectives of chiropractors and their adult patients with chronic low back pain. Stilwell and Harman (2017) found that the delivery of exercises, therapeutic alliance, and the nature of treatment influenced patient adherence to the prescribed HEPs. Also, Stilwell and Harman (2017) found from patients' perspectives that complex exercises, poor clinician explanation of the exercises, poor clinician-patient relationship, and excessive focus on passive rather than active treatment served as barriers to home exercise adherence. The findings of Beinart et al. (2013) in adult patients with chronic low back pain were in line with the findings of Stilwell and Harman (2017) on the same patient population. Beinart et al. (2013) found support for clinician supervision, as well as exercise program participation and psychological intervention participation, as important intervention-related factors associated with higher adherence. Together, these two studies

support the notion that proper clinician supervision is an important facilitator of exercise adherence.

Certain treatments may have side-effects that can impede exercise adherence. For example, Husebø et al. (2015) explored patients' perceptions of adherence to an exercise program during chemotherapy for breast cancer. In these women, Husebø et al. (2015) found that the greatest barrier to exercise adherence during chemotherapy was the negative side-effects of treatment such as nausea, vomiting, and fatigue. The presence of detrimental side-effects of cancer treatment did not allow the patients to adhere to their exercises (Husebø et al., 2015). This result suggests that certain patient populations are susceptible to low adherence to HEPs due to other treatments they receive for their medical conditions.

Researchers also sought the important role that physical therapists play in patients' adherence to HEPs. Babatunde, MacDermid, and MacIntyre (2017) examined existing studies on characteristics of the therapeutic alliance between rehabilitation therapist and patients with musculoskeletal conditions. Babatunde et al. (2017) found that evidence exists for the role of therapeutic alliance in predicting and moderating exercise treatment adherence in physical therapy. In addition, patient satisfaction with their physical therapists, physical therapists' reassessment of the HEPs, and patient understanding of the benefits of the HEPs correlated well with exercise adherence. Babatunde et al. (2017) supported the notion that a healthy patient-therapist relationship is a positive influence on patients' exercise adherence.

The communication skills of the physical therapist are also a factor to exercise adherence. Lonsdale et al. (2017) found that the communication skills of the physical

therapist influenced patients' adherence to the prescribed HEPs. In a randomized controlled trial on the effect of communication skills training on patient's adherence and clinical outcomes, physical therapists received training on communication skills which were meant to provide support and motivation to chronic low back pain patients receiving home-based rehabilitation. Lonsdale et al. (2017) found support for the hypothesis that patients under the care of physical therapists with supportive communication skills will demonstrate a higher level of self-rated adherence to therapy attendance and recommendations, including HEPs. However, the positive effect of physical therapists' communication skills on patient adherence was minimal and exerted influence on only the women patients.

Furthermore, a positive perception of the benefits of the HEPs affects adherence. Peek et al. (2018) found that the most commonly reported adherence enabler to prescribed self-management strategies is when patients perceive that the exercise program helps their conditions. This finding led the authors to advise practitioners to employ strategies which will enhance their patients' belief that the exercise program works and leads to improvement of their symptoms. Peek et al. (2018) recommended that physical therapists use any appropriate objective measure of progress to develop patients' beliefs about the positive benefits of the exercise program.

***Caregivers' perceptions of intervention-related factors.*** Researchers have explored the perceptions of factors affecting exercise adherence among caregivers of patients who received HEP prescriptions. In a study on parents of young children with disabilities, Lillo-Navarro et al. (2015) employed a modified grounded theory approach to explore the parents' perceptions of the HEPs which physical therapists prescribe, and the

effect of these perceptions on their adherence to such programs. In this qualitative study, 28 parents of young children with physical disabilities participated in six focus groups.

According to Lillo-Navarro et al. (2015), parents reported that the characteristics of the prescribed HEPs and physical therapists' teaching style influenced their adherence.

Within the theme of characteristics of the HEPs, parents expressed their preferences for simple exercises and those which they experienced as beneficial. They also perceived that exercises took precious time away from other important daily family activities and put an excessive burden on the children's body. On the other hand, within the theme of physical therapist's teaching style, parent participants believed that their adherence to HEPs was better when they perceived that the physical therapists supported their confidence in performing the exercises, taught them how to incorporate the exercises into the child's daily routine; and positively reinforced their adherence (Lillo-Navarro et al., 2015). The results of this study support the idea that positive experience of the HEPs and the therapist's teaching style is a positive influence on exercise adherence among parents of children with disabilities.

In clinical practice, the awareness of the numerous factors that account for patient's adherence level to HEPs is an important asset for physical therapists who desire to enact individualized strategies to improve patient's adherence behavior to HEPs. In summary, this section on factors associated with adherence to HEPs revealed that the reasons for adherence to the prescribed HEPs are multifactorial (Beinart et al., 2013), encompassing both patient-related (Başaran et al., 2014; Rone-Adams et al., 2004; Scorrano et al., 2018) and intervention-related factors (Babatunde et al., 2017; Lillo-Navarro et al., 2015; Lonsdale et al., 2017) which vary based on patient populations

(Husebø et al., 2015; Medina-Mirapeix et al., 2017; Saner et al., 2018). As with the literature on predictors of adherence to HEPs, limited studies exist on the factors associated with adherence to HEPs in the pediatric physical therapy population (Başaran et al., 2014; Lillo-Navarro et al., 2015; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). Qualitative studies (Husebø et al., 2015; Lillo-Navarro et al., 2015; Palazzo et al., 2016; Saner et al., 2018) predominate in elucidating these factors from the perspectives of the patients, their caregivers, or the healthcare provider (Baima et al., 2017; Başaran et al., 2014; Stilwell & Harman, 2017).

**Trajectory of adherence to HEP.** Research studies have shown that adherence to the prescribed HEPs declines in time. Nichols, Williamson, Toye, and Lamb (2017) conducted a qualitative study to explore the experiences of 14 participants who completed an exercise program trial study and received instruction to continue unsupervised home exercises for 12 months. Nichols et al. (2017) interviewed the participants at 4-month- and 12-month- time points to gather data on their experiences over time as well as to keep track of the number of participants who remain adherent to the HEPs. Only 11/14 (78.6 percent) and 7/13 (53.8 percent) of participants continued exercising at four and 12 months, respectively. Although Nichols et al. (2017) did not describe the level of adherence of the remaining participants who continued to exercise over time, the results of the study showed a steady decline in the individuals who remained adherent to HEPs in the long-term.

Other researchers have explored the trajectory of adherence to HEPs. In a randomized controlled trial comparing adult participants with chronic health conditions allocated to a gym-based and a home-based maintenance exercise programs, Jansons,

Robins, et al. (2017) examined long-term adherence and clinical outcomes up to one year. Participants in the home-based exercise group received five telephone follow-up supervisions only within the first 10 weeks of the exercise program which consisted of one hour of exercises in three days of the week. Jansons, Robins, et al. (2017) found that at the end of the study, the proportion of fully adherent participants was only 33%. This number is similar to what Del Corral et al. (2018) found in their study on short- and long-term adherence to a video game HEP in young individuals aged 7-18 years with cystic fibrosis. After six weeks of training, the intervention group received instruction to continue the program at a lower weekly frequency for up to one year. Del Corral et al. (2018) found that while adherence to the six-week training period was 95%, adherence declined to 35% at 12-month follow-up.

On the other hand, Houghton et al. (2018) found a higher rate of adherence of 47% to a 6-month program of home and group exercise intervention for children with juvenile arthritis, and that these number decreased over time. The same pattern of decline in adherence to HEPs appeared in another adult patient population. Huang et al. (2015) examined adherence trajectory in women diagnosed with breast cancer to a HEP consisting of home walking designed to increase in time and intensity over time progressively. Within the 12-week observation period, Huang et al. (2015) found a high adherence rate of 99.4% on the third week which progressively declined to 50% on the last week, leading to a conclusion that in this patient population, exercise adherence declined over time as a function of an increase in exercise demand. The decline in exercise short-term exercise adherence also shows in long-term adherence.

In a large-scale, long-term longitudinal study, Saida, Sørensen, and Langberg (2017) delivered a physical therapist-supervised exercise intervention program on 214 community-dwelling sedentary adults and examined their adherence to a recommendation to continue exercising unsupervised for 12 months after completion of the intervention program. Saida et al. (2017) used a single item questionnaire to assess exercise adherence at 12-month follow-up and discovered that only 48% of the participants remained adherent to the exercise recommendation at 12 months. This consistent pattern of decline in the adult population also manifests in other populations.

In the pediatric patient population, Liem et al. (2017) conducted a recent study on the feasibility of a home-based aerobic exercise program in adolescents with sickle cell anemia. In this study, 10 adolescents age 13 to 21 years participated in a 12-week individualized training program which consisted of three sessions per week of stationary bicycling. The participants received supervision in the form of weekly home visits which reduced to biweekly visits with alternating weekly phone calls in the second half of the program. At 12-week follow-up, Liem et al. (2017) found that although the cycling exercise program was feasible in this pediatric population, short-term adherence to prescribed sessions declined from 100% adherence in the first half of the program (week 1-6) to 83% in the second half of the program (week 7-12). Adherence to prescribed target exercise duration also declined significantly from 86% in the first half of the program to 53% in the second half. Liem et al. (2017) attributed the decline in short-term adherence to the home program in this patient population to the difficulty of maintaining a higher exercise intensity in the second half of the program or to the decline in the adolescent's interest and motivation. Liem et al.'s (2017) findings, together with those of

Del Corral et al. (2018) on children with cystic fibrosis and Houghton et al. (2018) on children with juvenile arthritis, support the notion of a consistent declining trajectory of adherence to HEPs in the pediatric patient population.

It is evident from the findings across all the included studies in this section that adherence to the prescribed HEPs declines in the short-term and long-term despite supervision. It is also apparent that the authors of the longitudinal studies in this section examined short-term adherence for up to three months (Huang et al., 2015; Liem et al., 2017) and long-term adherence up to 12 months (Del Corral et al., 2018; Jansons, Robins, et al., 2017; Nichols et al., 2017; Saida et al., 2017). Based on the collective findings of all the studies in this section, HEP adherence followed a declining trajectory over time regardless of duration and patient population. This notion led researchers to find the most effective strategies to improve HEP adherence, which is the topic of the next section.

**Interventions to improve adherence to HEP.** Poor adherence to the prescribed HEPs has led researchers to venture on effectiveness studies on strategies that physical therapists can employ to improve patient adherence. This section presents a summary and synthesis of studies on interventions aimed to maximize adherence to prescribed exercises. This section starts with a historical account of the systematic review and meta-analysis of clinical trials on improving exercise adherence to elucidate a trend in research on the topic in the past decade. Individual studies on adult and pediatric patient populations then follow and ends with this author's synthesis of the present status of the literature on adherence to HEPs.

*Systematic reviews and meta-analyses.* In 2010, the Cochrane Database of Systematic Reviews published an intervention review summary of clinical trials which

examined the effects of various strategies to support adults with chronic musculoskeletal pain conditions adhere to prescribed exercises and physical activity. Jordan et al. (2010) included 42 trials in this review which predominantly focused on osteoarthritis and spinal pain conditions. Jordan et al. (2010) found the following findings: (a) interventions helped improve adherence, (b) graded progression of activity improved adherence, (c) adherence was not dependent on the type of exercises, (d) cognitive behavioral therapy (CBT) was effective only on people with whiplash disorders, (e) supervised and individualized exercises helped improve adherence, and (f) self-management techniques may improve adherence. This review culminated into a recommendation that future studies should address long-term exercise adherence and the use of valid measures of exercise adherence.

More systematic reviews on exercise adherence emerged in the field of physical therapy several years after the Jordan et al. (2010) study. In 2015, Ezzat et al. (2015) reviewed the interventions to improve exercise adherence in people with various arthritic conditions and concluded that insufficient evidence existed to recommend a specific strategy to improve exercise adherence in this population. Ezzat et al. (2015) recommended that clinicians who prescribe exercises should consider the proper measurement of exercise adherence, the multiple factors influencing adherence, and the theoretical foundation guiding their intervention. This systematic review continued to show the lack of progress in proper measurement of exercise adherence and the importance of using theory to guide research endeavors on strategies to improve adherence.

In the same year, McGrane, Galvin, Cusack, and Stokes (2015) published a review with meta-analysis of 14 trials which examined the benefit of adding motivational strategies to usual physical therapy interventions to improve exercise adherence.

McGrane et al. (2015) found that for people with a variety of health conditions, adding a motivational component to routine physical therapy interventions can improve patient adherence to prescribed exercises, promote self-efficacy, and reduce long-term activity limitations. The authors advised physical therapists to use motivational strategies based on sound theoretical underpinnings to optimize exercise adherence in their patients. Adding motivational strategies was the important contribution of this meta-analysis.

Recent systematic reviews contributed important findings to the literature on interventions to improve adherence to prescribed exercises. Peek et al. (2016) found evidence to support four strategies as helpful in improving exercise self-management. These strategies include goal-setting, monitoring and feedback system, provision of written instructions, and the use of behavior-based strategies with follow-up supervision or sessions. Contrary to the findings of McGrane et al. (2015), Peek et al. (2016) did not find support for motivational strategies to improve long-term adherence in physical therapy patients. Peek et al.'s (2016) study, however, found more support for the benefit of behavioral-based strategies which earlier had limited application in adherence interventions (Jordan et al., 2010).

In 2017, additional systematic reviews supported the benefits of behavioral-based strategies found in earlier studies. Nicolson et al. (2017) conducted a meta-analysis on interventions to improve exercise adherence in adults with musculoskeletal conditions of more than three months in duration. Nicolson et al. (2017) found that behavioral

strategies, graded exercises, and follow-up sessions were helpful for people with arthritis, while motivational strategies were helpful for people with low back pain. In another review, Cole, Robinson, Romero, and O'Brien (2019) found support for behavioral strategies such as goal-setting, problem-solving, and feedback on improving self-efficacy to improve treatment adherence in those with chronic upper limb rheumatoid arthritis. Focusing specifically on adult patients with knee osteoarthritis, Triggs (2017) found that a combination of individualized exercises, education, and self-management advice works in increasing exercise adherence in this population.

More systematic reviews provided interesting results on the topic of improving adherence to HEPs. In 2018, Meade, Bearne, Sweeney, Alageel, and Godfrey (2018) focused their review on behavior change techniques (BCT) to improve exercise adherence in adults with various chronic musculoskeletal conditions. Out of eight randomized controlled trials, Meade, Bearne, Sweeney, et al. (2018) found moderate evidence supporting the benefit of BCTs such as goal-setting, social support, and behavior instruction, demonstration, and practice in increasing exercise adherence. Regarding the use of multimedia in improving adherence, Emmerson, Harding, and Taylor (2019) found that when compared to verbal or written instructions, the use of multimedia approaches may result in better adherence to HEPs, but concluded that insufficient evidence exists on whether this approach has a positive effect on patient outcomes.

A summary of the presented systematic reviews and meta-analysis of clinical interventions to improve patient adherence to prescribed exercises reveals several key points. First, there is a lack of a validated instrument to measure exercise adherence

properly (Ezzat et al., 2015; Jordan et al., 2010). Second, clinical studies on strategies to enhance exercise adherence concentrated on adult participants with chronic musculoskeletal conditions (Cole et al., 2019; Ezzat et al., 2015; McGrane et al., 2015; Meade, Bearne, Sweeney et al., 2018; Nicolson et al., 2017; Peek et al., 2016; Triggs, 2017). Third, although multiple strategies have varying evidence on usefulness to improve exercise adherence, no single strategy was beneficial for all patient populations (Cole et al., 2019; Ezzat et al., 2015; McGrane et al., 2015; Meade, Bearne, Sweeney et al., 2018; Nicolson et al., 2017; Peek et al., 2016; Triggs, 2017). Four, the use of theory to guide interventions, behavioral change strategies, and individualization of approach has increased over the years in improving adherence in the adult population (Ezzat et al., 2015; Meade, Bearne, Sweeney et al., 2018; Triggs, 2017). Finally, the use of multimedia approaches is a promising intervention to improve adherence to HEPs (Emmerson et al., 2019).

***Individual studies.*** Recent individual studies on HEP adherence have contributed new knowledge on clinical strategies to improve patient adherence. In a clinical trial involving adult patients receiving outpatient hand therapy, Murphy (2016) examined the effect of signing a contract at the onset of the therapy episode on patient's adherence to the prescribed frequency and repetitions of the HEPs. Murphy (2016) found that signing a contract with a written explanation of the importance of HEPs did not affect patient adherence to HEPs. However, patients in the test group had significantly higher perceptions of improvement in functional status at discharge than the patients in the control group. This study underscores the positive effect of signing a contract on

functional outcomes and the limited validity of weekly logs in capturing HEP adherence among study participants.

Recent studies have reported higher levels of adherence to HEPs using protocols which included higher levels of supervision than usual care. In a study on patients with mild to moderate stroke, Gunnes et al. (2018) combined regular monthly personal and phone consultations with a physical therapist with individualized goal-setting and motivational interviewing techniques to achieve 80% long-term adherence to weekly HEPs. Suzuki et al. (2019) found 97% to 100% adherence rate to a 4-week HEP in adults with pre-radiographic knee osteoarthritis which the authors believed was due partially to e-mail contact and support provided early in the program. Also, this study required participants to perform only a few exercises (i.e., three exercises for the intervention group and one exercise for the control group) once a day for only five days of the week. Lacroix et al. (2016) found a comparable level of high HEP adherence to a balance and strength training among community-dwelling older adults who received regular phone calls every two weeks to control the participants exercise performance. Furthermore, among adults with multiple sclerosis, Kinnett-Hopkins and Motl (2018) found 77% adherence rate to strengthening HEPs and 63% adherence rate to aerobic HEPs which included six individualized phone behavioral coaching and access to a social media support group. Collectively, these studies support the benefit of professional supervision, in combination with other strategies, in producing high adherence levels to the prescribed HEPs.

The use of technology in improving exercise adherence has gained popularity as discussed below. Mobile health, or mHealth, is the use of mobile communication

technology for the delivery of health care services using devices that individuals wear, carry, or access in ecologically-valid contexts (Helbostad et al., 2017). Connected health technology using wearable sensors and monitors coupled with electronic mobile devices and applications provide a means to improve patient experience of the HEPs which may translate to improved adherence (Argent et al., 2018; Argent et al., 2019). Lambert et al. (2017) compared the effect of a HEP in the forms of a mobile phone application and a traditional paper hand-out on patients' adherence. In this study, adult participants with various musculoskeletal conditions demonstrated higher adherence level to their HEPs when delivered as an app than as a paper hand-out. However, the app-based HEP group also received regular motivational text messages. Therefore, it is not known in this study if the app itself or the motivational text messages caused an increase in patients' exercise adherence.

Argent et al. (2019) provided post-knee replacement surgery patients a sensor-based biofeedback device to use for two weeks at home. The biofeedback device was connected wirelessly to a tablet-based application which allowed patients to see an avatar of themselves performing the exercises, as well as to view their full exercise participation data. The authors measured adherence rate using usage data directly from the app and explored participants' perceptions of the device usability and experience. In this study, Argent et al. (2019) found a high adherence rate of 79% to the prescribed HEPs among those who were in the early phase of rehabilitation. Patients expressed a positive perception of usability and their experience of the system despite the presence of system crashes and user-errors. This study shows that the addition of an electronic device using

modern technology can enhance the patient experience of the HEPs and adherence rate in the short-term.

Recent studies on the use of app-based technology in improving HEP adherence in pediatric population revealed conflicting results. For parent users, the use of an app to support parents of children with sensory processing disorders complete the prescribed HEPs was helpful (Gal & Steinberg, 2018). The parent participants in this study expressed their satisfaction with the delivery of behavioral and motivational techniques through the app. Contrary to these findings, adolescent patients with painful spinal kyphosis conditions did not use an app-based HEP as prescribed during a 6-month intervention period (Zapata, Wang-Price, Fletcher, & Johnston, 2018). The adolescents in this study perceived that the app-based HEPs served as a barrier than a supportive measure in improving their adherence to HEPs.

At this point, it suits to conclude that exercise adherence requires a behavior change. According to Hay-Smith, McClurg, Frawley, and Dean (2016), education alone is insufficient to promote adherence. Physical therapists may combine education with appropriate behavior change techniques based on sound health behavior theory. Goal-setting emerged as the common behavior change technique from existing studies. Patients and physical therapist alike considered this technique as effective in improving exercise adherence (Nicolson et al., 2018). Furthermore, a combination of regular coaching and supervision, individualization of intervention, and behavioral change techniques such as motivational interviewing and goal-setting, have the potential to improve long-term home exercise adherence (Gunnes et al., 2018). Finally, the use of technology in the form of mobile health, mobile apps, and sensor-based biofeedback devices continues to grow in

application to improve exercise adherence in physical therapy (Argent et al., 2018; Argent et al., 2019; Gal & Steinberg, 2018; Lambert et al., 2017).

It is apparent that intervention to improve HEPs is multi-faceted, complex, and poses a significant challenge to physical therapist aiming to promote rehabilitation outcomes for their patients. Individualization of the clinical approach to improving adherence starts with understanding the patient's perceptions and experiences (Hay-Smith et al., 2016). Physical therapists should explore patients' perspectives to understand their point of view on factors that influence their adherence to prescribed exercises (Frawley, McClurg, Mahfooza, Hay-Smith, & Dumoulin, 2015). Exploration of patients' perspective can support individualization of approach to patient care, which in turn, can promote an improved patient-therapist relationship (Jansons, Robins, Haines, & O'Brien, 2018). This dissertation study embodied this aim of understanding the patient's perceptions and experiences to improve HEP adherence.

**Adherence in pediatric physical therapy.** The focus of this study is adherence to the prescribed HEPs among parents of children who are receiving physical therapy. Based on the studies presented so far in this literature review, it is conclusive that when compared with research on adult populations, research on pediatric populations regarding adherence to exercise interventions, particularly to HEPs, is still limited. This idea coincides with that of Tanner et al. (2017), who stated that insufficient evidence exists to understand adherence to pediatric physical therapy. Therefore, pediatric physical therapists continue to lack guidance on how to improve clinical interventions that benefit improvement in patient adherence to HEPs. This section presents recent evidence on topics and issues surrounding adherence in pediatric physical therapy and HEPs.

**Poor adherence.** Researchers have found that adherence to pediatric physical therapy HEPs is poor (Başaran et al., 2014; Houghton et al., 2018; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). In a study on stress and adherence to physical therapy HEPs among 66 caregivers of children with long-term disabilities due to muscular dystrophy, Rone-Adams et al. (2004) found that only 34% of the survey respondents followed the HEPs as prescribed. Among the remaining 66% of the caregivers who reported different levels of non-compliance with the HEPs, weekly compliance followed a declining trend as the HEP prescription frequency per week increases. In other words, more caregivers did not perform the exercises when they received instruction to perform the exercises more often during the week than those who received instruction to perform the exercises in fewer days per week. This study shows that adherence is poor to HEPs that demand more time to perform.

Results of recent studies pointed to a different point of view on HEP adherence. Houghton et al. (2018) delivered a home- and group-based exercise program for children with juvenile idiopathic arthritis (JIA) in six months, and examined its effect on children's bone health, muscle function, and clinical outcomes. In this pediatric population, Houghton et al. (2018) found that attrition rate was high, and a 6-month intervention did not change the children's bone health positively. Findings revealed that adherence to the HEPs was at 47%, and declined over time leading to a recommendation that a need exists in understanding factors related to participation in and adherence to HEPs in children with JIA.

Medina-Mirapeix et al. (2017) surveyed 219 parents of children with long-term disabilities from 18 ECI centers to examine adherence to frequency and duration

components of the physical therapy HEPs. Using a self-report questionnaire, Medina-Mirapeix et al. (2017) found that 87% of parent respondents received HEPs with instructions to perform the exercises a certain number of days a week, and 79% to perform the given exercises a certain amount of time each session. In this study, the most commonly prescribed HEPs consisted of four to eight daily exercises on walking, balance, use of hands, and sensory stimulation. Results of the study indicated that 39% of parents adhered to the frequency and duration components of the prescribed HEPs, while 26% did not adhere to both components. Medina-Mirapeix et al. (2017) also found that parent adherence to frequency per week and duration per session components of the HEPs varies. This study showed that adherence is poor to both the frequency and duration components of the HEPs.

In another study, Başaran et al. (2014) surveyed 133 caregivers of children with cerebral palsy to examine adherence level and the factors which accounted for their adherence to physical therapy HEPs. Başaran et al. (2014) asked caregivers to respond to a single adherence rate question with four reply options about whether they perform the exercises daily. In this patient population, Başaran et al. (2014) found a high adherence rate of 65% but acknowledged that a possibility of overestimation of actual adherence existed due to self-report. Furthermore, Başaran et al. (2014) did not inquire about caregivers' adherence rate as thoroughly as Medina-Mirapeix et al. (2017) and Rone-Adams et al. (2004) did in their studies. Interestingly, this study showed that caregivers of children with cerebral palsy were more adherent to HEPs when the child's physical condition and function are more involved.

***Family-centered care.*** Family-centered care is at the heart of healthcare interventions for children (Coyne et al., 2018). In this healthcare model, the family is central in the child's life, and parents assume the important caregiving role for their children. Healthcare providers design intervention plans according to the priorities of the family, and they support the family in pursuing treatment options performing their roles and responsibilities (Coyne et al., 2018). Exercise prescription following a family-centered model considers the perspectives of parents in the evaluation of the efficacy and acceptability of the intervention (Coyne et al., 2018). In the context of physical therapy, HEPs are an essential component of all physical rehabilitation interventions for children and parents are responsible for performing the HEPs that physical therapists prescribe (Picha & Howell, 2018). Full parental involvement in rehabilitation, including the performance of the prescribed HEPs, is a cost-effective means of improving clinical outcomes in children with disabilities (Gorgon, 2018). In addition, parents can report their children's adherence behaviors adequately (Cole et al., 2019). Therefore, physical therapists should consider parents' perspectives of the HEPs so that they support the important role of parents in the successful rehabilitation of children with physical therapy needs.

***Parents' perspectives of the HEP.*** Understanding parents' perspectives is paramount in a family-centered care model of pediatric healthcare intervention. Qualitative researchers have explored parents' perspectives of physical therapy intervention programs. This subsection presents the available studies on parents' perspectives of the HEPs.

One such study is the qualitative study of Birt et al. (2014). Birt et al. (2014) explored parents' perceptions of the effectiveness and acceptability of physical therapy interventions for their children with joint hypermobility disorders. In this study, parents believed that the exercise program was beneficial to their children's condition. However, despite this belief, parents experience family difficulties which lower their adherence to the prescribed HEPs. The resounding message from this study is that parents need proper supervision, sufficient education, and support on how to incorporate the HEP into the family's daily routine.

Research supports the notion that caregivers experience difficulties in caring for children with long-term disabilities. Santer et al. (2014) conducted a systematic review and performed a thematic analysis of qualitative studies on parental views of nonadherence to long-term treatment of pediatric medical conditions. Santer et al. (2014) found that parents' treatment adherence depended on multiple factors surrounding their belief about the child's condition, benefits of treatment, family needs and priorities, child's resistance, and normalcy of life for all members of the family. In this study, Santer et al. (2014) revealed that parents encountered multiple challenges in balancing multiple competing family and personal concerns which affected their decisions to adhere to treatment recommendations.

In another qualitative study, Lillo-Navarro et al. (2015) explored parents' perceptions of the physical therapy HEPs and the effect of these perceptions on adherence to HEPs using focus groups. In this study, 28 parents of children with physical disabilities and aged six months to six years at the time of the study participated in six focus groups. The children in this study received physical therapy from three ECI centers

in Spain. Using a grounded theory design, Lillo-Navarro et al. (2015) found that the characteristics of the HEPs and the teaching style of the physical therapists influenced parents' adherence to HEPs. Although Lillo-Navarro et al. (2015) did not report on findings associated with parental factors related to adherence, this study made an important contribution to the literature by showing that parents' adherence to HEPs is related to a positive experience of both the teaching style of the physical therapist and the HEPs.

Other researchers have explored parents' perspectives on physical therapy HEPs. Peplow and Carpenter (2013) used a constructivist approach to explore the lived experience of four parents regarding adherence to HEPs for their school-aged children with cerebral palsy. In this study, school-based therapists supervised the exercise programs which the parents performed at home. Using thematic analysis, Peplow and Carpenter (2013) arrived at three themes related to the HEPs, parents' feelings, and support from therapists. Although this study failed to reach saturation due to limited sample size, findings supported the tenets of family-centered care which places utmost importance on the experiences and perspectives of parents regarding adherence to the prescribed HEPs.

In summary, studies suggest that pediatric physical therapists should understand the parents' perspectives of adherence so that they can employ effective strategies to support adherence to the HEPs (Birt et al., 2014; Lillo-Navarro et al., 2015; Santer et al., 2014). This understanding encompasses, among others, the predictors of exercise adherence (Medina-Mirapeix et al., 2017), caregiver stress and burn-out (Başaran et al., 2014), parental well-being (Williams & Burnfield, 2019), parents' preferences (Gal &

Steinberg, 2018; Lillo-Navarro et al., 2015), and psychosocial factors related to motivation (Bérubé et al., 2017). Despite existing research on adherence to HEPs, Houghton et al. (2018) and Tanner et al. (2017) believed that a lot is still unknown about adherence to pediatric physical therapy HEPs. Therefore, this qualitative study aimed to contribute to the extant literature by describing parents' perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences.

**Prior experiences and adherence.** The purpose of this qualitative study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. This section of the review of the literature review expands the discussion on the relevance of prior experiences to physical therapy HEPs adherence by presenting studies on mental models and prior experiences within the field of exercise prescription and adherence. The application of these concepts in physical therapy adherence studies follows. The purpose of this section is to support the merit of this study in contributing to the existing literature on adherence to physical therapy HEPs by emphasizing the important role of prior experiences.

Researchers have considered the role of prior experiences in non-adherence to medical treatments. Vermeire et al. (2001) conducted a comprehensive systematic review of studies on compliance with medical treatments to assess the issues explaining the problem of non-compliance to prescribed medical interventions. Vermeire et al. (2001) realized that new insights on this topic came from qualitative studies which emphasized patients' beliefs about and experiences with the therapeutic regimen and the clinicians.

They posited that to improve compliance with medical treatments, clinicians should base their strategies on a thorough understanding of patients' experiences related to the medical condition, treatment, and the healthcare provider. This study was a major initiative in attempting to solve the problem of non-adherence to medical interventions.

In physical therapy, the earlier studies on adherence focused on the predictive role of prior knowledge and prior exercise behaviors on future adherence behaviors. Alewijnse et al. (2003) examined the predictors of long-term adherence to a protocol-based pelvic floor muscle exercise therapy among women with urinary incontinence. They found that after completing therapy, short-term adherence to the prescribed HEPs at three months significantly predicted long-term adherence at 12 months. Alewijnse et al. (2003) also found that prior knowledge from sex education in school was one of the predictors of adherence to therapy. Schoo et al. (2005) reinforced the findings of Alewijnse et al. (2003) on the relationship between prior and future adherence behaviors. Schoo et al. (2005) found that older adults with hip and knee osteoarthritis who were adherent to the HEPs during the first month of the exercise program were more likely to remain adherent to the succeeding month of the program.

The predictive role of prior experiences gained impetus in recent studies on adherence in physical therapy. Medina-Mirapeix et al. (2009) examined adherence rates to the frequency and duration components of the prescribed HEPs among a large sample of 184 adult patients with chronic neck or low back pain. One of the key findings in this study was that an association existed between prior experiences with a HEP and patients' higher levels of adherence to the duration component of the HEPs. This study became a part of Essery et al.'s (2017) systematic review on the predictors of adherence to home-

based physical therapy which showed that prior experiences with adherence to a HEP were one of the factors which predicted HEP adherence. Furthermore, Ormel et al. (2018) identified previous exercise experience as one of the predictors of current adherence to prescribed exercises.

Prior experiences can reflect on an individual's baseline physical status which can predict future adherence to exercises. Older adults with hip and knee arthritis were more likely to adhere to the prescribed HEPs in the short-term if they were physically active at the start of physical therapy (Schoo et al., 2005). Saida et al. (2017) examined long-term exercise adherence in adults with chronic conditions and found that those individuals who were physically active and participated in sports regularly had a higher likelihood of sustaining an increase in long-term exercise participation. Bachmann et al. (2018) supported this finding when they found that among adults with arthritis, higher physical activity at baseline predicted higher adherence to the HEPs. Exploration of patients' prior adherence behaviors became one of Bachmann et al.'s (2018) recommendations to physical therapists who wish to improve their patients' level of HEP adherence.

Indeed, patients present to physical therapy with existing conditions and predispositions as a result of their prior experiences. According to John-Henderson (2015), prior life experiences, in conjunction with instructions and observations, shape patients' cognitions and exert a strong influence on the treatment decisions they make. In physical therapy, these decisions relate to whether to adhere to advice and HEPs they received from physical therapists (Rizzo, 2015). During the treatment episode, physical therapists could shape patients' cognitions, and thereby their adherence decisions, by creating a therapeutic alliance with the therapists (Babatunde et al., 2017) that

emphasizes a positive experience of the therapists' teaching style and the content of the HEPs (Lillo-Navarro et al., 2015).

Understanding patients' cognitions culminates to the discussion of mental models. In cognitive science, mental models are mental representations of the world which humans constantly reference when making sense of a concept, process, structure, or experience (Johnson-Laird, 1983). It is a collection of implicit assumptions, knowledge, beliefs, values, and expectations that people have about all that is in existence in the world (Johnson-Laird, 1983). It is a dynamic cognitive process which is constrained by experiences (Rizzo, 2015). Prior experiences help establish mental models which subsequently guide decision-making and future behavioral responses to new experiences (Rizzo, 2015).

Rizzo (2015) created the mental models of physical therapy patient adherence to HEP. This theoretical model is new and applies concepts in social sciences to the field of physical therapy in the aspect of exercise adherence. According to Rizzo (2015), patients hold mental models of how physical therapy intervention works and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. Mental models of adherence to HEP are patients' perceptions, values, and expectations about the exercises they received as recommendations from physical therapists (Rizzo, 2015). For this qualitative study, the physical therapy recommendation was for parents to adhere to the HEPs they received from their children's pediatric physical therapist.

According to Rizzo (2015), prior adherence experiences help shape physical therapy patients' mental models which influence their adherence behavior to the

prescribed HEPs. Rizzo and Bell (2018) used Rizzo's (2015) theoretical model to describe the parallels between patients' experience with adherence to the HEPs and prior adherence experiences in personal routines or regimens. Rizzo and Bell (2018) found that prior adherence experiences in various life routines influence patients' adherence to the prescribed HEPs. In other words, a variety of prior life experiences contributes to patients' mental models of adherence to HEP. This paradigm opens a new and exciting means of understanding patient adherence to physical therapy HEPs. Given the emerging interest on the role of prior experiences in patients' treatment behaviors in physical therapy, Rizzo's (2015) theoretical model served as a fitting framework for this study which sought to answer the question of how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences.

**Methodology.** This study employed a qualitative methodology with a descriptive design. Qualitative methodology was the appropriate research methodology to structure this study which aimed to explore the perceptions of parents of children receiving physical therapy about adherence to HEPs. This section presents a synthesis of the methodologies that researchers on the topics related to HEP adherence used in prior studies. This section intends to show that qualitative methodology was the appropriate methodology for this study.

The section on this chapter on factors associated with adherence to HEPs elucidated numerous patient-related and intervention-related factors which influenced adherence to a prescribed HEP. Researchers who explored multiple factors which influenced adherence (Husebø et al., 2015; Palazzo et al., 2016; Saner et al., 2018;

Scorrano et al., 2018; Stilwell & Harman, 2017) employed a qualitative methodology. However, a limited group of researchers used the same methodology in studies which focused on examining the trajectory of adherence to HEPs (Nichols et al., 2017). Researchers on these topics also used the quantitative methodology as the researchers on the topic of interventions to improve adherence to HEPs. The goal of this study was to gain knowledge on parents' perceptions of adherence to the prescribed HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. The results of this study may support the development of a survey for larger quantitative studies on parents' adherence to HEPs in the future.

Researchers used the qualitative methodology in studies on parents' perceptions about exercise adherence, a topic similar to this qualitative study which aimed to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs. Birt et al. (2014) explored parents' perceptions of the effectiveness and acceptability of physical therapy interventions for their children with joint hypermobility disorders. Similarly, Lillo-Navarro et al. (2015) used focus groups to explore parents' perceptions of the physical therapy HEPs and the effect of these perceptions on their adherence to the HEPs. In addition, Peplow and Carpenter (2013) used a constructivist approach to explore the lived experience of four parents regarding adherence to the HEPs for their school-aged children with cerebral palsy. Finally, Santer et al. (2014) explored parents' views on adherence to treatment among children with long-term conditions using a systematic review and thematic analysis of qualitative studies on parental views of nonadherence to long-term treatment

of pediatric medical conditions. These studies show that qualitative methodology is, indeed, the appropriate methodology to explore parents' perceptions of exercise adherence as in this study.

The theoretical foundation which grounded this study was the mental models of physical therapy patient adherence to HEP (Rizzo, 2015). Rizzo (2015) stated that "Future research using this perspective should define mental models of adherence via qualitative or other means designed to capture patients' prior experiences and perspectives of adherence" (p. 258). Rizzo and Bell (2018) applied this model in a qualitative study to explore the parallels between patients' experience with adherence to HEPs and prior adherence experiences in personal regimens. Rizzo's (2015) recommendation, in combination with studies which focused on the exploration of patients' and parents' perceptions of physical therapy interventions and HEP, provides a strong justification that qualitative methodology was the best methodology for this study.

**Instrumentation.** This study had two sources of data. The primary research data came from individual semi-structured phone interviews with open-ended questions and written sentence completion tasks using a sentence completion task form. The sentence completion tasks provided analyzable data that documented parents' knowledge, beliefs, and attitudes of adherence to the prescribed HEPs in writing. In addition, demographic data collection proceeded before the phone interviews and sentence completion tasks, which gathered information on the child's age, reason or diagnosis for receiving physical therapy, date of onset of physical therapy services, and the parent type (i.e., mother, father, both parents, or legal guardian) who was primarily responsible for the HEP.

Semi-structured interviews were the primary source of data in recent qualitative studies on patients' perceptions about exercise adherence. Researchers used individual semi-structured interviews to gather data on perceptions about topics related to home-based exercise adherence in adults with chronic health conditions (Jansons et al., 2018), rheumatoid arthritis (Nichols et al., 2017), chronic low back pain (Palazzo et al., 2016), and acute orthopedic conditions (Rizzo & Bell, 2018). Semi-structured interviews were also the main source of data in a recent study on caregivers' perceptions of exercise adherence (Scorrano et al., 2018) and clinicians' perceptions of patient adherence to HEPs (Serpanou et al., 2019; Stilwell & Harman, 2017). Similarly, Peplow and Carpenter (2013) used open-ended semi-structured interviews to explore perceptions of adherence to HEPs among parents of children with cerebral palsy. These studies show that semi-structured interviews are the appropriate source of data exploration of patients' perceptions of exercise adherence as in this qualitative study.

Aside from semi-structured interviews, other qualitative studies used focus groups to gather data on the patients' views of adherence to the prescribed HEPs. These include the study on parents of children with physical disabilities (Lillo-Navarro et al., 2015) and the other on women with breast cancer (Husebø et al., 2015). While focus groups is a viable option to collect data for this study, the preponderance of studies which used individual semi-structured interviews in qualitative studies on adherence to HEPs as discussed earlier justifies semi-structured interviews as the method of choice for this study.

Sentence completion task was the other source of data for this study. The exhaustive review of the extant literature on exercise adherence did not reveal qualitative

studies which used sentence completion for data collection. However, studies support the validity of using sentence completion as a qualitative research method in exploring participants' perceptions, feelings, and experiences (Ellis, 2018; Goelema et al., 2018; Kujala, Walsh, Nurkka, & Crisan, 2014; Piotrowski, 2018). Sentence completion as a means of data collection was unique to this study, as it provided important, analyzable qualitative data which were not obtainable in other self-report types of data collection such as interviews and focus groups.

### **Summary**

This chapter on literature review culminates to a summary of the key points of the extant literature supporting the relevance of this study. Synthesis of the recent literature on exercise adherence led to the gap which this study addressed. Despite the numerous studies on the topic of exercise adherence, more information is needed to know how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017).

Long-term exercise adherence requires a behavior change, and education alone is insufficient to promote adherence (Hay-Smith et al., 2016). Individualization of clinical approaches to improving adherence starts with understanding the patient's perceptions and experiences (Hay-Smith et al., 2016). Therefore, physical therapists should explore patients' perspectives to understand their perceptions that influence their adherence to prescribed exercises (Frawley et al., 2015).

This qualitative descriptive study addressed the stated gap in literature and used the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) to frame

the study's research questions, emphasizing the role of prior experiences on parents' perceptions of adherence, in the form of knowledge, beliefs, and attitudes towards the prescribed HEPs. More research is needed to understand adherence to prescribed exercises in the pediatric physical therapy patient population (Tanner et al., 2017). Qualitative methodology is the recommended methodology to explore physical therapy patients' adherence to the prescribed HEPs (Rizzo, 2015).

The literature addressed several key topics on patient adherence to HEPs. A HEP is a vital component of all physical therapy plan of care offering numerous clinical benefits for the patient (Ashari et al., 2016; Ferre et al., 2017; Miller et al., 2017). Despite the benefits, adherence to HEPs in physical therapy remains low (Anar, 2016; Azevedo et al., 2018; Miller et al., 2017). Abundant research exists on the topics of predictors of adherence to physical therapy interventions, the factors associated with adherence to HEPs, the trajectory of adherence to HEPs, and the interventions to improve adherence to HEPs. Synthesis of the presented studies in this literature review revealed a lack of a gold standard in the valid measurement of exercise adherence (Newman-Beinart et al., 2017), as well as a relative lack of research on strategies to enhance exercise adherence in pediatric patient population compared to the adult population (Cole et al., 2019; Ezzat et al., 2015; McGrane et al., 2015; Meade, Bearne, Sweeney et al., 2018; Nicolson et al., 2017; Peek et al., 2016; Triggs, 2017).

Qualitative data collection strategies such as semi-structured phone interview and sentence completion task were the appropriate methods for this study. As used in recent studies related to patient exercise adherence, semi-structured interviews provided data on parents' perceptions of adherence (Peplow & Carpenter, 2013). Sentence completion

tasks provided direct insight into the parents' description of their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs in writing. It was not the intent of this study to evaluate the accuracy of parents' performance of the HEPs against an established plan of care or a written HEP, nor measure the participants' adherence level to the prescribed HEPs. The researcher did not employ document review as a means of data collection for this study. Both interview and written sentence completion task data collection methods provided important qualitative data to answer the study's two research questions pertinent to the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs.

The purpose of this study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. There were similarities between this study and the study of Lillo-Navarro et al. (2015) regarding the target population and methodology. However, Lillo-Navarro et al. (2015) employed focus groups to explore parents' perceptions of adherence to the physical therapist-prescribed HEPs and reported findings limited to the characteristics of the HEPs and the teaching style of the physical therapists. Lillo-Navarro et al. (2015) did not consider the role of prior experiences in their study. In contrast, this qualitative study explored the same parent perceptions of the prescribed HEPs using semi-structured phone interviews and sentence completion tasks with an emphasis on prior experiences using the mental

models of physical therapy patient adherence to HEP (Rizzo, 2015) as a theoretical framework.

A recent qualitative study used the same theoretical framework (Rizzo & Bell, 2018). Based on the theoretical framework and the context (i.e., physical therapy), this study has similarities with the study of Rizzo and Bell (2018). However, this study explored perceptions of HEP adherence among parents of children receiving physical therapy using semi-structured phone interviews and sentence completion tasks. In contrast, Rizzo and Bell (2018) employed semi-structured interviews and applied Rizzo's (2015) theoretical model to adult physical therapy patients with acute orthopedic conditions.

The role of prior experiences on adherence to physical therapy HEPs is relevant and important (Alewijnsse et al., 2003; Essery et al., 2017; Medina-Mirapeix et al., 2009; Medina-Mirapeix et al., 2017; Rizzo, 2015; Rizzo & Bell, 2018; Schoo et al., 2005). Prior life experiences shape patients' cognitions and exert a strong influence on the treatment decisions they make (John-Henderson, 2015; Rizzo, 2015). In this regard, exploration of prior experiences offers a different and potentially illuminating path to understanding patient adherence to the prescribed HEPs in the pediatric physical therapy population. Consequently, this study aimed to fill an existing gap in the literature on understanding adherence to prescribed exercises in the pediatric physical therapy patient population (Tanner et al., 2017). This endeavor could potentially benefit the development of effective strategies for improving parents' adherence to HEPs to ultimately improve clinical rehabilitation outcomes for children receiving physical therapy. The next chapter describes the research methodology for this qualitative descriptive study, including the

research design, target population, sample, sources of data, data collection, data analysis, and ethical considerations.

## Chapter 3: Methodology

### Introduction

Chapter 3 of this dissertation provides a detailed discussion of the scientific conduct of this study to allow a clear understanding of its purpose, and the means of achieving this purpose through systematic steps and procedures. The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy home exercise programs (HEPs) with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of the United States. This study explored the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs, using a framework that considers the role of prior experiences on exercise adherence (Rizzo, 2015). This phenomenon is important in the promotion of exercise adherence and the development of effective strategies that might improve clinical outcomes for pediatric patients receiving physical therapy.

This chapter presents the methodology of this study. The chapter opens with the problem statement and research questions that will guide data collection. Then follows the discussion of the qualitative research methodology and the appropriateness of the descriptive design to support the purpose statement of the study. The chapter continues with the details of the ethical conduct of sample selection of the parents of pediatric patients, semi-structured phone interviews and sentence completion tasks as sources of qualitative data, data collection and management, and qualitative data analysis

procedures. It also shows the elements of trustworthiness that will give confidence to the results of data analysis. The chapter ends with the methodological limitations and delimitations of this study. Overall, the overarching goal for this chapter is to show the exact details of the strategies and methods of this study to allow any research replication endeavors in the future.

### **Statement of the Problem**

The problem that this study addressed is that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). While a HEP is an essential component of an effective physical therapy rehabilitation (Ashari et al., 2016), parent adherence to HEPs is unsatisfactory (Medina-Mirapeix et al., 2017) and more research is needed to understand adherence to prescribed exercises in this patient population (Tanner et al., 2017). Prior adherence experiences influence physical therapy patients' adherence to the prescribed HEPs (Rizzo & Bell, 2018). As the literature needs more research to understand adherence to pediatric physical therapy HEPs (Medina-Mirapeix et al., 2017), this study aimed to understand how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on their prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs.

The goal of this study was to explore important parent perceptions of adherence to HEPs that might explain their current adherence behaviors to the prescribed HEPs. More

specifically, it was interesting to know how parents describe their knowledge and understanding of adherence to the prescribed HEPs and the HEP itself, as adequate knowledge of the details of the HEPs and how to perform the exercises properly relates to better adherence to such regimen (Saner et al., 2018). It was also the goal of this study to explore parents' beliefs about the HEPs, its importance and benefits to the physical rehabilitation of their children, and whether these beliefs are conducive or not to optimum adherence to the HEPs. It was equally important to understand whether parents' have positive or negative attitudes about the prescribed HEPs, which might explain their current adherence to the HEPs. The parents' knowledge, beliefs, and attitudes about the HEPs are their mental models the HEP which influence adherence decisions and behavior (Rizzo, 2015). Following the tenets of Rizzo's (2015) theoretical model, it was a primary goal of this study to explore parents' prior experiences which led to these perceptions. Understanding parents' mental models of adherence to pediatric physical therapy HEPs based on prior experiences might contribute important knowledge to the existing literature on rehabilitation strategies aimed to improve parent adherence in the pediatric physical therapy patient population.

The field of pediatric physical therapy may benefit from the results of this study in terms of improving the assessment of parents' adherence behavior, and the development of effective strategies to improve clinical rehabilitation outcome for their children (Lillo-Navarro et al., 2015; Medina-Mirapeix et al., 2017). Thus far, no existing studies exist in the extant literature on pediatric HEP adherence which applied the Rizzo's (2015) mental models of physical therapy patient adherence to HEP as a theoretical framework. Rizzo's (2015) recent theoretical model was a fitting framework

for this study as it will help pediatric physical therapists maximize patient benefits from HEPs through exploration of important parent psychological factors such as prior experiences and mental models. In addition, this study was the first study to apply this theoretical model in the field of pediatric physical therapy.

### **Research Questions**

The theoretical foundation for this study (Rizzo, 2015) which links mental models, prior experiences, and current physical therapy exercise adherence behavior, grounded the research questions of this study. For this qualitative study, the phenomenon of interest was understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. For this study, the parents' perceptions are their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs for their children. An adequate understanding of this phenomenon required the following research questions:

RQ1: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

RQ2: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

The research questions guided the important methodological strategies of this study. A qualitative approach to data collection suited the need to describe parents' knowledge, beliefs, and attitudes about adherence to the prescribed physical therapy HEPs. This approach followed a qualitative descriptive design which combines the balance between description and interpretation sought by researchers who seek to

describe an individual's perception of an experience or a phenomenon (Sandelowski, 2000). The individual parents of children receiving physical therapy was the population of interest and the unit of analysis of this study. Semi-structured phone interviews and sentence completion tasks were the two primary methods which provided the data for this qualitative study (Guest et al., 2013). Semi-structured phone interviews provided the primary data on parents' description of their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. On the other hand, sentence completion tasks contributed additional data on parents' written description of their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs. Taken together, the methodological strategies briefly discussed so far aligned appropriately with a qualitative research methodology.

### **Research Methodology**

A qualitative methodology is a suitable research methodology to achieve the goal of understanding a phenomenon (Patton, 2015). For this study, the phenomenon of interest was understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. As a structure that guides inquiries, qualitative methodology guides researchers who pursue the goal of understanding the meaning of human actions (Schwandt, 2007). For this study, the human action of interest was adherence to the prescribed HEPs. According to Patton (2015), researchers use qualitative research methodology to explore and understand the meaning and perspectives that people construct of their experiences and the context within which these experiences unfold. This study aimed to explore parents' description of their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on

prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs.

Schwandt (2007) described qualitative inquiry as a study that gathers nonnumerical qualitative data. It contrasts with a quantitative inquiry which relies on numerical data (Guest et al., 2013). According to Guest et al. (2013), qualitative researchers rely on nonnumerical data which can take the form of texts, images, or sounds. Schwandt (2007) described qualitative data as data which are in the form of words, and which researchers acquire using qualitative methods. For this study, the nonnumerical qualitative data came from semi-structured phone interviews with open-ended questions and sentence completion tasks.

A qualitative methodology focuses on meaning and understanding. Merriam and Tisdell (2016) wrote that “qualitative researchers are interested in understanding the meaning people have constructed” (p.16). In other words, as people live in this world, they experience the world and everything in it, and they create meaning and understanding of these experiences. In this study, the experience of interest for the parents was the receipt of physical therapy intervention for their children. More specifically, the intervention was the prescription of HEPs. The focus of this study was on understanding the meaning parents’ have constructed of their experience of adherence to the prescribed HEPs for their children.

Researchers used the qualitative methodology in studies on parents’ perceptions of exercise adherence. Birt et al. (2014) explored parents’ perceptions of the effectiveness and acceptability of physical therapy interventions for their children with joint hypermobility disorders. Similarly, Lillo-Navarro et al. (2015) used focus groups to

explore parents' perceptions of the physical therapy HEPs and the effect of these perceptions on their adherence to the HEPs. Moreover, Peplow and Carpenter (2013) used a constructivist approach to explore the lived experience of four parents regarding adherence to HEPs for their school-aged children with cerebral palsy. These studies provide additional justification that qualitative methodology is the fitting methodology for exploring parents' perceptions of exercise adherence as in this study.

This study did not pursue a quantitative methodology on purpose due to several reasons. First, it was not the intent of this study to collect numerical data, the type of data which quantitative researchers gather to answer research questions (Guest et al., 2013). Second, the focus of this study was to understand a phenomenon and not to conduct an experiment nor test a hypothesis requiring the strict control of participant behaviors (Yin, 2014). Third, this study focused on meaning and understanding of parents' experience of adherence to HEPs and not on knowing the effects of adherence interventions (Gal & Steinberg, 2018), quantifying adherence levels (Kruger et al., 2018), nor finding relationships between adherence-related variables (Başaran et al., 2014; Lonsdale et al., 2017; Nava-Bringas et al., 2016). Finally, statistical generalization was not one of the aims of this study. According to Yin (2014), quantitative inquiries aim for statistical generalization of study results to a larger population, instead of analytic generalizations common to qualitative inquiries. Analytic generalization involves expanding the application of theories (Yin, 2014). In this study, analytic generalization took the form of contributing to the expansion of mental models of physical therapy patient adherence to HEP (Rizzo, 2015) in the pediatric physical therapy population. These reasons show that for this study, qualitative methodology was indeed, the appropriate methodology to

explore parents' perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs.

### **Research Design**

This study used a qualitative descriptive design. This research design combines the balance between description and interpretation sought by researchers who seek to describe an individual's perceptions of an experience or a phenomenon (Sandelowski, 2000). Qualitative description is a valuable method of accurately presenting the facts of an event, a case, or a phenomenon in a naturalistic manner (Sandelowski, 2000). Qualitative researchers who employ this design render the meanings that participants express in words in a manner that matches everyday language (Sandelowski, 2000). Free of highly abstract interpretation, qualitative description allows researchers to remain close to the facts of the data during analysis, allowing a kind of interpretation which researchers and readers can agree on easily (Sandelowski, 2000). Furthermore, qualitative descriptive research filters the description and interpretation of data according to a preset theoretical framework. In this study, this framework was Rizzo's (2015) mental models of physical therapy patient adherence to HEP.

Qualitative description allows a straightforward yet comprehensive description of participants' views (Sandelowski, 2000). Researchers in the healthcare field have used qualitative description to explore patient and clinician experiences, perceptions, and beliefs (Cheng et al., 2018; Marshall et al., 2018). Although this study is within the field of physical therapy, it was not a healthcare clinical study. The purpose of this study was to explore parents' description of their perceptions of adherence to pediatric physical

therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. In this study, the parents' perceptions were their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs for their children. The target population of interest for this study consisted of parents or legal guardians of children who had been prescribed a HEP by physical therapists or physical therapist assistants. Accordingly, the individual parents of children receiving physical therapy were the unit of analysis of this study. Qualitative description allowed for a comprehensive analysis of parents' description of their views about HEP adherence.

In this study, the parents' perceptions were in the form of knowledge, beliefs, and attitudes about adherence to prescribed exercises for their children. Using a qualitative description, this study provided an accurate, unadorned, yet comprehensive accounting of parents' knowledge, beliefs, and attitudes about the HEPs that physical therapists and physical therapist assistants prescribed. Data on the parents' perceptions did not come from answers to a defined self-report questionnaire as in a survey study (Medina-Mirapeix et al., 2017), but from semi-structured phone interviews with open-ended questions and sentence completion tasks to gather as much data from the participants (Sandelowski, 2000). Thus, although qualitative descriptive research design is minimally interpretative, it provides researchers with rich analyzable data for a comprehensive, accurate account of one's perceptions, views, or experiences.

Qualitative description of parents' perception of adherence to the prescribed HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs was the aim of this study.

This study did not explore the essence of the lived experience of the participants as in phenomenology (Merriam & Tisdell, 2016). This study did not explore the narrative stories of parents' life events and episodes as in narrative inquiries (Merriam & Tisdell, 2016). Still, this study did not take a case study design approach to evaluate a physical therapy process or program in-depth using multiple sources of data (Yin, 2014). Nor this study developed a theory or model using iterative data collection techniques to describe the phenomenon of adherence to HEPs as in grounded theory inquiries (Merriam & Tisdell, 2016). Rather, this study aimed to describe the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using a framework that considers the role of prior experiences on exercise adherence (Rizzo, 2015). Therefore, the qualitative descriptive design was the appropriate research design for this study according to the goal that it hoped to achieve.

### **Population and Sample Selection**

Participant selection for this qualitative study followed predetermined criteria that were relevant to the study objective. The target population for this study were the adult parents or legal guardians of children receiving physical therapy in a suburban region of a southern state of the United States, and who received a physical therapy HEP prescription. The researcher aimed to recruit a sample size of 20 parents or legal guardians from the target population to provide sufficient qualitative data for the study. The predetermined sampling criteria for this study included adult parent or legal guardian participants who read, speak, and write English, with children aged between one month to 17 years who were under outpatient physical therapy services, and who had been

prescribed a HEP by a physical therapist or physical therapist assistant. These participants comprised the small, homogenous group of individuals whom the researcher hoped to recruit to provide the sources of data to meet the objectives of this study.

The methodology guided the sampling selection for this study. According to Guest et al. (2013), small sample sizes are suitable for collecting data in qualitative studies. The concept of saturation is important in qualitative studies to ensure that researchers gather adequate and quality data to support the study objectives (Saunders et al., 2018). After 10 weeks of data collection and obtaining only 10 participants, the researcher believed that the target number of 20 participants could not be realized. According to GCU guidelines for qualitative descriptive studies, learners should pursue a minimum of 20 participants to recruit, but must have a minimum of 10 participants in the final sample. Thus, the researcher decided that data collection was complete after meeting the university guideline on the required minimum number of participants. For this study, a final sample of 10 participants provided the data from semi-structured phone interviews and sentence completion tasks.

Convenience sampling strategy was the sampling approach for this study. This study employed convenience sampling strategy (Patton, 2015) using predefined qualification criteria to screen for potential participants who have similar characteristics. These characteristics were as follows: (a) an adult parent or legal guardian of a child with an age between one month to 17 years old, (b) the child receives outpatient physical therapy, (c) the parent or legal guardian received instruction on a HEP for the child from a physical therapist or a physical therapist assistant, and (d) the parent or legal guardian speaks, reads, and writes English. Convenience sampling with defined criteria guided the

recruitment procedures of potential participants. Given the predetermined sampling criteria, the plan was to recruit as many participants as possible and seek a minimum final sample size of 10 participants.

Recruitment of participants proceeded in a predefined systematic manner. Recruitment began after obtaining approval from the GCU Institutional Review Board (IRB). Appendix B shows the evidence of this IRB approval. Six outpatient rehabilitation facilities in the suburban region of a southern state of the United States were the recruitment settings for this study. These sites are providers of pediatric physical therapy in the target location of this study.

The first phase of sample selection started with the researcher meeting in person with the site administrators or directors. During these meetings, the researcher requested access to the target population by discussing the purpose and nature of the study, the GCU IRB approval, the scientific contribution of the results of the study, and sources of data. Also shared were the details of the sample selection process, informed consent process, confidentiality, and ethical considerations. The request also included the collection of minimal demographic information, qualification criteria for participants, and data collection procedures. The goal at this point in sample selection was to gain approval to conduct the study on parents or legal guardians, whose children were currently receiving outpatient physical therapy services. The site administrators or directors wrote site authorization letters as an evidence that they approved the study and that they were willing to support the researcher in the recruitment process. Appendix A shows a copy of the site authorization letters.

The second phase of sample selection started upon receipt of GCU IRB approval. The site administrators or directors authorized the researcher to post recruitment posters with or without pull tabs (see Appendix G) on the site lobby or waiting rooms. Participants initiated contact with the researcher via e-mail or phone to express their willingness to participate in the study. For the interested participants who initiated contact with the researcher by phone, the researcher verified that the interested participants met all qualification criteria and explained the details of the study. Explanation of the details of the study included the informed consent process, confidentiality, data collection method using recorded phone interview and written sentence completion task, data storage security, and the use of identification numbers instead of names for participant identification. For the interested participants who initiated contact with the researcher by e-mail, the researcher asked the interested participants' phone number and contacted the interested participants by phone to verify that they met all qualification criteria and to explain the details of the study.

Upon receipt of verbal agreement by phone to participate in the study, the researcher asked for the interested participants' home address to send the informed consent form and the sentence completion task form by regular mail with a postage-paid return envelope. The researcher then completed the demographic form for the participant by phone. An option to complete the informed consent online through e-mail using DocuSign (2019) was offered to the interested participants. All participants chose to receive the informed consent form via DocuSign (2019). After receiving the signed informed consent form online via DocuSign (2019) and the completed sentence completion task form by mail, the researcher contacted the participants by phone to

schedule the phone interview. Scheduling of the phone interview data collection was according to the convenience of the participants. The researcher also sent a copy of the signed informed consent form to the participants as soon as possible via DocuSign (2019). This completed the second phase of the sample selection process.

### **Sources of Data**

This study had two sources of qualitative data to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs. The sources of data for this study came from individual, semi-structured phone interviews with open-ended questions using an interview guide and from written sentence completion tasks using a sentence completion task form. The researcher also collected minimal demographic information by phone from the participants who consented to participate in the study. The demographic information included the child's age, the reason/s for receiving physical therapy, the date when the child started receiving physical therapy, and the parent who was responsible primarily for the HEP. This qualitative descriptive study had two research questions: (a) How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?, and (b) How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? Qualitative methodology, purpose statement, and research questions guided the selection of sources of data for this study.

**Interviews.** Individual, semi-structured phone interviews with open-ended questions provided the majority of qualitative data for this study. This method of data collection aimed to address the first and second research questions of this study.

According to Guest et al. (2013), depth is a main methodological objective in qualitative studies and to achieve this aim, interviews are an excellent means of generating data to understand a phenomenon of interest. The important features of the phone interviews in this study were the following: (a) one-on-one basis, (b) use of open-ended questioning, (c) use of inductive probing questions to obtain depth in phone interview data (Guest et al., 2013), and (d) use of a conversational style to build and maintain rapport. The phone interviews also followed an interview guide approach to allow comprehensive and systematic data collection (Patton, 2015).

Researchers develop interview questions in advance in studies that use an interview guide approach (Patton, 2015). The researcher developed the interview questions specific for the study based on the interview questions used in existing qualitative studies which explored patient or parent perceptions of the prescribed HEPs. These qualitative studies include the study on patients with adults with rheumatoid arthritis (Nichols et al., 2017), adults with chronic low back pain (Stilwell & Harman, 2017), children with physical disabilities (Lillo-Navarro et al., 2015), children with cerebral palsy (Peplow & Carpenter, 2013), and adults with acute orthopedic conditions (Rizzo & Bell, 2018). Appendix D displays the interview guide for this study.

This study employed measures to ensure the credibility of the interview guide and the sentence completion task form. The first credibility check for the interview guide was expert panel review. Before data collection, the interview guide underwent an expert panel review. The researcher identified and contacted three researchers on the topic of exercise adherence, with one of them being an expert in qualitative design. Appendix F

lists the names and the credentials of these experts. The researcher sought feedback from the expert panel for any necessary improvement of the interview guide.

The interview guide and the sentence completion task form underwent field testing. After revision of the interview guide from expert panel review, the researcher field tested the interview guide and the sentence completion task form on one parent who is not a part of the study sample but meets the study qualification criteria. For field testing, the researcher followed the exact procedures of formal data collection in terms of the administration of the instruments and ethical guidelines as delineated later in this paper. The goals of field testing were to discover weaknesses in the data collection instruments and instructions and to make improvements before the formal data collection. The researcher did not record the phone interview as the intent of the phone interview field testing was not to collect data. The researcher wrote field notes throughout phone interview field testing. For the sentence completion task form, the researcher went through the form with the field test parent over the phone. The researcher obtained informal feedback from the field test parent about the clarity of the questions, word choices, and instructions. As compensation for participation in field testing, the field test parent received \$25 Visa gift card via regular mail each for the phone interview and the sentence completion task. Field testing informed the necessary revisions and improvement of the data collection instruments. Appendices D and E show copies of the interview guide and sentence completion task form, respectively.

Formal data collection began after receipt of GCU IRB approval. Interview of the participants for the formal data collection proceeded in a predefined systematic manner. After the collection of signed informed consent forms via DocuSign (2019) and

completed sentence completion task forms by mail, the researcher interviewed the participants by phone using the same interview guide. All phone interviews occurred while the participants were at home or in their preferred environment. Phone interviews lasted an average of 48 minutes and were audio-recorded using the Rev Call Recorder app (2019). The researcher did not write field notes during the phone interviews to maintain focused attention on the participants' responses and to allow the timely use of inductive probing questions (Guest et al., 2013).

**Sentence completion task.** The other source of data came from sentence completion tasks which parents completed in writing to describe their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs. This method of data collection aimed to address the two research questions of this study. Studies support the validity of using sentence completion as a qualitative research method in exploring participants' perceptions, feelings, and experiences (Ellis, 2018; Goelema et al., 2018; Kujala et al., 2014; Piotrowski, 2018). Sentence completion as a means of data collection is unique to this study, as it provided analyzable qualitative data which were not obtainable in other self-report types of data collection such as interviews and focus groups. In this regard, a sentence completion task was a descriptive endeavor which aligned with the design of this study.

This study used a sentence completion task form. Appendix E displays the sentence completion task form. Participants completed three hanging sentences to provide qualitative data on their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs in a written form. The three sentence stems include the following: "*I believe that following the home exercise plan is ...*", "*My experience of following the*

*home exercise plan was ...*”, and *“For any parents who are having difficulty following the physical therapy home exercise plan, my advice for them would be ...”*. The first sentence stem *“I believe that following the home exercise plan is ...”* aimed to extract information for the study’s first research question, How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? The second sentence stem *“My experience of following the home exercise plan was ...”* aimed to provide information for the study’s second research question, How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? Finally, the third sentence stem *“For any parents who are having difficulty following the physical therapy home exercise plan, my advice for them would be ...”* was geared to provide information addressing both research questions. The sentence completion task form underwent field testing as a credibility measure as the interview guide.

Participants completed the sentence completion tasks on an earlier date ahead of the phone interviews. The order of data collection in this study, wherein participants completed the sentence completion task first, followed by the phone interview, was intentional. Following the advice of Guest et al. (2013), the researcher did not provide a copy of the interview guide to the participants in advance of the phone interview to prevent leading participants’ responses and to allow spontaneity during the interview. However, knowledge of the interview questions and topics has the potential to facilitate richer responses during the interviews (Guest et al., 2013). The completion of sentence completion tasks before the phone interview served this purpose. In addition, research

interviews may appeal to potential participants as stressful and time-consuming (Guest et al., 2013). The researcher believed that starting data collection with a less time-consuming sentence completion task mitigated this notion. Finally, the researcher believed that the order of data collection facilitated the speed of completion of data collection, as the completion and return of the sentence completion task forms was a requirement to proceed with the scheduling of the phone interviews.

The researcher sent the sentence completion task forms to the participants via regular mail. The participants completed the sentence completion task form on their own at a time and day of their choosing. The sentence completion task form contained clear directions on how to complete the three sentence stems. An instruction to respond quickly without thinking too long follows the method of sentence completion in the study of Kujala et al. (2014). This method of sentence completion allows for participant responses matching the typical responding in verbal research interviews where participants receive the question and respond promptly in however ways they wish. Ample space was provided after each sentence stems to encourage participants to elaborate further their responses to the three sentence stems. After completing the written sentence completion task, the participants mailed the form back to the researcher in a postage-paid envelope.

### **Trustworthiness**

The trustworthiness of the qualitative inquiry is the responsibility of the researcher (Morse, 2015). Qualitative researchers must ensure that adequate verification and evaluation mechanisms are in place to ensure the trustworthiness of the study (Morse, 2015). According to Morse (2015), verification strategies must be built into the design and conduct of the methodology of a qualitative inquiry. The researcher employed

several measures of trustworthiness to ensure balance, fairness, and neutrality (Patton, 2015) in the methodological procedures of this study.

**Credibility.** Credibility refers to the researcher's accurate representation of the participants' perspectives in qualitative studies (Patton, 2015). Credibility in qualitative inquiries supports validity, or the soundness of an empirical study (Merriam & Tisdell, 2016). The researcher ensured credibility in the results of this study by representing the perceptions of the participants in the most accurate way possible. The use of sentence completion task helped to accomplish this goal as participants had the opportunity to express their perspectives in writing in addition to expressing their views verbally as responses to the phone interview questions.

Sampling adequacy also supported the credibility and transferability of an inquiry (Morse, 2015). In this study, the researcher allowed enough time for the conduct of the phone interviews to allow deep engagement and collection of rich data to reach data saturation. Moreover, audio-recording of the phone interview in this study avoided researcher recall bias and allowed highlighting of exact participant language that supported emergent categories during data analysis.

Triangulation, or the use of more than one sources of data, strengthens the credibility of a study as another source of data can compensate for the shortcomings of another (Patton, 2015). Recall and self-presentation bias may limit the credibility of the interview data (Patton, 2015). The use of another source of qualitative data, such as a written sentence completion task completed on a different day and in a different context as the phone interview, limited the impact of the limitations inherent in the phone interview data and allowed a more credible representation of participants' perceptions of

the topic of interest. In this study, data from a simple sentence completion task as a means for participants to express their perceptions and experiences in writing corroborated the phone interview data that pertain to the same topic.

**Transferability.** Transferability refers to the applicability of the findings of the qualitative study to similar cases or contexts (Patton, 2015). Both transferability and credibility support the validity of a qualitative inquiry (Merriam & Tisdell, 2016). In addition to employing sampling adequacy to support transferability as discussed earlier, this study adopted a systematic methodology and described it in sufficient detail. The detailed description of the methods of this study supported transferability (Morse, 2015). This process will allow other researchers to evaluate whether the findings of this study can compare with the findings of other studies based on the similarity in context and sampling. The results of this study have the potential to elucidate a detailed understanding of parents' adherence to pediatric physical therapy HEPs which may prove useful to pediatric physical therapists and physical therapist assistants who wish to improve their patients' clinical outcome. Furthermore, the detailed description of methodology in this study may allow replication of the results of this study, ensuring dependability and confirmability—two concepts which relate to reliability.

**Dependability.** Dependability is a criterion of reliability in qualitative inquiry (Morse, 2015). Dependability ensures that the methods of the study are written in such detail that researchers who wish to repeat the study will obtain the same results (Morse, 2015). Dependability in research relates to the fairness of the study (Patton, 2015). This study ensured dependability by describing the processes of sampling selection, data collection, and data analysis in sufficient detail to allow readers to develop a thorough

understanding of the step-by-step methods of these processes. The appendix section of the dissertation manuscript shows copies of the interview guide and sentence completion task form that the researcher used for data collection. The appendix also shows the informed consent form that all participants signed to show that study participation was voluntary and that the study followed established ethical guidelines. This detailed description created an audit trail, which eliminates the suspicion of fraud in the conduct of independent research and shows that the researcher followed established research practices honestly, systematically, and properly.

In this study, repeated coding during data analysis was an additional evidence of dependability. Schreier (2012) recommends repeated coding in intervals of 10-14 days apart to ensure coding reliability (Schreier, 2012). The researcher performed repeated coding according to Schreier's (2012) recommendation during the initial phase of building the coding frame for the phone interview data. This process ensured reliability in data analysis, especially when only one researcher conducts a study (Schreier, 2012). Dependability also supports confirmability, another quality criterion of reliability in qualitative research (Patton, 2015).

**Confirmability.** Confirmability guarantees that the results of the qualitative study truly reflect the perspectives of the participants and not of the researcher (Shenton, 2004). Together with dependability, confirmability allows other researchers to replicate the results of qualitative studies (Shenton, 2004). According to Patton (2015), researcher bias is a threat to qualitative inquiries, where the researcher is the primary instrument of research. The researcher in this study adopted the attitude of emphatic neutrality, an inquiry stance during data collection to allow an authentic understanding of participants'

perceptions (Patton, 2015). Emphatic neutrality helped the researcher of this study maintain watchful awareness of personal biases and selective perception (Patton, 2015). Ultimately, the pursuit of emphatic neutrality ensured that the results of this qualitative study truly reflected the perspectives of the participants and not of the researcher.

Triangulation and support for external audits were two additional pieces of evidence of confirmability in this study. External audit support for this study reflects on showing readers and external auditors the step-by-step procedures of decision-making in data analysis (Morse, 2015). The detailed description of the creation of the coding frame and how data was reduced to categories and then to subcategories (Schreier, 2012) were evidence for external audit support for this study. Interested readers can confirm the findings of this study through external auditing and review of the evidence in the appendix section of the dissertation manuscript. In this study, the use of more than one source of data also supported confirmability through triangulation (Patton, 2015). For triangulation, the researcher used the sentence completion task data to supplement and compare the phone interview data on parents' perceptions of adherence to the prescribed HEPs. The majority of the stated quality strategies to ensure the trustworthiness in this study occurred primarily in the data collection phase of the methodology.

### **Data Collection and Management**

The researcher of this study aimed to collect data of sufficient quantity and quality to answer the study's research questions. The researcher conducted all the phone interviews and sentence completion tasks to gather data without the use of a research assistant or a hired interviewer. Data collection began with the procurement of required authorizations. The first authorization came from pediatric organizations where

participant recruitment occurred. Six outpatient rehabilitation facilities in the suburban region of a southern state of the United States were the recruitment settings for this study. These organizations provided site authorization letters to GCU IRB to inform of their approval of the study and of their support in the recruitment of study participants. Appendix A shows the copies of the site authorization letters. The second authorization came from GCU IRB. The researcher obtained approval from GCU IRB to begin the data collection phase of this study. The overarching goal of obtaining this approval was to ensure the protection of study participants according to established guidelines for the conduct of ethical research. Appendix B shows the evidence of this IRB approval. Data collection began upon receipt of GCU IRB approval.

Data collection started with the recruitment of the participants. Recruitment of participants occurred through six outpatient rehabilitation facilities in which the researcher had no existing employment relationships. The site administrators or directors of the outpatient rehabilitation facilities authorized the researcher to post a recruitment poster on the clinic lobby or waiting rooms. The participants initiated the first contact with the researcher via e-mail or phone to express their interest in participating in the study.

When the interested participants initiated contact with the researcher by phone or e-mail, the researcher verified by phone that the interested participants met all qualification criteria, and explained the details of the study. Explanation of the details of the study included the informed consent process, confidentiality, data collection method using phone interview with app-based digital recording and sentence completion task in writing, data storage security, and the use of identification numbers instead of names for

participant identification. Upon receipt of verbal agreement by phone to participate in the study, the researcher completed a demographic information form (see Appendix H) for each participant, consisting of minimal information such as the child's age, reason or diagnosis for receiving physical therapy, date of onset of physical therapy services, and the parent type (i.e., mother, father, both parents, or legal guardian) primarily responsible for the HEP.

Participants were given the option to receive the informed consent form by mail or via DocuSign (2019). All participants opted to receive the informed consent form via DocuSign (2019). The informed consent form described the details of the study, the qualification criteria, the role of the researcher, the risks associated with participating in the study, the confidentiality of participant information, the use of data in a publication, and the consistent use of identification numbers instead of names from data collection to publication. The researcher obtained the participants' home address by phone and sent the sentence completion task form by regular mail with a postage-paid return envelope.

After receiving the signed informed consent form online via DocuSign (2019), the researcher sent a copy of the signed informed consent form to the participants via DocuSign (2019) as soon as possible. After receiving the completed sentence completion task form by mail, the researcher contacted the participants by phone to schedule the phone interview. Scheduling of phone interviews proceeded according to the convenience of the participants. The final sample for this study consisted of 10 adult parent participants who consented in writing to participate in this study and subsequently provided the data for the study.

**Interviews.** The phone interviews of the 10 participants proceeded in a predefined systematic manner. The researcher used the interview guide, which underwent prior credibility measures such as expert panel review and field testing. All phone interviews occurred while the participants are at home or in their preferred environment. Phone interviews started with the researcher reminding the participants that they can withdraw from participation freely at any time without any consequences to them. App-based audio-recording of all phone interviews took place using the Rev Call Recorder app (2019). Phone interviews lasted from 36 minutes to 60 minutes long, with an average phone interview duration of 48 minutes and 30 seconds long. The researcher did not write field notes during the recorded phone interviews to maintain focused attention on the participants' answers to questions and to allow the timely use of inductive probing questions (Guest et al., 2013). The researcher wrote field notes immediately after the conclusion of the phone interviews to document personal reflections about the interview process.

The researcher expressed appreciation to the participants upon the conclusion of phone interviews and gave the participants the option to receive \$75 Amazon e-gift card via text or a \$75 Visa gift card by regular mail as compensation for participation in the study. The researcher sent the gift cards as soon as possible after the phone interviews according to each participant's choice. Within four days of sending out the gift card, the researcher contacted the participants to verify that the gift cards were received.

**Sentence completion task.** The sentence completion task for the 10 participants also proceeded in a predefined systematic manner. The researcher used the sentence completion task form (see Appendix E). All sentence completion tasks occurred in

writing after the participants signed the informed consent form. Participants completed the sentence completion task on their own time without interactions with the researcher. The focus of the sentence completion task was the parents' description in writing of their perceptions and experiences of adherence to the prescribed HEPs for their children. All sentence completion tasks preceded the phone interviews on an earlier date.

**Data management.** The management of all collected data in this study followed systematic procedures for data preparation and storage. According to the guidelines of Guest et al. (2013), the researcher kept a data tracking log at the beginning of data collection. Each participant received a unique participant ID number which was used to label any physical data and recruitment documents. The researcher created a filing system which organized all data according to participant ID numbers. The researcher kept this filing system in a dedicated and secure location, with a security lock, and accessible only to the researcher. The researcher maintained the filing system for this study for three years. After three years, all data were destroyed appropriately through paper shredding, digital file overwriting, or digital storage reformatting to render all data unrecoverable. A systematic organization of collected data using data tracking log and filing system facilitated efficient record-keeping, data monitoring, and data analysis.

Data preparation preceded data analysis. All phone interview Rev Call Recorder app (2019) digital audio files underwent transcriptions using Rev.com online transcription service, which signed a non-disclosure confidentiality agreement with the researcher. Transcription of phone interview audio data followed a strict confidentiality measure of using unique participant ID numbers for each participant instead of real names, as well as masking of proper names that will lead to personal identification of the

participants and their children. The researcher reviewed the accuracy of online transcription outputs against the original Rev Call Recorder app (2019) digital files for all phone interview data. Data analysis followed after data transcription.

### **Data Analysis Procedures**

The purpose statement, research questions, and research design guided the data analysis approach of this study. The purpose of this qualitative descriptive study was to explore parents' description of their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. The phenomenon of interest was understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. An adequate understanding of this phenomenon required the following research questions: (a) How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?, and (b) How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. In-depth semi-structured phone interviews and written sentence completion tasks were the two sources of data which underwent analysis to answer the stated research questions.

Analysis of the phone interview transcripts and the completed sentence completion task

data addressed the two research questions of this study. Taken together, the important elements of this qualitative descriptive study supported the choice of data analysis approach for the collected data.

This study employed qualitative content analysis (QCA) approach in data analysis of the two sources of data. Sandelowski (2000) recommends QCA for data analysis in qualitative descriptive studies. QCA is the strategy of choice when research questions are descriptive, and the creation of coding frame calls for a combination of deductive concept-driven and inductive data-driven methods (Schreier, 2012). Vaismoradi, Turunen, and Bondas (2013) describe overlapping similarities between content analysis and thematic analysis as valid approaches in qualitative descriptive studies, pointing to the former as more appropriate for studies that aim for higher levels of description than interpretation.

According to Vaismoradi et al. (2013), QCA serves studies that aim to explore the word pattern and trends, frequency, and relationships in the textual data conceptually. According to Schreier (2012), the emphasis on the latent meaning, in contrast to the literal meaning, is one of the primary distinctions of QCA from quantitative content analysis. QCA is a data analysis approach that is both partly data-driven and concept-driven, considers as much context as possible in understanding the data, and employs double-coding as an important quality criterion (Schreier, 2012). Most importantly, the QCA approach involves reduction and summarization of data with a focused analysis only on parts of the data that relevant to the research questions, and interpretation of the meaning of these parts of data to suit the qualitative intent of a study (Schreier, 2012).

QCA follows a systematic and reliable approach to data analysis. As the first step, the researcher read all the phone interview transcripts, the completed sentence completion tasks data, and researcher's post-interview field notes to obtain a sense of the whole data (Vaismoradi et al., 2013). The researcher used MAXQDA (VERBI Software, 2018) for data analysis. Building a unidimensional and exhaustive coding frame was the next step to start structuring and filtering the textual data (Schreier, 2012). The researcher built the initial coding frame using the phone interview data. This study followed the guidelines of Schreier (2012) in creating the coding frame.

The next step was deciding the structure of the coding frame. This study used a combination of data-driven and concept-driven strategies to create the categories and subcategories for the coding frame (Schreier, 2012). Vaismoradi et al. (2013) used the QCA terms categories and subcategories as equivalent to thematic analysis terms themes and subthemes, respectively. For this major step in QCA, the researcher selected five phone interview transcripts for building the coding frame. The researcher then created categories and subcategories for the coding frame, with appropriate category descriptions.

Coding, segmentation of the phone interview transcripts to identify the units of coding and the creation of categories and subcategories occurred simultaneously and iteratively. Segmentation of the interview transcripts to identify the units of coding was the next step in QCA (Schreier, 2012). Units of coding are segments of the data of each unit of analysis that researchers can categorize according to the coding frame (Schreier, 2012). The researcher conducted a pilot phase to evaluate the soundness of the coding frame (Schreier, 2012). The researcher performed the trial coding of the coding frame twice, 10 days apart, to ensure coding reliability (Schreier, 2012). The results of the pilot

phase informed the revision and finalization of the coding frame for use in all qualitative data of this study.

The main analysis phase is the heart of QCA. This phase is the culmination of the systematic and reliable procedures to create a sound coding frame (Schreier, 2012). The researcher applied the coding frame to all the phone interview transcripts first, followed by the sentence completion task data. The researcher finalized the matrix of frequency counts across the categories in MAXQDA to transform the level of analysis from the units of coding to the level of units of analysis (Schreier, 2012). This process allowed for counting the frequency of occurrence of subcategories and gave an overview of all the results of QCA (Schreier, 2012). Completion of this step concluded QCA, which led the researcher to present a structured narrative summary of the results of QCA to answer the research questions of this study.

This study employed a QCA approach in data analysis of the primary sources of data to answer the study's research questions. The researcher also collected minimal participant demographic data to give additional information on the contexts of this study. The demographic information included the child's age, reason or diagnosis for receiving physical therapy, date of onset of physical therapy services, and the parent type (i.e., mother, father, both parents, or legal guardian) primarily responsible for the HEP. The researcher presented a narrative and tabular summary of the nominal and numerical information in the sample demographic data using descriptive statistics. Chapter 4 provides a full description of the data analysis procedures and the results of this study.

## **Ethical Considerations**

Established guidelines in the conduct of ethical research guided the entire methodology of this study. Embodied in the study's research problem, questions, and design was the researcher's concern for beneficence, which in this study was to elucidate human perceptions of an important construct that will have a positive effect on the lives of children. In this study, ethical consideration started with the identification of the target population. Sampling focused on parents and not on children to protect the well-being of minors from research participation (Department of Health and Human Services, 2009). Data collection occurred using phone interviews and sentence completion tasks while participants were at home or in their preferred environment to allow participants to continue their child caregiving roles and prevent undue hardships of research participation somewhere else. Collection of more than one source of data minimized researcher bias and allowed a more in-depth understanding of the phenomenon of interest (Patton, 2015). The detailed descriptions of participant selection, data collection, and data analysis supported external audits (Morse, 2015), which ensured trustworthiness in the conduct of this study and showed that the researcher followed ethical research practices.

This study sought approval from GCU IRB as a major test of the ethicality of the study's methodology according to Belmont principles (Belmont Report, 1979). The researcher followed the procedures outlined in the approved proposal. No form of data collection commenced before receipt of GCU IRB approval. Once GCU IRB approval was obtained, the researcher followed any applicable HIPAA guidelines (Department of Health and Human Services, 2013) that applied to the population of interest. Although this study was within the field of physical therapy, it was not a healthcare clinical study.

The researcher did not review patient charts to access any protected health information and physical therapy plan of care for any participants of the study. The researcher did not inquire on any protected health information from the organizations where participant recruitment occurred, including existing patient caseloads and number of patients that met the study qualification criteria. In addition, the researcher did not disclose to site administrators or directors the participation of their patients to the study. Furthermore, the researcher believed that the site administrators or directors did not make any extraordinary effort to increase the participation of their patients to the study. Finally, the site administrators or directors did not receive monetary incentives or promise from the researcher for their assistance in the recruitment of participants.

The researcher respected participants' autonomy by obtaining a signed written informed consent form from all participants before data collection. The informed consent highlighted the voluntary nature of research participation. The researcher prevented coercion in research participation by reminding participants at the beginning of the phone interview that their participation was completely voluntary and that they had the right to withdraw from participation at any time when desired without any repercussions. More importantly, as delineated in the informed consent form of the study, participants whose child was a present or was a previous patient of the researcher within the last 12 months of data collection were excluded from participation. This exclusion criterion applied to patients who were associated with the researcher's current place of employment during the conduct of the study. As delineated clearly in the informed consent form, the participants received monetary compensation for participating in the study, in appreciation of their time, and for voluntarily sharing their perspectives. The participants

did not receive any more compensation other than what they agreed to receive according to the informed consent. The researcher did not believe that the amount of compensation for participation, as approved by GCU IRB, exerted any coercive influence on the participants for initiating and completing participation in the study.

Participation in research may expose participants to certain risks. This study aimed to minimize participants' exposure to risks following federal regulations governing the protection of human participants in research (Department of Health and Human Services, 2009). GCU IRB approval was an evidence that this study met the criteria for a sound and ethical research design. The only risks or discomforts that participants were to expect for participation in this study was the loss of time during participation and undue interruption of their routine child caregiving duties. It was reasonable to consider that due to the nature of data collection procedures involved in this study (i.e., phone interview), participants might feel uncomfortable being interviewed. The researcher mitigated these issues by using the informed consent process, establishment of rapport, assurance of strict safeguarding of participants data, reminding participants of their right to withdraw from participation at any time without any repercussions, and ensuring them that no data sharing will occur outside of the GCU dissertation body.

The researcher made it clear to the participants of his strict role as a researcher and not as a physical therapist clinician. This role as a researcher was delineated clearly in the informed consent form. The researcher did not provide any physical therapy professional advice or instructions throughout data collection. A system was put in place that if participants had any clinical inquiries during phone interviews, the researcher will direct them to express these inquiries to the attending physical therapists or physical

therapist assistant of their children, and that the researcher will not answer any participant questions related to physical therapy for their children.

Confidentiality is an important component of the informed consent process. The informed consent accentuated the highly confidential nature of research involvement to all participants. The researcher showed respect for participants' privacy and anonymity by using identification numbers instead of names consistently from data collection, transcription, data analysis, reporting of results, and future publication. Full protection of participant identity occurred through the removal or masking of any proper names or indicators that may lead to public identification of the participants. No entities other than the GCU dissertation body had access to participants' research information. The researcher kept a filing system of all participants' research data in paper form in a dedicated and secure location in his residence, with a security lock, and will be accessible only to the researcher. The researcher maintained the paper filing system for this study for three years.

The researcher also kept all participants' electronic research data in a computer with password protection accessible only to the researcher. After completion of the study, all electronic data were transferred to a portable hard drive with password-protection and accessible only to the researcher. This portable hard drive was maintained in the same filing system as the paper data. The researcher maintained the filing system all data, in paper and electronic forms, for three years. After three years, all data were destroyed appropriately through paper shredding, digital file overwriting, or digital storage reformatting to render all data unrecoverable. Appendix A, B, and C show the evidence of site authorizations, IRB approval, and Informed Consent form, respectively.

## Limitations and Delimitations

**Limitations.** This study involved several limitations related to methodology. While statistical generalization is not a goal of qualitative inquiries, qualitative researchers can strive for analytic generalizations which involves expanding the application of theories (Yin, 2014). In this study, analytic generalization took the form of contributing to the expansion of mental models of physical therapy patient adherence to HEP (Rizzo, 2015) in the pediatric physical therapy population. The sampling frame of this study may not reflect the pediatric physical therapy population at large due to convenience sampling.

Still related to sampling, participants characteristics and motivations posed as limitations of this study. It was possible that participants who agreed to participate in this study were the ones who were highly adherent to the prescribed HEPs. The resulting corpus of data for this study then may not have included the views of those who were less adherent to the HEPs. Furthermore, the researcher discussed the compensation to the participants during recruitment. It was unknown if compensation was the primary motivator for participation to the detriment of expressing honest views that may benefit children who receive pediatric physical therapy.

The small final sample size of this qualitative study was another limitation. Researchers can opt to increase the sample size to achieve data saturation (Saunders et al., 2018). With 10 participants in the final sample, this study met the minimum GCU requirement for sample size but did not benefit from the richness and depth of data that could have come from having a larger sample size. This limitation, however, was mitigated by a large volume of data collected in the phone interviews, which far exceeded

the GCU minimum requirement. In addition, no new information emerged from analysis of the data from the tenth participant, which indicated that data collection achieved the point of data saturation (Saunders et al., 2018).

The use of interviews and sentence completion tasks as the sources of qualitative data were also an inherent limitation in this study. While the researcher assumed that participants were honest in their responses during the phone interviews and sentence completion tasks, social desirability bias among study participants exists and may lead to dishonest responses (Guest et al., 2013). In this study, the use of sentence completion task as another source of qualitative data directly from the participants taken from a separate day and context as the phone interviews helped to mitigate social desirability bias (Guest et al., 2013) as participants described their perceptions and experiences in two different forms of expression—verbally during phone interviews and in writing during sentence completion tasks, to add credibility to understanding the parents' perceptions of adherence to the prescribed physical therapy HEPs.

**Delimitations.** This study also had limitations that were under the researcher's control. Participant selection was also a source of delimitation for this study. This study focused on participants who speak, read, and write English, missing the views of those who do not speak, read, and write the language. The researcher could have included non-English speaking participants in the sampling frame and use a translator. However, the researcher did not pursue this option as the use of a translator creates bias in data presentation (Guest et al., 2013).

The use of QCA approach in data analysis was another source of delimitation in this study. According to Schreier (2012), QCA discards irrelevant parts of the data as it

focuses only on relevant parts of the data that answer the research questions. It was possible that in-depth phone interviews in this study yielded participant insights into other important topics surrounding the topic of exercise adherence. Although these other topics might be of real importance to the participants and thus have empirical merit, this study followed the guidelines of QCA (Schreier, 2012) and focused only on contents that answered the study's research questions.

The method of data collection was a delimitation of this study. In this study, the interviews occurred using a telephone while participants were at home or in their preferred environment. Body language and cues are important in establishing rapport during face-to-face interviews (Farooq & De Villiers, 2017). By using the telephone method to gather interview data, this study limited the researcher's access to participants' body language and cues, which limited the creation and maintenance of rapport and use of inductive probes. The researcher mitigated these issues by following the strategies recommended by Farooq and De Villiers (2017) on effective communication using the telephone in qualitative research which include listening carefully, articulating interview questions clearly, maintaining an interested tone, and communicating presence throughout the interview.

The sentence completion task as a form of data collection was a significant delimitation of this study in several ways. Unlike the high volume of data collected from the phone interviews, the amount of data collected from sentence completion tasks was small due primarily to the instrument developed and used for the study. The form contained only three sentence stems. Although the direction on the form was clear, the direction prompted participants to reply quickly, which may have limited the depth and

richness of written responses. The name of the data collection itself carried a connotation favoring single-sentence replies. Furthermore, although additional lines followed every sentence stem to encourage participants to express themselves more in writing, the structure of the form may have significantly limited the volume of participant responses. Nevertheless, the researcher believed that the sentence completion tasks, as employed in this study, provided important written qualitative data that came directly from the participants and served the purpose of triangulation of verbal responses obtained from the phone interviews. Finally, the researcher is the instrument of research (Patton, 2015), and this in itself was a delimitation. Researchers influence the quality of participant responding, and thus the quality of collected data (Patton, 2015). In this study, the researcher adopted the attitude of emphatic neutrality to help the researcher maintain a watchful awareness of personal biases and selective perception (Patton, 2015) and allow participants to express their views as naturally as possible. The researcher of this study is an experienced physical therapist who is a board-certified clinical specialist in pediatric physical therapy. The clinical experience of the researcher with the patient population of this study reflected in the amount of collected data from the phone interviews.

Furthermore, the clinical experience of the researcher also influenced the understanding and subsequent analysis of the collected data from sentence completion tasks and phone interviews. According to Patton (2015), the rigor of data analysis depends on the skills and experience of the researchers. For this study, the researcher performed the data analysis by himself and did not seek assistance from experts in data analysis, particularly in QCA. To mitigate this delimitation, the researcher took advantage of the written guidelines, which Schreier (2012) provided sufficiently on how

to conduct QCA as an individual. Chapter 4 expands on the limitations of this study related to data analysis.

### **Summary**

This chapter provided a detailed discussion of the scientific conduct of this study to allow a clear understanding of its purpose, and the means of achieving this purpose through systematic steps and procedures. The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to improve parent adherence to HEPs, in a suburban region in a southern state of the United States. This study explored the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs using a framework that considers the role of prior experiences on exercise adherence (Rizzo, 2015). This phenomenon was important in the promotion of exercise adherence and the development of effective strategies that may improve clinical outcomes of pediatric patients receiving physical therapy.

The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). Guided by a theoretical foundation which links mental models, prior experiences, and current physical therapy exercise adherence behavior (Rizzo, 2015), this study aimed to answer two research

questions: (a) How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?, and (b) How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? A qualitative methodology was a suitable research methodology to achieve the goal of understanding a phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs to ultimately improve parent adherence to HEPs. According to Patton (2015), researchers use qualitative research methodology to explore and understand the meaning and perspectives that people construct of their experiences and the context within which these experiences unfold.

A qualitative descriptive design structured this study. This research design combines the balance between description and interpretation sought by researchers who seek to describe an individual's perception of an experience or a phenomenon in a manner that matches everyday language, free of highly abstract interpretation (Sandelowski, 2000). Qualitative description allows researchers to remain close to the facts of the data during analysis, allowing a kind of interpretation which researchers and readers can agree on easily (Sandelowski, 2000). This design aligned with participant selection and the data collection methods of this study. Although this study is within the field of physical therapy, it was not a healthcare clinical study.

Using predetermined criteria, participant selection for this study focused on a small, homogenous group of 10 English-speaking adult parents of children aged 18 months to 11 years old who were receiving physical therapy, who received a physical therapy HEP prescription in a suburban region of a southern state of the United States.

Convenience sampling strategy (Patton, 2015) was the sampling approach for this study. Individual, semi-structured phone interviews with open-ended questions and written sentence completion tasks were the sources of data for this study.

Data collection and analysis in this study followed systematic, ethical, and trustworthy steps and procedures. This study employed a detailed description of the methods to support external audits (Morse, 2015), accurate representation of participants' perspectives, sampling adequacy, researcher's adoption of the attitude of emphatic neutrality (Patton, 2015), and triangulation (Patton, 2015) as measures of trustworthiness in data collection. On the other hand, triangulation (Patton, 2015), detailed description of the methods to support external audits (Morse, 2015), and repeated coding (Schreier, 2012) were the measures of trustworthiness in data analysis. GCU IRB approval preceded any form of data collection. The researcher obtained site approvals before participant recruitment, as well as written informed consent before parent participation in phone interviews and sentence completion tasks. The informed consent detailed the important steps to protect participant confidentiality and autonomy, as well as appropriate data management procedures were in place. Although this study had several limitations and delimitations, the researcher ensured that the choices made in this study were justifiable and strategies were in place to mitigate their effects on the results of the study.

Finally, this study employed the QCA approach in data analysis of the two sources of data. Sandelowski (2000) recommends QCA for data analysis in qualitative descriptive studies. QCA is the strategy of choice when research questions are descriptive, and the creation of coding frame calls for a combination of deductive concept-driven and inductive data-driven methods (Schreier, 2012). QCA approach

involves reduction and summarization of data with a focused analysis only on parts of the data that relevant to the research questions, and interpretation of the meaning of these parts of data to suit the qualitative intent of a study (Schreier, 2012). This study followed a systematic and reliable approach to QCA following the guidelines of Schreier (2012). This concludes the chapter on methodology. Chapter 4 provides a detailed account of data analysis procedures and the results of this study.

## Chapter 4: Data Analysis and Results

### Introduction

The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of the United States. This study addressed two research questions to explore the phenomenon of understanding parents' perceptions of adherence to pediatric physical therapy HEPs. These research questions were the following: (1) *How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?* (2) *How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?*

Aligned with the qualitative descriptive research design, this study employed qualitative content analysis according to the guidelines of Schreier (2012) to analyze the qualitative data from semi-structured interviews and sentence completion tasks. Chapter 4 of this dissertation manuscript presents the demographic data of the study participants and describes the relevant characteristics of the collected data from interviews and sentence completion. A description of data analysis procedures follows to discuss in detail the process used to analyze the data. Finally, the results section presents a detailed analysis of the data and the presentation of the results of data analysis.

## **Descriptive Findings**

The participants of this study were 10 adult parents who read, speak, and write English; with children aged between 18 months to 11 years old who were receiving outpatient physical therapy services; and who had been prescribed a HEP by a physical therapist or physical therapist assistant in a suburban region of a southern state of the United States. After obtaining GCU Institutional Review Board approval, the researcher began recruitment and data collection on September 16, 2019. On the tenth week of data collection, the tenth participant completed the phone interview. Overall, the participants' response to research recruitment was low. After 10 weeks of data collection and obtaining only 10 participants, the researcher believed that the target number of participants could not be realized. According to GCU guidelines for qualitative descriptive studies, learners should pursue a minimum of 20 participants to recruit, but must have a minimum of 10 participants in the final sample. Thus, the researcher decided that data collection was complete after meeting the university guideline on the required number of participants.

The researcher collected minimal demographic information by phone from the participants who consented to participate in the study. The demographic information reflected the child's age, the reason/s for receiving physical therapy, the date when the child started receiving physical therapy, and the parent who is responsible primarily for the HEP. Appendix H displays the demographic information form used in data collection. Table 1 on the next page shows the demographic information of the participants of this study.

Table 1.

*Participant Demographics*

Participant ID #	Parent Type	Child's Age	Reason/s for Receiving Physical Therapy	Age When Child Started Receiving Physical Therapy	Person/s Mainly Responsible for the HEP
P01	Mother	18 months	Cerebral Palsy, Hemiplegia	1 year	Mother
P02	Mother	6 years	Microcephaly, Cerebral Palsy	10 weeks	Mother
P03	Mother	5 years	Cerebral Palsy	1 year	Mother
P04	Mother	7 years 6 months	Hypoxic Ischemic Encephalopathy, Spasticity	11 months	Mother
P05	Mother	4 years	Cerebral Palsy	4 months	Mother and Father
P06	Mother	7 years	Cerebral Palsy	3 years	Mother
P07	Mother	7 years	Cerebral Palsy, Diplegia	10 months	Mother
P08	Mother	6 years	Developmental Delay, Multiple Medical Conditions	3 months	Mother
P09	Mother	11 years	Cerebral Palsy	4 months	Mother and Father
P10	Father	3 years 6 months	Developmental Delay	3 years	Mother and Father

The researcher assigned an individual participant ID number according to the order of completion of informed consent. All participants were parents, and none were legal guardians. Of the 10 parent participants, only one was a father. Children's ages ranged from 18 months old to 11 years old, with a mean age of 5 years and eight months. The predominant reason for receiving physical therapy was cerebral palsy, accounting for the primary diagnosis of seven of 10 participants' children. Physical therapy started at the age of 1 year old and younger for eight of 10 participants' children. The majority of the participants (i.e., six of 10) claimed that the mothers were the parent mainly responsible

for carrying out the HEP, while the rest (i.e., four of 10) stated that both mother and father were equally responsible for the child's HEP.

Semi-structured phone interviews with open-ended questions provided the majority of data on parents' description of their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. Eight participants completed the phone interviews while at home. Two participants (i.e., P02 and P07) started the phone interview while in a parked vehicle, but only P07 completed the interview in this setting. P02 had to reschedule to continue the phone interview on another day due to interruptions. Data collections spanned 10 weeks for 10 participants, equating to about one participant per week.

Phone interviews lasted from 36 minutes to 60 minutes long, not counting the pre-interview explanation of the interview, confidentially, and consent processes, and the debriefing post-interview. The phone interviews each produced between eight to 12 pages of transcribed data, single-spaced, 12 pt. Times New Roman from all the participants. The total duration of all the phone interviews for this study was eight hours and five minutes, with an average phone interview duration of 48 minutes and 30 seconds long. On the other hand, the total number of transcript pages for this study was 100 pages, with an average of 10 pages long. Ten pages of transcribed data exceeded the minimum GCU requirement of five pages for a qualitative descriptive study. These numbers support the notion that the researcher collected sufficient phone interview data to proceed with data analysis. Table 2 on the next page presents a detailed summary of the phone interview demographics.

Table 2.

*Phone Interview Participant Location, Date, Duration, Transcript Pages*

Participant ID #	Participant Location	Date	Duration (min)	Transcript Pages (Single-spaced)
P01	Home	Sept 23, 2019	60	12
P02	Vehicle on Clinic Parking Lot and Home	Sept 27, 2019 and Sept 30, 2019	48	11
P03	Home	Oct 6, 2019	53	11
P04	Home	Oct 11, 2019	44	9
P05	Home	Oct 18, 2019	40	9
P06	Home	Oct 25, 2019	52	11
P07	Vehicle on Ball Game Parking Lot	Nov 8, 2019	55	11
P08	Home	Nov 8, 2019	39	8
P09	Home	Nov 15, 2019	58	10
P10	Home	Nov 22, 2019	36	8
Total			8 hr 5 min	100 pages
Average			48 min 30 s	10 pages

The second source of data came from a written sentence completion task using a sentence completion form (see Appendix F). Participants completed the sentence completion tasks on an earlier date ahead of the phone interviews. For this form of data collection, participants completed three hanging sentences to provide additional data on their knowledge, beliefs, and attitudes about adherence to the prescribed HEPs in a written form. Table 3 on the next page presents a summary of the sentence completion task data and the amount of codes generated using QCA. Across all 10 participants, the sentence completion task produced 77 sentences from all three sentence stems, with an average of eight sentences. The sentence completion task produced a total of 978 words from all participants, with an average of 98 words. Using QCA, the total number of codes generated were 66, averaging 7 codes per participant.

Table 3.

*Sentence Completion Form Responses and Codes Generated*

Participant ID #	Form Reply (sentences)	Form Reply (words)	Codes Generated
P01	12	189	11
P02	11	86	8
P03	7	140	10
P04	8	86	4
P05	5	68	5
P06	7	56	4
P07	4	87	7
P08	6	83	8
P09	14	163	5
P10	3	20	4
Total	77	978	66
Average	8	98	7

**Data Analysis Procedures**

This study followed a qualitative descriptive design. According to Sandelowski (2000), qualitative description is a balanced combination of description and interpretation of an individual's perceptions of an experience or a phenomenon in a naturalistic manner, matching everyday language free of highly abstract interpretation, and achievable by means of remaining as close to the facts of the data as possible during analysis. In order to achieve the goals of qualitative description, Sandelowski (2000) recommends qualitative content analysis (QCA) as the analysis approach of choice. According to Schreier (2012), QCA involves reduction and summarization of data with a focused analysis only on parts of the data that are relevant to the research questions, and interpretation of the meaning of these parts of the data to suit the qualitative intent of a study. According to Vaismoradi et al. (2013), QCA serves studies that aim to explore the word pattern and trends, frequency, and relationships in the textual data conceptually.

This study employed the step-by-step data analysis procedures of QCA according to the guidelines of Schreier (2012).

**Data preparation for analysis.** The researcher recorded all phone interviews using the Rev Call Recorder app (2019) and exported all digital data directly online to Rev.com for transcription. Transcripts were downloaded from the Rev.com website and checked individually for accuracy. The process of reading the phone interview transcripts to “get a sense of the whole” began at this stage. The researcher searched for all proper names that may lead to the identification of the participants and their children, and replaced these words with the word “[deleted]”. The researcher created a Word document copy of every sentence completion task form exactly as written by the participants. Verbatim Word file creation of participants’ written responses on the sentence completion task forms ensure credibility in data preparation. The researcher also used Rev Voice Recorder app (2019) to record field notes immediately after every phone interview, transcribed them online, downloaded, and created a Word document for each participant. Online transcription, accuracy checking, and Word file creation occurred continuously as data became available during data collection. Also, as data became available, the researcher uploaded all prepared phone interview transcripts, sentence completion task data, and field notes data to MAXQDA (VERBI Software, 2018) for organization and preparation for coding.

**Qualitative content analysis.** QCA involves reduction and summarization of data with a focused analysis only on parts of the data that relevant to the research questions, and interpretation of the meaning of these parts of data to suit the qualitative intent of a study (Schreier, 2012). The researcher conducted QCA according to the guidelines of

Schreier (2012). This section describes how the researcher applied the QCA approach in the analysis of the qualitative data of this study.

***Building the coding frame.*** According to Schreier (2012), QCA begins with the creation of a coding frame. It was the original attention of the researcher to begin building the coding frame as soon as data became available from five participants. The researcher read the phone interview transcripts and sentence completion task data from the first five participants twice to “get a sense of the whole” and began QCA in MAXQDA.

***Creating primary categories.*** Repetitive reading of the data allowed the researcher to decide on the structure of the coding frame. According to Schreier (2012), researcher must decide on the structure of the coding frame based on their data. The researcher decided that a mixed strategy that is part concept-driven and part data-driven was the appropriate strategy to formulate the categories and subcategories of the coding frame.

For the primary categories, the researcher used a completely concept-driven strategy based on the theoretical foundation of the study (i.e., mental models of physical therapy patient adherence to HEP, Rizzo, 2015) and the two research questions of the study. Four primary categories were then created in MAXQDA. The researcher then created a category definition for each of the primary categories and used the memoing feature of MAXQDA for immediate reference. Appendix I displays the codebook used for coding in MAXQDA, with exemplars from the phone interviews and sentence completion tasks.

***Relevant and irrelevant categories.*** Schreier (2012) advised that novice researchers using QCA create the coding frame by classifying the data into two main categories: relevant and irrelevant categories. The researcher adopted this strategy by adding an optional fifth primary category named *Irrelevant Category* in the early stage of building the coding frame in MAXQDA. The researcher defined this primary category as “Category includes participants’ general description of the physical therapy services and the physical therapists that have no relevance to the research questions.” Halfway into building the coding frame, it became apparent that data belonging to this primary category was easily identifiable and further coding of these data would not have relevance to the results of the data analysis. Therefore, the researcher discontinued coding parts of the data that belonged specifically to this category to save time.

***Creating main categories and subcategories to the primary categories.*** The process of creating the main categories and subcategories to the primary categories began when the researcher started coding the first phone interview transcript from P01. Although Schreier (2012) made a clear distinction between coding and QCA, the researcher used the descriptive aspect of open coding to generate the main categories and subcategories of the coding frame. Once the four main categories were in place, the researcher proceeded to conduct open coding in MAXQDA.

Saldaña (2016) wrote extensively about the different types of coding methods that researchers can apply to analyze qualitative data. The researcher used Descriptive coding, In Vivo coding, Process coding, Magnitude coding, Emotion coding, and Structural coding (Saldaña, 2016) as the primary coding methods for open coding in this study. Table 4 on the next page shows these primary coding methods as applied to examples

from the phone interview transcripts. This study also employed summarization (Schreier, 2012) as names or labels for the codes, which became the names of the main categories and subcategories at many levels of the coding frame.

Table 4.

*Coding Methods Used in the Study and Examples*

Coding Method	Transcript Example	Code
Descriptive coding	<i>This week? Not too much because it's been a hectic week. With the funeral and stuff, but in a given week, I would say out of the week, probably about four days.</i>	4 days a week (Frequency of parent performance of the HEP)
In Vivo coding	<i>I feel that it is not optional, you, that you should not flake. You should not be lazy on your child's development. Especially if they are little. If it's a sports injury or if it's something like that, you know, okay but (silence) ... something from birth, this is something that, you know. But either way, even if it's a sports injury, it's not, it's something that you need to courage at home and at therapy. It's not an option.</i>	Adherence is not an option
Process coding	<i>I think overall, I've been doing really well. But it hasn't just been me. It's been a whole family effort. My husband, my daughter, my mom, everybody who has contact with my son. I tell them, "We all have to." "If I give him the cup, and tell him to hold it with his hand, then you give him the cup and tell him to hold it. You don't hold it for him."</i>	Involving the whole family helps
Magnitude coding	<i>Yes. I mean, like I said, I was skeptical at first because I used to go in with him at therapy and just to see him be pushed to try to fit up or... It's kind of scary, of course. Any parent would feel that way but to see my child actually now working harder at it and enjoying it, and he's improved so much, so much progress, it's just, it's very positive. It's very motivating. If a child can do it the parents should be able to encourage him to do it more, and it's just very positive. I mean, it's very motivating.</i>	Very positive (Overall experience with adherence)
Emotion coding	<i>But it just depends. It depends. If you are one of those moms that can just kind of do it all and it just all falls into place, then yes your child is going to do well. But if you're one of those moms, sometimes it becomes overwhelming because you're that you're like, "Oh my God, I had to do this."</i>	It is overwhelming
Structural coding	<i>I: What do you think are the benefits of doing the home exercises as often as the physical therapist recommended? P02: I guess, you get to meet his milestones better. He gets to meet his goals, you know, a little sooner than we expect it to happen.</i>	Belief about the benefits of adherence to the HEP

The process of open coding the interview transcript from P01 led the researcher to believe that the most appropriate strategy to use in creating the main categories and subcategories to the four primary categories was a mixed strategy that is part concept-driven and part data-driven (Schreier, 2012). The researcher used the interview guide questions primarily to create concept-driven categories, and used a combination of logic, summarization, and subsumption to create data-driven strategies (Schreier, 2012). This process continued iteratively until the researcher completed open coding of the interview transcripts of P01 to P05.

To illustrate the process of creating concept-driven categories using the interview guide, the third main category *Knowledge of the HEP* and the subcategories below it were all derived from interview guide question #3 *Can you tell me the home exercises that the physical therapist recommended for you to do on your child?* and its follow-up questions *How often are you supposed to do the home exercises?* and *How often are you able to do the home exercises on a regular week?* To illustrate the process of creating data-driven categories using logic, the researcher created subcategories such as *Positive attitude*, *Negative attitude*, and *Neutral attitude* for the main category *Attitude about adherence to HEP*.

The researcher used a purely data-driven strategy in creating the five subcategories to the main category *Prior physical therapy experience*. These subcategories include *Prior physical therapy*, *Prior adherence attitude*, *Child's condition and responses affected prior adherence*, *Prior experiences with child's physical therapists affected prior adherence*, and *Parents' background knowledge affected prior adherence*. The researcher employed summarization and subsumption following the

guidelines of Schreier (2012). Instead of using short codes, the researcher paraphrased the units of coding from the interview transcripts and used the paraphrases as codes. Then the researcher analyzed the list of these paraphrases and employed subsumption, which involved aggregating similar information together and creating subcategories (Schreier, 2012). Figure 2 shows a schematic example of how the researcher employed a purely data-driven strategy in creating a subcategory.

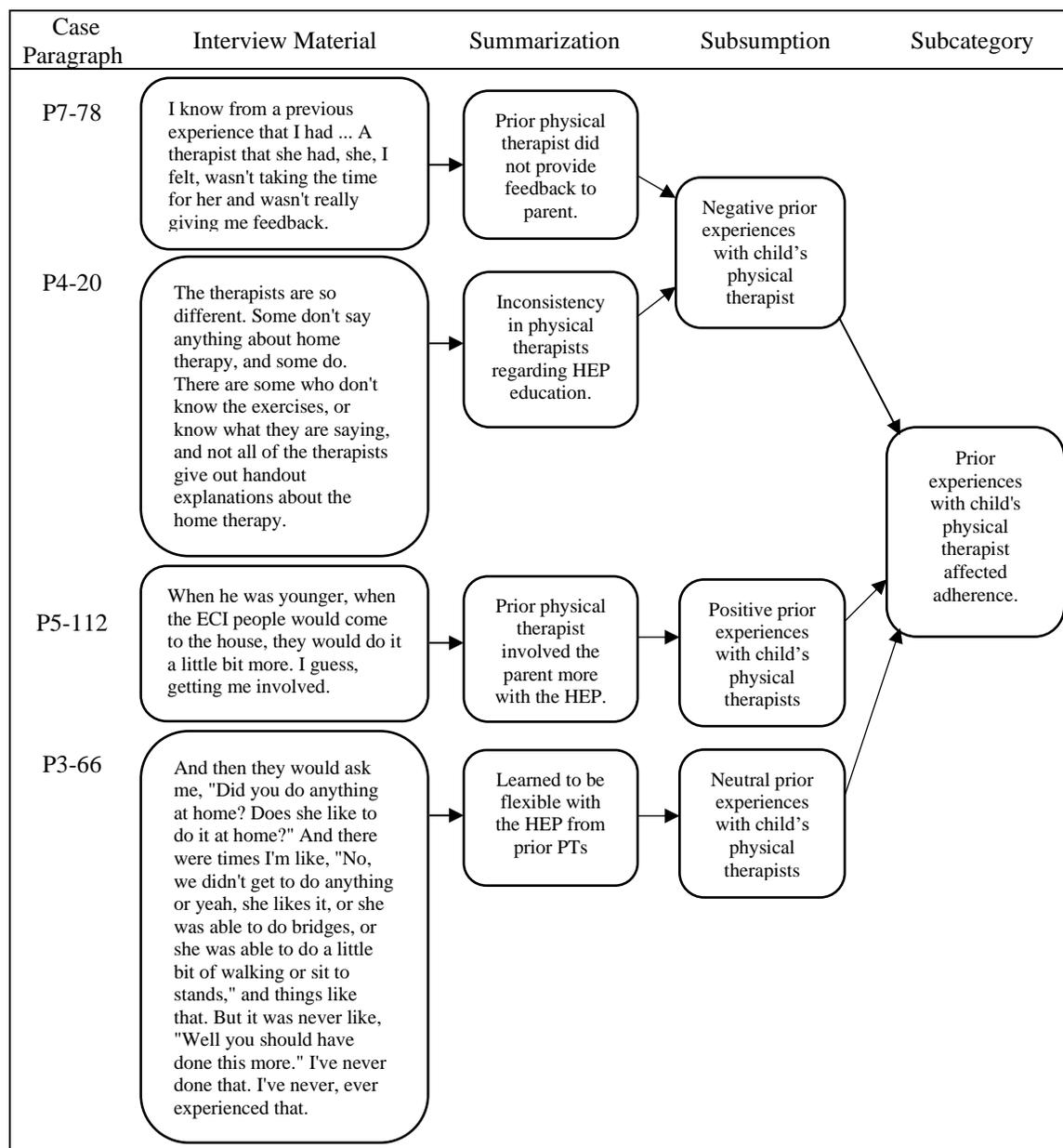


Figure 2. Data-driven strategy in creating a subcategory.

Schreier (2012) explained that defining a category and creating decision rules are two helpful means of applying the categories consistently and accurately to the data during the process of building the coding frame. In this study, the researcher followed Schreier's (2012) advice on defining the primary categories and utilized the memoing feature of MAXQDA for easy reference to the definitions of the primary categories. However, the researcher was not compelled to use decision rules in classifying information under the highly interrelated constructs of knowledge, belief, and attitude.

The researcher relied heavily on consideration of contexts provided by the surrounding information in the data in deciding to which primary category (i.e., knowledge, belief, and attitude) a certain piece of information belonged for categorization purposes. Context was also important in making coding decisions to categorize data as either positive, neutral, or negative in applicable subcategories and lesser subcategories. For further clarification of coding decisions on interview data, the researcher consulted data from the sentence completion task from the same participant. The researcher also found it unnecessary to define the main categories and subcategories. Throughout the coding frame, the category labels for the main categories and subcategories are simple everyday words, staying true to what Sandelowski (2000) described as a characteristic of qualitative description, a research design which employs description and interpretation words that match everyday language, free of highly abstract interpretation, and staying as close to the data as possible.

***Handling repetitions.*** Handling repetitions is a key issue in conducting QCA (Schreier, 2012). The researcher decided to disregard repetitions of the same codes from the same participant if these codes come from the same data (i.e., phone interview data,

sentence completion task data) as it was not a goal of this study to elucidate how strongly one participant feels about a certain topic that was covered during the phone interview. For example, P03 mentioned about maximizing her child's potential twice during the phone interview. The researcher coded the first time P03 first mentioned the information as *Adherence is about maximizing child's potential* and categorized this code under the subcategory *Positive attitude*. The researcher did not code the second time P03 mentioned the information again towards the end of the interview.

***Residual category.*** According to Schreier (2012), in the process of summarization and reduction of data during QCA, it is common that relevant information will occur only once. If the goal of the study is summarization, it is up to the researchers to decide whether to retain or discard this information. Since the goal of this study is detailed description, the researcher created subcategories named *Residual category/ Miscellaneous* (Schreier, 2012) as containers for all relevant information that was mentioned only once in the entire data. The researcher created residual categories as deemed appropriate throughout the coding frame at the level of entries to the subcategories. The code counter feature of MAXQDA was utilized in creating frequency counts for all the categories and subsequently, the identification of entries for the residual categories.

The processes involved in building the coding frame, which includes open coding, segmentation of the data into units of coding, summarization, and subsumption, and generation of main categories and subcategories all occurred concurrently, iteratively, and evolved continuously until the finalization of the coding frame. The researcher avoided decontextualizing the units of coding during the process of data segmentation for

coding and categorization (Schreier, 2012). Segmentation of data during analysis involves a danger of removing the units of coding from its surrounding context, which may lead to analyzing units of coding in isolation. As discussed earlier, contexts provided by the surrounding sentences, paragraphs, and the preceding interview questions were very crucial to the researcher in analyzing the units of coding and deciding whether a unit of coding belonged to a knowledge category, belief category, or attitude category. Contexts also allowed the researcher to effectively determine whether a piece of information is a prior experience or an ongoing experience. Furthermore, context provided by phone interview data and sentence completion task data from the same participants allowed the researcher to make coding decisions to categorize a piece of information as either positive, neutral, or negative in applicable subcategories and lesser subcategories.

*Pilot phase of the coding frame.* According to Schreier (2012), it is important to conduct a pilot test of the coding frame to evaluate its soundness, completeness, accuracy, and coding consistency. Schreier (2012) recommends that researchers who conduct QCA solo do a pilot coding of the coding frame in an interval of 10-14 days as a test of coding reliability. The researcher planned originally to build the coding frame using interview transcript data from the first five participants and conduct the pilot phase of the coding frame. Just when the researcher completed building the coding frame using interview data from the first five participants, data from P06 became available. After reading the interview transcript from P06, new information became apparent. Thus, the researcher completed coding the interview transcript from P06 in MAXQDA and included this data in the coding frame before pilot testing.

The researcher conducted the pilot coding 10 days after the finalization of the coding frame using interview data from the first six participants. During the pilot phase, the researcher went through all the units of coding of the six interviews one-by-one, checked the appropriate designations of every unit of coding within the coding frame, edited names of the categories, and checked for overlaps. The researcher ensured that all the categories of the coding frame were unidimensional and mutually exhaustive (Schreier, 2012). As most of the main categories and subcategories of the coding frame were data-driven, the researcher did not start from scratch in doing the pilot coding. The researcher also did not keep a record of initial and final codes during the pilot phase as a means to check coding consistency in detail (Schreier, 2012).

The researcher conducted pilot coding twice in this study. After finalizing the coding frame using phone interview transcripts from P01 to P06, the researcher then applied the resultant coding frame to all available phone interview transcripts first, and then to all the sentence completion task data. This process occurred continuously as data became available. Data from P07 and P09 produced additional new information, which added more subcategories to the existing coding frame. After coding the data from P10, no new information emerged. It was at this point that the researcher believed that saturation was reached in building the coding frame.

Since new information was added to the existing coding frame in terms of more subcategories, the researcher believed that the existing coding frame needed further checking for accuracy. Once again, the researcher went through all the units of coding of the 10 interview data and sentence completion task data one-by-one, checked the appropriate designations of every unit of coding within the coding frame, and checked for

overlaps. The researcher conducted the second cycle of pilot coding seven days from the day that coding of data from P10 finished. This process became the second pilot coding phase of the coding frame, an evidence that the researcher performed due diligence in ensuring that the final coding frame is sound and valid. The detailed description of the data analysis procedures and repeated coding were the measures of trustworthiness which the researcher employed to support dependability and confirmability—the two quality criteria of reliability in qualitative research (Patton, 2015).

*Main analysis.* The pilot phase of QCA allowed the researcher to check for the quality of the coding frame. According to Schreier (2012), the researcher is ready for the main analysis phase of QCA once the coding frame becomes final from the result of pilot coding. The main analysis phase is the heart of QCA, as it is the culmination of systematic and reliable procedures to create a sound coding frame (Schreier, 2012).

At this stage, the researcher finalized the frequency counts across the categories in MAXQDA to transform the level of analysis from the units of coding to the level of units of analysis (Schreier, 2012). The final coding frame, with the frequency of occurrence of main categories and subcategories of the coding frame, is the result of QCA (Schreier, 2012). Figure 3 on the next page shows the hierarchical structure of the study's coding frame. Completion of this step led the researcher to present a structured narrative summary of the results of QCA to answer the research questions of this study. This concludes QCA according to the guidelines of Schreier (2012). The next section presents the detailed narrative summary of the results of QCA.

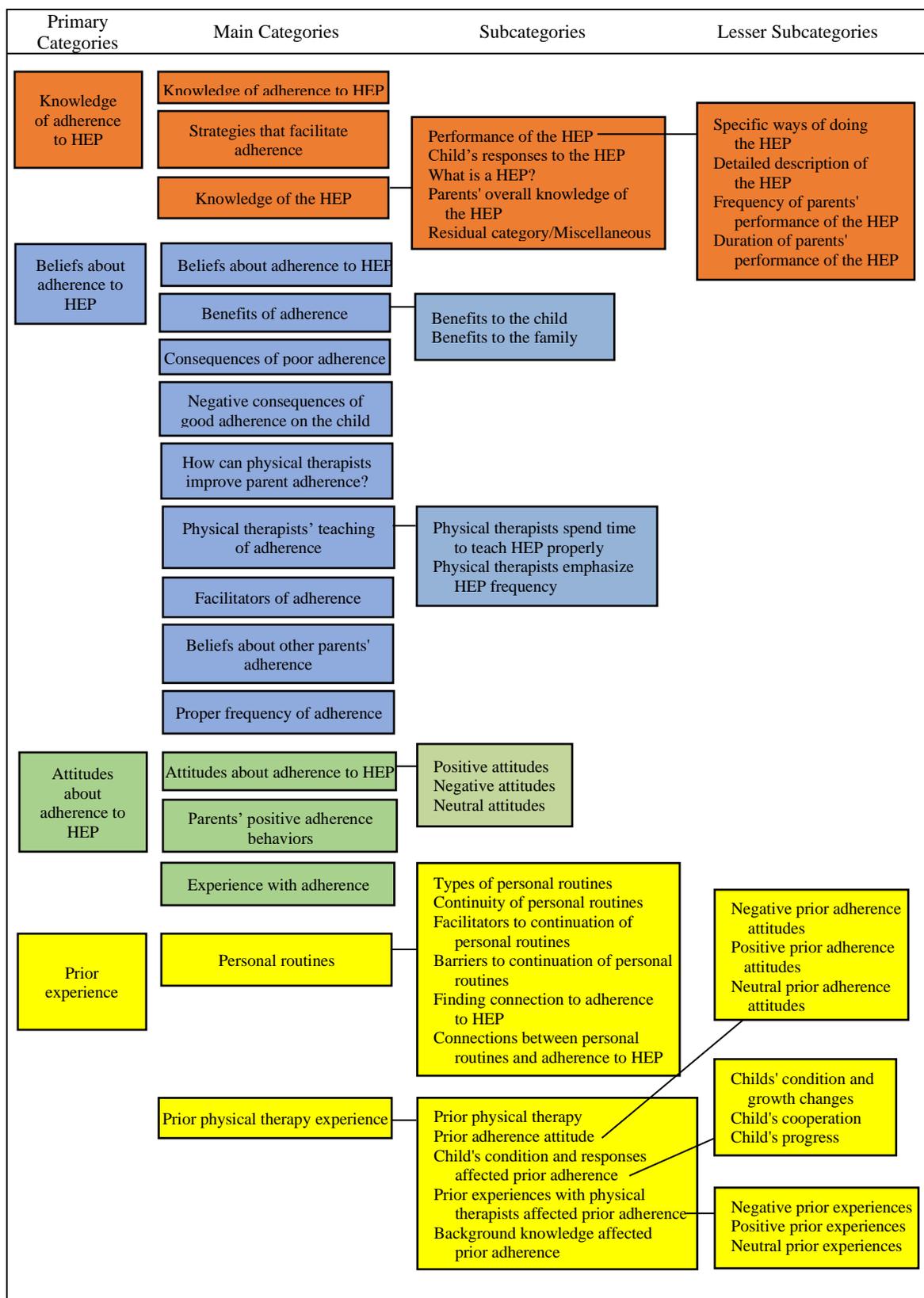


Figure 3. The hierarchical structure of the coding frame.

## Results

The coding frame was the result of QCA of the data of this study. This section presents the narrative summary of the findings of QCA as conducted in this qualitative descriptive study. Results of QCA are presented according to the research questions that the study aimed to address. The following research questions guided this qualitative, descriptive study:

RQ1: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

RQ2: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

**Research question 1.** Research Question 1 asked how parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs. Three concept-driven primary categories emerged out of this research question, which structured the data in the coding frame: (1) *Knowledge of adherence to HEP*, (2) *Beliefs about adherence to HEP*, and (3) *Attitudes about adherence to HEP*. The following sections present the results of QCA at the level of these three primary categories.

**Primary category 1: Knowledge of adherence to HEP.** Data summarization and reduction using QCA following the guidelines of Schreier (2012) yielded three main categories for all phone interview and sentence completion task data from the 10 participants in this study. These main categories are the following: (1) *Parents' knowledge of adherence to HEP*, (2) *Strategies that facilitate adherence*, and (3)

*Knowledge of the HEP.* Table 5 below shows the frequency counts for the primary category Knowledge of Adherence to HEP.

Table 5.

*Main Categories and Subcategories of the Primary Category: Knowledge of Adherence to HEP, and Code Frequency Counts*

Primary Category	Main Categories and Subcategories	Frequency Count
Knowledge of adherence to HEP	Knowledge of adherence to HEP	14
	Strategies that facilitate adherence	51
	Knowledge of the HEP	
	Performance of the HEP	
	Specific ways of doing the HEP	29
	Detailed description of the HEP	10
	Frequency of parents' performance of the HEP	9
	Duration of parents' performance of the HEP	2
	Child's responses to the HEP	16
	What is a HEP?	12
	Parents' overall knowledge of the HEP	10
	Residual category/Miscellaneous	3

**Main category 1: Knowledge of adherence to HEP.** The most commonly described knowledge of adherence to HEP concerned the benefits of adherence. Participants acknowledged that adherence benefits the child in writing and in words. P02 stated, "I've grown to where I know it helps him," while P02 verbalized, "Because everything is just for the better of your child. And, and that's, and that's the bottom line." P03 recalled an event to describe her knowledge of the benefits of adherence to her child:

For example, today, I accidentally dropped a bottle, I think it was like a lotion bottle or whatever. I didn't pick it up. I didn't say anything. I didn't tell him anything. I just walked away, and I came back to look, and he went and picked up the lotion, which required him to use his hands, bend down, pick it up, and put it back on the counter. All of that would not have been possible for him last year.

You know, it took a lot. It took a lot of cognitive level, because he's not where he should be. It took, you know, thinking and planning for him to get where he needed to go pick it up. And he realized it's on the floor, and I got to pick it up and put it on the counter. All of that, like the whole combination of all of that has been because of the consistency of us taking him to therapy and then applying it at home.

In writing, P08 expressed that her child “has improved so much.” She further wrote that following the HEP plan “is very beneficial and will help out in the long run.”

The next most common knowledge of adherence was the idea that *Adherence requires consistency*. P03 wrote, “In my experience, following the PT plan at home requires a lot of consistency,” while P07 verbalized, “Of course, we didn't do it when it was inclement weather, but as consistent as possible was definitely the key.” P10 phrased the idea as “stick to it.” In addition, P08 wrote, “It takes consistency and dedication to reach goals.”

The third most common knowledge of adherence to HEP came from P09, who indicated that the child's autonomy and motivation were important concerns regarding adherence to HEP. P09, whose child has received physical therapy for over 10 years, wrote:

Find what exercises that child likes. Learn how to do the exercises in a fun way or a way that also gets the child to learn a skill. It's also O.K. to give the child time off. Also ask the child to set goals for themselves. That way they can see progress for themselves. I think it's all about them being in control of their therapy.

Her idea in writing about the importance of the child's autonomy and motivation in adherence remained consistent during interview. She expressed:

Make it something that she can set her goals, especially when they get older. To be able to just set their own goals and say, "I want to work on this, I want to work on that" and be able to have more input. Because when they're little, they don't have so much input in it. So, when they get older, I think they know what they like, what they don't like. They're learning this and that. So, I think that you have to let them tell you like, "Mom, I don't like this, or I don't want to do it today, or I don't." And be okay with it.

Three residual category responses emerged from three participants. One of these ideas came from P09, who wrote that adherence is "a very important part of therapy." P01 expressed her knowledge of adherence as a team effort of parent and therapist when she stated:

If it wasn't me working together with the therapist, you know, it's a team effort for the patient to get better. You know, that's what parents have to understand that working together is only going to be better for your child. And I really, really believe that.

P02 voiced that parents can learn to adjust and to work around adherence. In the interview, she stated, "You've got to roll with the punches. It comes a part of our life, and we've learned to adjust and to work around it, and to give him a break when he needs a break." Table 6 shows the subcategories and frequency counts for the first main category *Knowledge of adherence to HEP*.

Table 6.

*Subcategories of the Main Category: Knowledge of Adherence to HEP and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Knowledge of adherence to HEP	Adherence benefits the child	5
	Adherence requires consistency	4
	Child's autonomy and motivation are important	2
	Parents can learn to adjust and to work around it	1
	It is a team effort of parent and physical therapist	1
	Adherence is a very important part of physical therapy	1

**Main category 2: Strategies that facilitate adherence.** The second main category encompassed 51 responses from participants. Under this main category, parents expressed their knowledge of their own strategies, which helped their adherence. The five most common strategies that facilitate adherence known to participants include: (1) knowing the HEP well, (2) making the HEP a daily routine, (3) communicating with the physical therapists, (4) incorporating the HEP in the daily activities, and (5) involving the whole family.

With 21 responses, *Knowing the HEP well* was the most commonly cited strategy that facilitates adherence. Participants noted that knowing the HEP well can be accomplished by (1) asking questions and demonstrations, (2) being present during session, and (3) doing own research. Concerning the strategy of asking questions and demonstrations, P07 stated:

You should be able to say what you feel, not necessarily aggressively, no, but just open up if you feel like you're lacking something, or you're lacking the communication or needing advice in something, you should be able to ask or feel

like you should ask. If you don't have that or you don't have that feeling, you need to address it with them and tell them, "Can I ask you this?"

Expressing the same idea, P02 verbalized:

And don't be afraid to ask the therapist to show you... "are we doing this right, is this good for him, or is the way he should be standing, is this the way his feet should be, how do his ankles look." I think that's one thing that I've learned.

Being present during the physical therapy sessions was the second most cited strategy to know the HEP well. P06 noted:

I don't sit out in the waiting room. So, maybe that's why I feel like, well, it's not that hard, but because I'm there every day... the whole year I go, and I watch.

Because I want to see how she's doing. I want to know how to do certain exercises properly because I don't want to hurt her, and I don't want her to hurt herself.

Finally, doing own research was the third most cited strategy to know the HEP well.

When her child experienced a regression of abilities during a growth spurt, P07 remembered:

It was also during those couple of months when she had the growth spurt, so that definitely felt like I was lost for a moment, and so I had to do my own research, like "What do I need to do?"

Continuing on the main category *Strategies that facilitate adherence, Making the HEP a daily routine* was the second most common strategy that participants knew facilitated their adherence to HEP. Three participants in the interview and four participants in the sentence completion task gave importance to this strategy. P02 stated:

Now we have our routine. Like, okay it's after lunch, take a nap, and wake up, okay let's do some stretching, let's do some weight-bearing, let's do some tummy time, let's sit in the wheelchair. Like now he has a strict routine, and that's helped.

I think routine at home is beneficial and crucial. You have to have a routine.

In the written words of P01, *Making the HEP a daily routine* was to “make a plan and schedule and stick to it. Set a certain hour of the day for exercises and make it routine.”

P10 used the words “fit it into your day,” while P05 declared it as “make it a part of your routine.”

*Communicating with the physical therapists* was the third most common strategy known to the participants as a facilitator of their adherence. P01 explained:

And that's what parents need to do. You shouldn't just, okay, therapists are doing it. Oh, no. Like, “What can I do?” I think parents need to ask questions, any type of concerns that they have at home. You need to bring it up with the therapist.

P09 worded the same strategy differently:

Or to even say, "I think I found this other exercise to be more beneficial than this one. Can you help me or what do you think about this?" Always keep an open communication with the therapist with what is working and what is not working.

On paper, P07 expressed the same strategy as “to talk to their therapist and maybe they could have other recommendations to assist on the plan.”

Further down the main category *Strategies that facilitate adherence*, the fourth most common idea was incorporating the HEP in the child’s daily activities, followed by involving the whole family. For the strategy of *Incorporating the HEP in the daily activities*, P01 used bath time as an opportunity to do the HEP. She wrote, “Find any

activity as an opportunity to help them. I use bath time as a way for my son to use both hands to splash water.” On the other hand, P04 did it while watching TV. In writing, she stated, “Even if its massages while child is watching TV helps so much.” As for the strategy of involving the whole family, P03 uttered, “But it hasn't just been me. It's been a whole family effort. My husband, my daughter, my mom, everybody who has contact with my son.”

Participants either wrote or verbalized six more strategies known to them as facilitators of their adherence to the HEP. These strategies include *Enrolling the child in adaptive sports, Making the HEP fun for the child, Being a stay at home parent, Looking for community resources, Having similar physical therapy toys at home, and Having prior physical therapy for the other child.* Table 7 summarizes the subcategories of the main category *Strategies that facilitate adherence.*

Table 7.

*Subcategories of the Main Category: Strategies that Facilitate Adherence and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Strategies that facilitate adherence	Knowing the HEP well	
	Asking questions and demonstrations	12
	Being present during session	6
	Doing own research	3
	Making the HEP a daily routine	7
	Communicating with the physical therapists	5
	Incorporating the HEP in the daily activities	4
	Involving the whole family	4
	Enrolling child in adaptive sports	3
	Making the HEP fun for the child	2
	Being a stay at home parent	2
	Looking for community resources	1
	Having similar physical therapy toys at home	1
Having prior physical therapy for the other child	1	

**Main category 3: Knowledge of the HEP.** Under the primary category of *Knowledge of adherence to HEP*, participants expressed their perceptions both in writing and in words about many topics concerning the HEP. The researcher found these ideas relevant to understanding the participants' perceptions of adherence to the HEP. Four data-driven subcategories emerged out of these topics, including (1) *Performance of the HEP*, (2) *Child's responses to the HEP*, (3) *What is a HEP?*, and (4) *Parents' overall knowledge of the HEP*.

Participants performed the HEP for their children in a variety of ways. The three equally most common ways participants performed the HEP was by making it fun for the child, modifying the HEP to suit their situations, and mimicking what they saw the physical therapists did during therapy sessions. P05 stated:

We just try to always make it fun because I feel like the child could think that it's like they're always working. They're always, if you're constantly making them do therapy even at home and it's not fun, a child should be playing. That's part of childhood play.

P02 wrote that “everything can be modified for our child at home,” similar to P03’s statement that “it's just a matter of modifying to what you do have at home and just continue.” P06 gave a reason for why modifying the HEP was needed:

If it's something that I can't remember, I'll think of something else they might've told me or showed me and just skip one that I don't know that well, then just do something else. Sometimes you don't want to do the same thing every time because it gets hard.

Some participants made use of what they learned by being present during therapy sessions. "I just pretty much do what I see them do," stated P06. P07 said it as:

My experience when I was in there, I would be able to see, and I was able to try to mimic those kinds of therapies at home, versus someone just telling me, "Okay, this is what you're going to do," and that's it.

Participants' responses to the interview guide question 3: *Can you tell me the home exercises that the physical therapist recommended for you to do on your child?* allowed the researcher to assess their description of the HEP as either in detail or not in detail. All participants explained in lengths of multiple paragraphs the detailed account of the specific exercises that were a part of the HEP plan for their children. One example came from P03:

Some of the things were like kicking the ball, throwing bean bags and therefore required him to bend over, pick them up and put them back in the box. Other ones were going up the stairs and going down the stairs. And of course, with the walking, we wanted to really improve his gait. So, we do a lot of walking.

In terms of how often participants typically performed the HEP in a given week, only P03 performed the HEP throughout the day. She stated:

When we don't come to therapy, that's when you try to do it in the morning, in the afternoon, and right before bedtime to keep stretching. So, a couple of times a day, we try to do a little bit.

Three participants performed the HEP daily, another three performed the HEP four to six times in a given week, and two participants only had time to do the HEP one to three days a week. As for how long they performed the HEP, two participants specified that

they did the HEP “30 minutes to an hour” or “about an hour, an hour and a half a day.”

Table 8 displays the subcategory *Performance of the HEP*.

Table 8.

*Lesser Subcategories of the Subcategory: Performance of the HEP and Code Frequency Counts*

Subcategory	Lesser subcategories	Frequency Count
Performance of the HEP	Specific ways of doing the HEP	
	Make it fun	4
	Modify the HEP	4
	Mimic what the physical therapists do	4
	Use distraction to improve child cooperation	3
	Use incentives	3
	Find creative ways to do the HEP	2
	Do the HEP as part of the daily activities	2
	Parents sometimes forget to do the HEP correctly	1
	Provide feedback	1
	Parents divide the HEP responsibility	1
	Parents do the HEP anytime	1
	Have another child do the exercises with their child	1
	Provide positive reinforcement	1
	Only when child initiates doing the HEP	1
	Detailed description of the HEP	
	HEP in detail	10
	HEP not in detail	0
	Frequency of parents' performance of the HEP	
	2-3x a day	1
Daily	3	
4-6 days a week	3	
1-3 days a week	2	
Duration of parents' performance of the HEP	2	

The subcategory *Child's responses to the HEP* contained 16 responses, which revealed the participants' understanding that children respond differently to the HEP. Four responses supported the most common idea that children can learn the HEP and do it independently. P08 wrote that her child “now does the home exercise plan on his own,” while P06 stated, “It helps her to also learn that she can do it on her own.” Some

exercises are uncomfortable and P05 attested to this idea when she said that her child “doesn't want to feel the stretch. Probably because it hurts. I mean, I'm sure it doesn't feel that good.” To the child, HEP was a play, according to P10’s statement, “She thinks it's all play” and “I mean, it's playing to him” from P08. Two contrasting views surfaced, as two participants commented that HEP got easier over time for their children, but to two other participants, their children disliked doing the HEP over time.

For the next subcategory labeled *What is a HEP?*, participants described in their own words the meaning of the HEP to them. Six responses emphasized value, pointing to the idea that *HEP is beneficial to the child's condition*. P05 said:

I just know that overall, in the long run, improves his range of motion or keeps his range of motion I guess because I feel like you can tell when we slack off or if we go on vacation and don't do it or something. He just gets tighter because he doesn't get stretched.

To some, *HEP is knowledge that empowers parents*. P06 explained:

I think it's good that they empower parents with this information and knowledge. Because when your therapy for some is over, you don't want to feel helpless. You want to have that knowledge that she can continue to grow and get stronger, or your child will continue to grow and get stronger because you have this skill that you learned and knowledge that you learned, and you can implement it and continue to do that to help your child grow.

Additionally, P03 described the HEP as a “homework.” P01 described her knowledge of the HEP in a different way when she said, “These exercises they don't have names, it's kind of just like, okay, so, move his leg, do a rotation. They really don't have

names, they're just, little activities that I get to do with him every day.” On the other hand, a HEP is any exercise that is done at home without any equipment, according to P09’s words “It's all exercises that can be done at home, just like any other exercise.” and “...it doesn't have to be like, you have to go home and go and buy all this equipment.”

The final subcategory for the main category *Knowledge of the HEP* is labeled *Parents' overall knowledge of the HEP*. The majority of responses to this subcategory were derived verbatim from participants’ words in reply to the interview guide question 7: *Can you tell me how well you know your child’s home exercises?* Five participants declared that they knew their child’s HEP very well, while the other five claimed that they knew their child’s HEP well. No participants stated nor implied that they did not know their child’s HEP.

Finally, under the main category *Knowledge of the HEP*, the researcher captured residual information from three participants, which highlighted the idea that *Some physical therapists do not make the HEP very clear to parents*. P04 stated:

And maybe, I don't know, at therapy, I don't know if maybe this is what they have to do. They still have to do stretching there, but sometimes I think, is that’s wasted time from our therapy time because I've already done stretching at home or I do stretching at home. So, why can't you just jump into whatever else, like standing or doing something else?

Table 9 on the next page summarizes the last four subcategories of the main category *Knowledge of the HEP*.

Table 9.

*Subcategories of the Main Category: Knowledge of the HEP and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Knowledge of the HEP	Child's responses to the HEP	
	Child can learn the HEP and do it independently	4
	Some exercises are uncomfortable	2
	Child thinks it's all play	2
	HEP gets easier over time	2
	Child dislikes doing the HEP as he/she gets older	2
	HEP became more complicated to do in time	1
	HEP does not get easier in time	1
	Child sometimes does exercises better at home	1
	Child does the HEP as a sign of accomplishment	1
	What is a HEP?	
	HEP is beneficial to the child's condition	6
	HEP is knowledge that empowers parents	2
	No equipment is needed to do the HEP	1
	Any exercises that can be done at home	1
	Little exercises/activities, with or without names	1
	A homework	1
	Parents' overall knowledge of the HEP	
	Knows very well	5
	Knows well	5
	Knows not well enough	0
	Residual category/Miscellaneous	
	Some physical therapists do not make the HEP very clear to parents	3

In summary, the first primary category of the coding frame labeled *Knowledge of adherence to HEP* contained three main categories as a result of data summarization and reduction using QCA following the guidelines of Schreier (2012). These main categories are the following: (1) *Parents' knowledge of adherence to HEP*, (2) *Strategies that facilitate adherence*, and (3) *Knowledge of the HEP*. Tables 6, 7, 8, and 9 summarize the subcategories and the frequency counts of this part of the coding frame.

**Primary category 2: Beliefs about adherence to HEP.** Following the guidelines of Schreier (2012), the second primary category of the coding frame encompassed

participants' beliefs—what they accepted, assumed to be true, opined, and reasoned as true—about adherence to the HEP prescribed by their child's physical therapist. Nine concept-driven main categories emerged from QCA of the phone interview transcripts and sentence completion task data. Table 10 displays the nine main categories of the coding frame under the second primary category *Beliefs about adherence to HEP*.

Table 10.

*Main Categories and Subcategories of the Primary Category: Beliefs about Adherence to HEP, and Code Frequency Counts*

Primary Category	Main Categories and Subcategories	Frequency Count
Beliefs about adherence to HEP	Beliefs about adherence to HEP	17
	Benefits of adherence	
	Benefits to the child	32
	Benefits to the family	5
	Consequences of poor adherence	19
	Negative consequences of good adherence to the child	13
	How can physical therapists improve parent adherence?	44
	Physical therapist's teaching of adherence	
	Physical therapists spend time to teach HEP properly	9
	Physical therapists emphasize HEP frequency	12
	Facilitators of adherence	17
	Beliefs about other parents' adherence	8
Proper frequency of adherence	11	

**Main category 1: *Beliefs about adherence to HEP*.** The first main category captured the different views of participants about adherence to HEPs. The most common subcategory *Adherence is a routine* was endorsed by four participants. P09 wrote “The more it is practiced during therapy and at home, the more it becomes a normal routine.” P07 verbalized:

Being consistent is very important, even a routine like you do every morning is very beneficial for any child. I just feel like having that routine, knowing what

they're going to do, knowing what's expected out of them, and they already know what to do, and just making it more consistent.

Consistency of doing the HEP in a routine way manifested in the voice of P03:

The walking, the crawling, the picking up, the remembering, and that requires consistency. I really tell a lot of parents like, "I know that your child is limited, but if you teach him, he will figure it out some way, somehow." I don't know how, and I don't know when, but I know he will if you're consistent.

Furthermore, P02 believed that "A routine I think, is crucial when you do PT. You have to do it at home and continue doing it."

The next four most common subcategories include *Good adherence is a good idea*, *Children can learn to do the HEP independently*, *Adherence depends on parent's motivation*, and *Adherence is a hard balance for the family*. *Good adherence is a good idea*, from the words of P05: "Like doing it all the time, right? I think that's good. I think they should be." Participants believed that children could learn to do their HEP independently. As P06 stated, "I want her to know that those are important. And even if she's not at therapy, she's going to be able to do this on her own." P08 had a different idea that *Adherence depends on parent's motivation*. According to her:

I guess it depends maybe on the child or the parents' view on it. I'm more of a person that likes to motivate my child, so I think if I had just an ugly attitude towards it, "Come on, hurry up, let's get this over with," then my child wouldn't be so motivated. But since I just, I have a different view on it, it motivates my child to do it.

P03 opined that adherence was a hard balance for families. She said:

It is really hard balance. You know, I'm fortunate that I have only one other child. I know some, some families have more than multiple kids, and when you have one special needs kid, that one child takes up a lot of your time.

Table 11 summarizes the subcategories for the main category *Beliefs about adherence to HEP*.

Table 11.

*Subcategories of the Main Category: Beliefs about Adherence to HEP, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Beliefs about adherence to HEP	Adherence is a routine	4
	Good adherence is a good idea	2
	Children can learn to do the HEP independently	2
	Adherence depends on parent's motivation	2
	Adherence is a hard balance for the family	2
	Adherence is beneficial if the parent knows what to do	1
	Parent's motivation affects physical therapist's motivation to encourage adherence	1
	Cooperation with HEP improves as child gets older	1
	Adherence is built on trust	1
	Parents can always do more at home	1

**Main category 2: Benefits of adherence.** This main category covered participants' responses to interview guide question 5: *What do you think are the benefits of doing the home exercises as often as the PT recommended?* and to the first sentence stem of sentence completion task form *As a parent (or legal guardian) of a child who receives physical therapy, I believe that following the home exercise plan is ....* The units of coding for this main category amounted to 37. The two subcategories that emerged include *Benefits to the child* and *Benefits to the family*.

The code *Child makes progress* was the overwhelming benefit of adherence to the child. Participants believed that adherence to the HEPs helped their children in ways that

address the limitations and disabilities that resulted from their diagnoses. P04 stated that adherence helped her child “gain strength,” while for P06, it was about “your body starts to build up the stamina that it needs.” P05 voiced, “Well, I would assume the benefits would be better outcomes, better progress, better, for us, range of motion. Whatever that is. Better gains in terms of abilities. I guess.” P02 stated the same, saying, “The benefits would probably have to be, you see more results, better results.”

Functional improvement was the second most common subcategory, followed by the idea that adherence *Speeds up recovery*. P08 trusted that adherence would help her child’s abilities:

And say he couldn't do this at first, but if we keep at it, he's eventually going to get there. And it would just be just, how do you say it? He would see it as a different experience to actually meet his goal and be able to do something as just like the other kids. Because right now I know he feels like he's different because he can't do as much. But if he keeps doing it, he'll get there.

According to P01:

But there has to be a consistency in the home as well to help the process, to help everything that could, you know, the recovery could be sooner. The recovery could be more advanced, and then you can just move on to something else. The benefit is how quickly your child can recover or gain strength.

In her words, she believed that adherence speeds up the child’s recovery.

*Child learns a routine* and *Positive effects on growth* were the next most cited subcategories under the main category *Benefits of adherence*. P06 believed that adherence helps the child learn a useful routine for the future. She articulated:

So that way, she'll learn to do that daily and incorporate that into her routine as she is coming along and growing. It's good for her to start now and always have that, "Oh well, I always exercise at this time during the week or in the weekend." So, for her to hopefully continue as she gets older and grows up that it'll be like a routine, embedded, habitual, whatever you want to call it. I think that's very important for her in her situation because I will not always be there as she grows older. It'll be something good for her to already have in her routine.

When P02 stated that with adherence, "you get to meet his milestones better," she spoke about the positive effects of adherence on her child's growth. Two additional responses were mentioned only once. One by P01, who believed that adherence *Decreases the need for therapy*, and the other one by P04, who hoped that adherence would make her child want to do more in physical therapy.

Adherence not only benefits the child; it also benefits the family. P06 found a way to connect with her child during exercises:

So, when she does her exercises and stuff, it's just like a little time we spend together. So, I think it's a good bonding experience for you get to know them a lot more by doing that. It's just like if you have a trainer and you're going to the gym, you talk to them and you build a connection with them.

P08 consistently emphasized that adherence benefits both the child and the family. On paper, she wrote that adherence was "beneficial to both the patient and those who are involved with them." While in words, she stated, "to help them in the long run and not only would it be beneficial for the child, it will be beneficial for the parents, the family."

Last but not least, P01 expressed that adherence gave her peace of mind. She said, "The

benefit is just, is not having it in your head that your child is going to be a little bit disabled, or your child is going to be hurting.” Table 12 provides a summary of the stated subcategories.

Table 12.

*Subcategories of the Main Category: Benefits of Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Benefits of adherence	Benefits to the child	
	Child makes progress	10
	Improves function	8
	Speeds up recovery	7
	Child learns a routine	3
	Positive effects on growth	2
	Decreases the need for therapy	1
	Child will want to do more in therapy	1
	Benefits to the family	
	It's a good parent-child bonding experience	2
	Adherence benefits the child and the family	2
Parent peace of mind	1	

**Main category 3: Consequences of poor adherence.** Participants also spoke about the consequences of not following the HEPs according to the recommendations of the physical therapists. Units of coding for this main category totaled to 19. Participants believed that children will not improve if parents' adherence is poor. According to P08, “as far as the goals, he won't reach it as quick or maybe not even at all if we don't do it.” P10 explained it in a more specific way:

Well, I mean, the child goes to therapy twice a week. It leaves five days in the week. If you didn't do your exercises, it means five days of non-activity or not addressing the issues. So, if you expect progress, it's not going to happen in just two visits per week. You have to follow through at home.

Regression of the child's status was another consequence of poor adherence reported by the participants. As P01 said, "I think it will backtrack my child. Personally, I think it will backtrack him. I think it will just kind of bring him back to not wanting to use his arm or to use his leg." P03 was more concerned with the child's long-term dependence on parents when she expressed that "At the end of the day and at the end of their life, the parents are the ones that will be stuck with these children for a very long time, if you do not put the effort right now."

Participants also believed that the child would view the HEP as not important if parents were not doing it regularly. P08 assumed that "If I don't do it as often, I think he's going to view it as like, well, it's not important." On the other hand, P05 considered that the consequence of poor adherence depends on the child. She stated:

It probably depends on the child. I feel like for my child, it does. I mean maybe for a child that isn't as involved or maybe mildly effected, maybe it doesn't make as big of a difference. But I mean, I feel like for my child it does.

Table 13 provides a summary of the main category *Consequences of poor adherence*.

Table 13.

*Subcategories of the Main Category: Consequences of Poor Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Consequences of poor adherence	Child will not improve	6
	Child will regress	3
	Child will remain dependent on parent	2
	Child will view the HEP as not important	2
	Unsure/ Depends on child's needs	2
	Child will need therapy longer	1
	Child becomes hard to regulate	1
	Child will not want to participate in therapy	1
	Child will not see parent as supportive	1

**Main category 4: Negative consequences of good adherence to the child.** The interview guide question 6 asked participants to think of anything negative about doing their child's home exercises. This interview question produced 13 units of coding, all of which described the children's response to the exercises. P03 conveyed an observation that her child "would get cranky or he'll cry or he just didn't want to do it", while P05 dealt with occasions where "Sometimes he doesn't like it. Sometimes he doesn't want to do it, and he just wants to play. He wants to do with easy." *Child never gets to rest*, according to four participants. P08 explained it this way:

Well, the only negative thing I would say is just sometimes after a hard day, he might just not want to... He's just not up for it. It's very rare with [deleted], but he has had maybe like two instances where he's just like, I'm tired, and it's just hard to push him if he's tired. I know they go to school almost all day.

P02's concern was that her child would get sometimes get sick. She voiced:

There's a give and a take for everything. There are pros and cons, but for [deleted] and his diagnosis, is his seizures, his epilepsy. So, when he gets a little bit too much physical therapy his seizures act up, and that's kind of hard and tricky for his body because sometimes he doesn't sleep after therapy, and I know his body is tired, and he stays awake, and then here comes the seizures.

Table 14 on the next page shows the summary of the main category *Negative consequences of good adherence to the child*, with corresponding code frequency counts.

Table 14.

*Subcategories of the Main Category: Negative Consequences of Good Adherence to the Child, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Negative consequences of good adherence to the child	Child dislikes doing the HEP	5
	Child never gets to rest	4
	None	1
	Child gets sick	1
	Child gets frustrated	1
	Child gets bored	1

**Main category 5: How can physical therapists improve parent adherence?** The participants in this study had a lot to say how physical therapists can help them and other parents improve adherence to the HEPs. The fifth main category contained 44 units of coding, the most common of which supported the belief that physical therapists should provide parents more demonstration of the proper way to perform the HEP. P05 commented:

I mean letting us try it, or I guess seeing us practice whatever it is that you want to do kind of thing. Instead of just saying, "Oh, when you get home you should do this." Maybe have us actually do it in front of you....

P02 stated, "I wish we could put aside 30 minutes just strictly for parents hands-on with the therapist there" and added that "I wish they could do it on me and then I could do it back to them."

*Encourage in a positive way* and *Provide more ideas* were the two next most cited subcategories. According to P03, "I think that when you have a good physical therapist and they can encourage you in a positive way" and added that "Sometimes I feel like, if the PT is laid back like, "Oh, just do this and do that, he'll be fine." then the parent

becomes laid back.” By saying, “Maybe take a little bit more time, maybe an extra five, 10 minutes to go more in-depth or other ways that we could help him,” P08 wished for more ideas from the physical therapists.

Participants wanted more communication with their children’s physical therapists. P04 expressed that “some therapists are quiet, some talk, some don’t, and we just want to help our child.” P07 expressed the same idea in a different way:

I think it's the lack of communication. If the physical therapist is not having that communication and talking about their goals, and what they're doing, or what, and recommending what the child should be doing at home and what they are doing at home, and stressing it, and just having that feedback.

On the other hand, P04 believed that she needed a “better explanation” of the HEP, and wished to have the HEP in writing. She added, “Like I said, going back to maybe more handouts. Like a handout with an explanation of the exercises for our child. More explanatory, too, like not, how do I say it? In more down to earth words.”

Participants also believed that physical therapists should see if parents do the HEPs properly. P08 stated:

Maybe if they ask me, okay, well, how are you doing the home exercise plans? And if I show them, I think it would be nice if they tell me, okay, yes, you're doing it right, but that's how we do it here because, well, what if I'm doing something wrong this whole time I'm making him do it like that. But yeah, if they can just take a little more time.

Additional suggestions came from participants who wanted consistency in the physical therapists seeing their children. As P04 said, “We needed consistency with the

therapists.” Furthermore, P09 believed that the physical therapists should also explain the HEP to the child. In writing, she expressed that “The exercises should be explained to the parent as well as the child (If it’s an older child).” As shown in Table 15, participants had many other recommendations that they believed could help parent adherence to the HEPs.

Table 15.

*Subcategories of the Main Category: How Can Physical Therapists Improve Parent Adherence?, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
How can physical therapists improve parent adherence?	Provide more demonstration	9
	Encourage in a positive way	6
	Provide more ideas	6
	Improve communication with parents	3
	Better explanation	3
	Provide written HEP	3
	Check if parent is doing the HEP correctly	3
	Improve consistency in attending physical therapists	2
	Explain the HEP to both parents and child	2
	Create a parent support group	1
	Create a parent-child open clinic	1
	Provide resources for affordable equipment	1
	Provide online reference for the HEP	1
	Provide other parents' success stories and experiences	1
	Set realistic goals with parents on HEP frequency	1
Incorporate self-care skills for older children	1	

**Main category 6: Physical therapist’s teaching of adherence.** In this main category, two subcategories summarized how participants perceived the physical therapists’ educational efforts concerning adherence to HEPs. These subcategories relate to whether the physical therapists’ spent time to teach HEP properly and if the physical therapists emphasized HEP frequency as part of their efforts to educate their clients. For the first subcategory, seven participants indicated that the physical therapists spent time

to teach them the HEP properly. No participants stated otherwise, while two participants were not certain. P07 recalled:

When she started, I can definitely say yes, the therapists did take their time. I was allowed to stay there for the entire time and watch them work, and watch just them working with her, I can definitely see that was a privilege that was given. It was supposed to help me, and it did.

P10 believed that the physical therapist made a good effort to teach the HEP, and described the effort as “It's more, a more verbal instruction than anything else.” Based on P08’s words, the physical therapist did not spend enough time to teach her the HEP. She stated:

I mean, they went over it briefly. I don't go in with him so at the end of his hour, they come out and for about two, three minutes, they'll be like, okay, we worked on this, we worked on that.

The majority of the participants indicated that the physical therapists did not emphasize how often the HEP was supposed to be performed on a given day or week. In P07’s words:

Specific instructions, no. What they normally say is, "When it comes upon," or, "You happen to be doing this take the time and show her," or, "Do this with her." Basically, that's what I've been told, I haven't been told a certain timeframe that's suggested that I sit down or set aside for her, and this is the time we're going to do this, no, for this long, I have never been instructed like that.

Similar to P07’s statement, P05 stated, “I don't know that they ever really specified.”

Both P02 and P01 claimed that their children's physical therapists emphasized to them specific recommendations on how often to perform the HEP. P02 voiced:

No, they emphasize. Oh, they emphasize all right. They tell me, "Okay, make sure you're doing the AFO's four to six hours a day, weight-bearing three to four times a day, or as often as possible, wheelchair try to do it every other hour."

Similarly, according to P01, "Oh no, they emphasize, they tell me. They do three days, I should do three days, just to kind of match what they're doing." On the other hand, the physical therapists of other participants were not very clear on their instructions on the HEP frequency. P06 stated, "They said it was really up to us when we saw that if she hasn't been really active like let's say it's summer vacation or something," while P08 said, "Honestly, I'm sure they did, but I don't remember." This main category clearly shows that there were inconsistencies in the way physical therapists teach their clients on HEP adherence. Table 16 shows the two subcategories of the main category *Physical therapist's teaching of adherence*, summarizing how participants perceived the physical therapists' educational efforts concerning adherence to HEPs.

Table 16.

*Subcategories of the Main Category: Physical Therapists' Teaching of Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Physical therapists' teaching of adherence	Physical therapists spend time to teach HEP properly	
	Yes	7
	No	0
	Maybe	2
	Physical therapists emphasize HEP frequency	
	Yes	4
No	5	
Maybe	3	

**Main category 7: Facilitators of adherence.** In this main category, participants expressed their opinions about the various means, which they believed could help them improve their adherence to the physical therapy HEPs. The most common idea which the participants believed could facilitate their adherence was if the parent stays at home and does not work. P05 voiced:

But yeah, I know some parents that actually are really involved and, especially ones that get to stay at home with their kids, they seem to, in my opinion, they seem to just have more time. I mean, that's what I think it is, but they seem to just have more time. They're actually there with them all day and have the opportunity to do those things.

Three participants expressed their belief that having similar physical therapy equipment at home would help them do the HEPs more consistently. P03 said, "I wish we had a treadmill, that would be good," while P06 thought, "I wish I had more of big mats so I could do more."

*Making the HEP a routine* was the third most cited facilitator of adherence. In P07's words:

Even just showing them one thing at a time and being consistent for a week. Just show them how to squeeze the toothpaste onto the toothbrush, show them how to do that, and then just work with them for that one week for five minutes, it can go a long way... Being consistent and just taking those five minutes, 10 minutes, or setting aside a time and saying, "In my busy schedule this is the time I need to work with my child...."

P07 expressed the same idea, but in different words. She said, “Doing them consistently. That's how I can improve. Like doing it more consistently and making it a part of their routine.”

Two participants valued *Social support from other parents*, whose children also received physical therapy. P01 talked about the other parents she befriended in therapy. She said, “When we get therapy, we have our little therapy sessions also. We talk to each other, and you know, we kind of encourage each other. You know, we kind of just help each other.” In talking about other parents, P03 explained that “We all kind of learn the exercises, we may exchange phone numbers, and we may text and say, "Hey, but how's your child?" and encourage each other.”

P02 showed consistency in words and in writing about her belief that it is all about doing what is best for the child and the family. On paper, she wrote, “do what works best for me & their child. Nothing is perfect. Every child learns on their own pace.” During the interview, she expressed the same belief by saying:

Keep doing what's best for your child. You have to do what works for your family, and for your child. You can't compare yourself to what another child is doing because every child is different, and every child is going to develop and learn differently.

Table 17 on the next page summarizes the subcategories to *Facilitators of adherence*, which shows the participants’ opinions on what could help them improve their adherence to the physical therapy HEPs.

Table 17.

*Subcategories of the Main Category: Facilitators of Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Facilitators of adherence	Being a stay a home parent	4
	Investing in PT equipment for home	3
	Making the HEP a routine	3
	Social support from other parents	2
	Doing what works for the child and the family	2
	Building up on one exercise at a time	1
	Having a positive outlook in life	1
	Keeping a HEP journal	1

**Main category 8: Beliefs about other parents' adherence.** Participants also voiced their opinions on how other parents, whose children also received physical therapy like their children, adhered to the HEPs prescribed by the physical therapists. This main category included eight units of coding and three subcategories. The most common responses under this main category belonged to the subcategory *Parents' adherence is poor*. P06 expressed her opinion:

I had one friend that was doing that, and I don't know that she ever did it at home. She also has quite a plateful. She has a lot of other children, and she's also caring for her father that lives with her now, and she has grandkids as well. So, I can't honestly say that I've ever heard her saying that, "Oh, well I'm going to do them."

P05 and P08 shared the same opinion about other parents. P05 stated, "Whereas other people that I know don't do it at all, or just do it when they can kind of thing.", while according to P08, "I mean, I don't mean to sound judgy or anything. I don't really think they take it as serious as I do, so I really don't know if they are actually doing it as much as I do."

Three participants believed that *Parents' adherence is 50/50*. P02 said, "I'm pretty sure half of the parents don't do it just by analyzing and just seeing kids at therapy that have been there as long as we have." This opinion coincided with that of P04 when she stated that other parents' adherence is "50/50 because there are some good parents out there that do it, and then there are some parents that don't do it." On the other hand, P05 shared a different opinion that "I feel like different parents have different ways of doing it." Table 18 shows this portion of the coding frame.

Table 18.

*Subcategories of the Main Category: Beliefs About Other Parents' Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Beliefs about other parents' adherence	Parents' adherence is poor	4
	Parents' adherence is 50/50	3
	Parents' adherence varies	1

**Main category 9: Proper frequency of adherence.** The last main category under *Beliefs about adherence to HEP* included participants' beliefs about the ideal number of times during the day or the week that parents should do the HEPs on their children. This main category contained 11 units of coding, a few more than the previous main category. By far, participants acknowledged that *Daily* adherence to physical therapy HEPs is ideal. Five participants expressed this view in the phone interview and one participant in the sentence completion task. P01 wrote, "The daily repetition of the exercises is what is needed for improvement." On the other hand, P05 stated, "I just assumed it was every day", almost mimicking P04's words, "I would just assume that I should do it probably every day." Furthermore, according to P03, "I think that ideally would be every day."

P02 and P05 believed that adherence should be *As often as possible*. P02 voiced, “It does make a big difference in our world, in our lives at home. The more, the better, the less I think sometimes is not the best, but definitely the more is always better for us.” In the words of P05, adherence should be “as much as possible.” Participant frequency responses of *Two times a week*, *Three times a week*, and *Not daily for some children* were given one time each. Table 19 below displays the frequency counts for the main category *Proper frequency of adherence*.

Table 19.

*Subcategories of the Main Category: Proper Frequency of Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Proper frequency of adherence	Daily	6
	As often as possible	2
	Two times a week	1
	Three times a week	1
	Not daily for some children	1

In summary, the second primary category of the coding frame labeled *Beliefs about adherence to HEP* is the largest in the coding frame, comprising nine main categories as a result of data summarization and reduction using QCA following the guidelines of Schreier (2012). The main categories and subcategories with corresponding frequency counts are summarized in Table 10 to Table 19. The main category that earned that highest number of units of coding is *How can physical therapists improve parent adherence?*, in which participants expressed their beliefs about the many ways physical therapists can help or support parents’ adherence to the HEPs. The importance of the findings offered in this main category is covered in the next chapter.

**Primary category 3: Attitudes about adherence to HEP.** This section of Chapter 4 continues the discussion of the results of QCA, with emphasis on the third primary category of the coding frame—*Attitudes about adherence to HEP*. This primary category included all units of coding pertaining to the participants' attitudes, which encompasses their way of thinking, position, judgment, inclination, feeling, emotion, or point of view about adherence that appeared to reflect in their behavior. This major part of the coding frame contained 161 units of coding using QCA of the phone interview and sentence completion task data. In this primary category, three main categories emerged. The first main category *Attitudes about adherence to HEP* was data-driven using logic, while the second main category *Parents' positive adherence behaviors* was data-driven using summarization and subsumption. The third main category *Experience with adherence* was concept-driven using the interview guide question 10: *So far, what can you say about your experiences of following the home exercises from physical therapy?* and interview guide question 11: *Overall, would you say it was a positive or a negative experience?* Table 20 shows this primary category of the coding frame.

Table 20.

*Main Categories and Subcategories of the Primary Category: Attitudes about Adherence to HEP, and Code Frequency Counts*

Primary Category	Main Categories and Subcategories	Frequency Count
Attitudes about adherence to HEP	Attitudes about adherence to HEP	
	Positive attitudes	70
	Negative attitudes	30
	Neutral attitudes	6
	Parents' positive adherence behaviors	45
	Experience with adherence	
	Positive	6
	Very positive	4
	Negative	0

**Main category 1: Attitudes about adherence to HEP.** The main category *Attitudes about adherence to HEP* contained three subcategories, which include *Positive attitudes*, *Negative attitudes*, and *Neutral attitudes*. The researcher used summarization and paraphrasing of the data according to the guidelines of Schreier (2012), in addition to In Vivo coding, Process coding, and Emotion coding (Saldaña, 2016) to derive the labels of the codes under this main category. Subsumption of the units of coding (Schreier, 2012) led to the final frequency counts, which upon sorting, ranked the lesser subcategories according to how often the participants mentioned the information in the entire data set.

*Positive attitudes* was the first subcategory of *Attitudes about adherence to HEP*. This subcategory contained 70 units of coding from the phone interview and sentence completion task data. The predominant positive participant attitude, which reflected on their way of thinking, was that adherence was important to see progress. According to P02, “I don't think [deleted] would be where he was at today if I didn't push, and I didn't keep up, and I didn't take him to therapy every week, and doing it at home, and learning new things.” In P01's words:

It's overwhelming. Yes. Is it tiring? Yes. I'm not going to lie, you know... But you know what, at the end of the day when my son is handing me a paper, when he's trying to balance on his own, when he's even trying to write on paper and pencil, these are small little changes that make it all worth it. You know, he's trying to say mama and daddy, if he's squatting up and down, he's trying to jump, and then catch himself with his balance. These are all small changes. He's trying, him

trying, and him getting the hang of all these exercises on his own is what makes it worth it.

On paper, P04, word per word, wrote, “It only benefits her if I continue services at home. Continuing therapy at home rather than just at therapy is super beneficial!”, while according to P07’s writing, adherence was “essential in order to see maximum results.”

*Adherence is a responsibility*, according to participants. With 10 units of coding, this position or inclination was the second most common positive attitude. P07 explained:

Basically, parents helping their child with their exercises regularly ... I mean, I think all parents should be able to do that, at least, especially if they know their child needs it. I don't think any parent should have to be putting that as the back burner or feel like, "I can't do this," because of X reason. I just feel like it's very important and very important to show their child that they're there for them, and they're with them in the journey that they've been given....

P09 stated, “I feel it as a part of my responsibility.” P08 voiced, “Well, my opinion about being, doing it regularly, I mean, like I said, from my experience, it's a must, it's our child. I think it's just nothing we should play with.” P05 expressed the same attitude when she said, “It's something I have to do.”

*It is a good feeling* was the third most common positive attitude of adherence to the HEP. P10 described this attitude in the form of a feeling or emotion when he said:

Yeah. I mean, for the most part, we've tried to do the best and yeah. I mean, once we're done with the heavy play and we got some good core activation. You know, it's feeling good. Hip muscle activation. It's well worth it. I mean, we feel pretty

big accomplished. I know she doesn't realize she's doing them. But yeah, it feels good.

P08 worded this positive attitude as, "How I feel, at this point, I actually enjoy it. I mean, I just... I guess I see it as a blessing that he can do this as compared to when he was born." According to P06, "She knows what it's for because she feels that herself. She'll tell me, "Mom, I feel strong." And that feels good to hear that.

*Adherence can be better* was also the third most common positive attitude of adherence. In the interview, P02 stated:

I could do better. I do follow it pretty good, but I could do better. Again, there's always room for improvement. Sometimes I slack off, sometimes I'm not in the mood to do it, sometimes I have errands to run, or something to do where I'm not always home to do it.

P01 wished she could do more for her child, when she stated, "I feel that sometimes I don't get enough done in the day to help him because he just wants to play. It's been summer, so he wants to be in the pool, things like that." P04 expressed the same attitude when she verbalized, "I wish I could do more for her like I said. More time in the day or, just like I said, more different exercises." P05 said, "I wish I could do it more."

Participants had a positive attitude that seeing progress was rewarding for them as parents. P08 spoke about her child's progress and how it meant to her. She said:

In the beginning was only three seconds on left leg, when they had him standing on one leg, he only did three seconds on one leg, but he did six seconds on the other so the next time we would go, if we keep working on it, it increases little by

little and so I guess by doing it more, ...how do you say it? More... It motivates me, I guess, to do it more with him.

P03 stated:

Well, when I see my son accomplish something that he wasn't doing before, then that motivates me, and motivates me to want to continue doing the home program. And it also encourages me that all the work that we're putting is actually, you know, it's not, it's not in vain. It's, it's worth something. We're seeing gains, and improvements are always like, "wow, I can't believe it."

*It is a routine*, according to participants. P02 expressed this positive attitude as "I have to keep on his routine, on his daily stretches, on his daily standing. It does make a big difference in our world, in our lives at home." P08 stated:

At first, when they told me at therapy, okay, we'll try to work on this, we'll try to work on that, I actually had to write it down, and now it's like, I don't even know where that paper is at. It's just we're so used to doing it all the time. It's just something that comes naturally to us now.

*It is a priority* was another positive attitude of adherence to the HEP. P01 expressed a strong position about adherence as a priority when she stated, "It shouldn't just be optional. Like, okay, you know, therapy's done. You know, go home and do whatever. I'm like, 'No, no, it should be a requirement.'" P07 also spoke of adherence as a priority. According to her, "I am given that privilege that I can just drop anything that I'm doing, and it's really not as important as getting my own child to where I want her to be, or where she wants to be."

*It is a learning experience*, according to participants. On paper, P01 wrote, “It’s a learning experience for my child and myself but with the guidance of his therapist we are seeing amazing results.” When discussing her child’s response to the HEP as her child became older, P09 stated, “I always thought it was going to stay the same. It was going to be more motivated, more encouraging, and stuff. And it hasn’t always been. I was surprised by that. That is what I was not ready for.” P02 expressed the positive attitude that adherence was a learning experience this way:

So, we've both learned to push through therapy. Even though he cries and screams, I just talk to him and tell him that it's okay, he's going to be okay. At home, he doesn't cry as often because I guess he's with me, and he feels my touch, and he hears my voice.

*It is doable* was another positive attitude about adherence. As P10 stated, “We don't really think about it as a chore. It's more of a... We realized that it's for her benefit, and we don't mind doing it.” The same positive attitude resonated in P08’s exact written words “it is doable.” Table 21 on the next page shows the subcategory *Positive attitudes*, summarizing the participants’ responses in a descending order from the most frequent responses to the least frequent responses. With a total of 70 units of coding, this subcategory produced 15 unique codes. In summary, the five most common positive parent attitudes about adherence include *Adherence is important to see progress*, *Adherence is a responsibility*, *It is a good feeling*, *Adherence can be better*, and *Seeing progress is rewarding*. The corresponding frequency counts are provided accordingly.

Table 21.

*Subcategory: Positive Attitudes, and Code Frequency Counts*

Subcategory	Lesser Subcategories	Frequency Count
Positive attitudes	Adherence is important to see progress	17
	Adherence is a responsibility	10
	It is a good feeling	6
	Adherence can be better	6
	Seeing progress is rewarding	5
	It is a priority	4
	It is a routine	4
	It is a learning experience	4
	It is doable	4
	It is about maximizing child's potential	3
	Adherence requires patience	2
	It is about making the effort	2
	Poor adherence is unfair to the child	1
	Adherence is a part of the child's life	1
	It is a family effort	1

As there were positive attitudes towards adherence, there were also negative attitudes towards adherence. *Negative attitudes* was the second subcategory of *Attitudes about adherence to HEP*. This subcategory contained 30 units of coding from the phone interview and sentence completion task data, about half of the total number for the *Positive attitudes* subcategory. With 13 units of coding, the most common negative participant attitude about adherence centered around finding time to do the HEPs.

*It is hard to find time* was the predominant negative attitude of participants about adherence to the HEPs. Eight of the 10 participants expressed this attitude in writing and in words. P02 captured this negative attitude in explicit words for the rest of the participants:

It's very hard to find time, especially if you have other children. [deleted] was an only child for five years, so all of our time was focused on [deleted]. Now that we

have our second son. I can see now and understand now where doing home therapy is sometimes hard because we don't just have one child, we have two children, house chores, and life. Life in general happens, so it's very hard. It is very hard to do it every day... I can see it now where it's hard to do it at home, and for parents that have multiple kids, or even working. I remember when I was working four years ago, I wouldn't do home therapy as often. I was tired, I had laundry, I had things to do, and becoming a working parent that has a special needs child with physical therapy, that's hard. It's doable, but it's hard to find the time.

P06 had an extra responsibility, in addition to being a wife, a mother, and a full-time employee. She said:

So, I'm trying, these last two weeks have been kind of hectic, but it's really not her fault that I haven't been able to. My mother is staying with me. So that's the reason I haven't had as much time with her. She had a fall and has a fractured humerus.

P05 expressed the same negative attitude towards adherence. She stated:

But I mean for us, for the parents, it's just time-consuming. It's hard to... We both work. Me and my husband both work full time, so it's very hard. I mean, that's part of the reason why we can't do it every day because well, we're gone most of the day and then by the time you get home, it's just very time-consuming. It's hard to make it into every day.

*It is hard to find time* as a negative attitude reflected on the sentence completion tasks. As P05 wrote, good adherence was “difficult because I work full time and have/had

a hard time doing what I'm supposed to on a regular basis. (sad face symbol)". In addition, P10 wrote that his and her wife's adherence was "inconsistent due to time constraints."

*It is exhausting* was the second most common negative attitude towards adherence. P01 stated, "He gets his checkups, he has several appointments and that sometimes I get exhausted. I get tired. You know, as a parent, it's exhausting." P02 voiced the same attitude. She said, "It takes a beating on our body, being a special needs parent with a child that needs physical therapy. It's exhausting. It takes a lot mentally and physically to do it at home." P05 worded this negative attitude as, "It's just a lot of work sometimes," while P03 stated it simply as "it's just exhausting."

Participants also expressed a negative attitude that adherence was overwhelming for parents. "I sometimes feel overwhelmed," according to P02. On the other hand, P01 said, "Consistency will help him. But the consistency is also a lot...it's a lot of work, and sometimes you just feel really, really overwhelmed." This strong negative emotion was evident in the words of P03 when she stated:

It depends. If you are one of those moms that can just kind of do it all and it just all falls into place, then yes, your child is going to do well. But if you're one of those moms, sometimes it becomes overwhelming because you're that you're like, "Oh my God, I had to do this."

*It makes parents feel guilty when not done* was another negative attitude of adherence to HEP. P03 expressed this emotion when she stated:

And I think as a mom, you get guilty, if you don't, you feel guilty if you don't follow the routine. Because you feel like it's, I just got to do this, and I got to do,

like I said, that's how I had that mentality. Like I got to do it. And when he didn't do it, I felt really bad at the end of the day.

P05 expressed the same negative emotion. She said, "I feel guilty. That's what I feel like because I don't, because I don't do them enough. I know I don't."

Participants also articulated a negative attitude towards adherence when they expressed a point of view that adherence was difficult for their children. P09 conveyed in words, "But to do it every day and follow these certain exercises, I think that would be asking too much for the child." P02 worded the struggles of her child with the HEP as, "He fights it, oh he does! He does fight physical therapy. It's not easy, it's not fun for him. Sometimes it's a sweating battle."

In addition to the five negative attitudes towards adherence to the HEP, participants also mentioned that it was difficult when the child does not want to cooperate, that adherence was frustrating, and that not seeing progress was discouraging. The negative attitudes towards adherence are listed and sorted in descending order in Table 22 below.

Table 22.

*Subcategory: Negative Attitudes, and Code Frequency Counts*

Subcategory	Lesser Subcategories	Frequency Count
Negative attitudes	It is hard to find time	13
	It is exhausting	4
	It is overwhelming	3
	It makes parents feel guilty when not done	3
	It is difficult for the child	3
	It is difficult when child does not want to cooperate	2
	It is frustrating	1
	Not seeing progress is discouraging	1

The subcategory *Neutral attitudes* towards adherence contained six units of coding, which reflected information that were not entirely positive nor negative as the information in the two previous subcategories. For this subcategory, the most common attitude was *Uncertainties* about adherence. P04 expressed this uncertainty about adherence by saying, "I don't know if she's bored, or I'm bored," and adding "or if it's helping her, or that's her exercises not helping her."

P09 articulated this attitude by saying:

I think for me it was always thinking that, am I doing it right? Or am I going to hurt my child if I do a certain event? Or am I going to push her too hard to where she's not going to like it?... And I think that's, for me sometimes it'd be like, "No way we can do it that way." Sometimes I'll be like, "No, it has to be this way, it has to be like this." And so, I think you end up thinking, "Oh, maybe I'm being too strict with it or am I doing it right? I'm going to hurt her."

P09 expressed another neutral attitude towards adherence when she said something which meant that giving the child a break was acceptable. P09 reasoned that her child had been receiving physical therapy for more than 10 years and that her child had become more involved in school activities. She stated:

But then once she got older and then she was going to catechism after school and then if she's got an activity at school like she likes to do UIL, one year she did UIL, so all these things and then homework. So, we could like, "Okay, well we'll do it Saturday, or we'll do it on the Saturday in the morning." You have to give them off that break.

In another part of the phone interview, she reiterated the same position about adherence:

Because I think also, she's been in it for so long that I have to remember, "Okay give her a break." Let's give her a break because she needs to have that break, she needs to feel like this is now... It's okay if she misses out a little bit.

*Passive acceptance* was the third and last neutral attitude towards adherence. P05 voiced passive acceptance when she said, "I can't do anything about it. It's just part of my life now." Table 23 provides the codes with frequency counts for the subcategory *Neutral attitudes*.

Table 23.

*Subcategory: Neutral Attitudes, and Code Frequency Counts*

Subcategory	Lesser Subcategories	Frequency Count
Neutral attitudes	Uncertainties	3
	Giving child a break is OK	2
	Passive acceptance	1

**Main category 2: Parents' positive adherence behaviors.** The second main category to the primary category *Attitudes about adherence to HEP* included participants' behaviors and dispositions, which reflected their positive attitudes about adherence. This main category was entirely data-driven and contained 45 units of coding. *Persist* and *Encourage the child* were the two equally most common positive adherence behaviors in this study.

In expressing the positive behavior *Persist*, P02 wrote, "Eventually everything works out for the best interest of their child(ren). Never give up!!" She repeated the same meaning when she mentioned in the phone interview that "Yeah, at home is where you really have to push and really have to, you know, keep up with doing it at home, not just at therapy." Persistence was what P05 described when she stated, "No, heck no. I mean,

if it's hurting him really bad and it's very obvious that he's just hating it, I'll stop for a minute. Give him a break maybe. No, I don't really give him that.” P07 told a story of persistence when she taught her child how to put on the car seat belt by herself:

She sits in the back of the driver's seat, because usually when I get down because I have to help her and I'm driving, I always put her right behind me, so I'm able to see her still. I usually load her up on the left, so she has to pull the seatbelt with her left hand. I've been trying to get that seatbelt long enough, so it comes to the right, she clips it with her right, so that helps. Even that, that was a struggle. I mean, I have been trying to teach her that since she was four and she learned it at seven and a half.

P01 declared her commitment to adherence when she said:

But this is just something that I take very personally. I know that this is going to help him develop just as well as his cousin and other little kids his age. So, personally, this is my life right now, and I would not have it any other way. I would not go to any other therapist, and I am not going to stop doing the exercises, you know. Because this is this.”

*Encourage the child* was an equally most common positive adherence behavior.

P08 wrote, “Encourage the patient to reach their goals,” as an advice for parents who were having difficulty following the physical therapy home exercise plan. P07 revealed her ways of encouraging her child in this statement:

I don't ever say that she can't do it or ... I just always say, "Okay, you just need to work on it, we need to work on that." I do not ever say to her, or accept her

answer as, "I can't do that." "Okay, you just need to work on it." I'll correct her, and I'll say, "You just need to work on it. You need to learn ... Start learning."

*Do it regularly* and *Involve the whole family* were the two next most common positive adherence behaviors as described by the participants. P08 described her adherence behavior of doing the HEP regularly as, "We do it regularly, so I try not to leave anything out. We try to get everything done one day. I don't like to be like, okay, well today we'll work on this and tomorrow we'll work on that." P02 wrote, "We as parents must follow through daily." Almost similar to what P05 said in the interview, "I should be doing them every day."

When it comes to involving the whole family, P08 and her husband shared the HEP responsibility this way:

His dad. It's mainly me but once in a while he'll be like, "Daddy, why don't you stretch me out." Or I'll try to do it, and he's like, "I want daddy to do my other leg." We each do one.

P09 explained how her family was involved with the HEP:

I think it's equally both me and my husband. My husband does a lot more outdoor stuff with her. And if the opportunity comes up where she wants to go outside and play basketball, we recently bought her a basketball booth and so my husband will go out there and help her with that or play with her on that. Or like the swings, she has a swing, and my husband will try to show her how to swing herself, like learn to swing herself because that's also something that she struggled with because of her legs...My mom and dad do also try to encourage her to do stuff.

P05 also talked about how she and her husband did the HEP:

I guess it's kind of like a team, a lot of times. Usually, when we are doing it, we're both doing it together. One of us is holding him and doing stuff, and the other one is like helping with play with toys or something.

Four participants described a positive adherence behavior labeled as *Do what you can*. In written words, P03 stated, “Do what you can – everything counts towards working at your child’s goals.” In the interview, P10 said, “I come home from work in the evenings and do my best to do my part with her. With her work.” P05 and P04 used the same words to describe this adherence behavior. P05 stated, “I mean, we just try to do it as much as we can,” while P04 worded it as “That's why I try to do as much as I can.”

Participants described many more positive adherence behaviors. In total, QCA identified 13 positive adherence behaviors for the second main category of the primary category *Attitudes about adherence to HEP*. Table 24 shows these positive adherence behaviors.

Table 24.

*Subcategories of the Main Category: Parents' Positive Adherence Behaviors, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Parents' positive adherence behaviors	Persist	7
	Encourage the child	7
	Do it regularly	5
	Involve the whole family	5
	Do what you can	4
	Look for opportunities throughout the day	3
	Be a role model to the child	3
	Find a balance at home	3
	Set goals	2
	Keep the child active in many ways	2
	Do not view adherence as a burden	2
	Follow every PT recommendation	1
	Set a time to do it	1

**Main category 3: Experience with adherence.** The third and final main category of the primary category *Attitudes about adherence to HEP* captured the participants' overall personal assessment of their adherence to the prescribed physical therapy HEP. As stated earlier, this main category was derived conceptually using the interview guide question 10: *So far, what can you say about your experiences of following the home exercises from physical therapy?* and interview guide question 11: *Overall, would you say it was a positive or a negative experience?* Ten units of coding belonged to this main category, once each for every participant in the study.

Overall, all participants in this study had a positive experience with adherence to the HEPs. Four participants (i.e., P01, P02, P07, P08) described their adherence experience as *Very positive*, while six participants (i.e., P03, P04, P05, P06, P09, P10) said that theirs was *Positive*. No participant expressed a negative adherence experience. P02 said, "Very positive, very, very positive." P07 voiced:

We've had a pleasant experience with her journey. I mean, I love being involved with her. There isn't a moment I would want to miss because I'm like, "Oh, she accomplished this!" Because we work so hard at it, at accomplishing where she's at. It's been an amazing thing; she gets there, and she gets her goal.

P08 described her experience of adherence with these words:

I was skeptical at first because I used to go in with him at therapy and just to see him be pushed to try to fit up or... It's kind of scary, of course. Any parent would feel that way but to see my child actually now working harder at it and enjoying it, and he's improved so much, so much progress, it's just, it's very positive. It's

very motivating. If a child can do it the parents should be able to encourage him to do it more, and it's just very positive. I mean, it's very motivating.

As for P01, her adherence experience was “Oh, positive. All the way through. A positive exercise. It's positive. Just, I mean, I feel like I'm just repeating myself now because it's true.”

Six participants stated that their adherence experience was positive overall. P03 stated, “So far, I could say they're all positive.” P09 described the experience as “It's been good. It's been a positive. I've seen it as a positive.” P10 just said, “For us, it's positive.”

Table 25 shows the summary of the main category *Experience with adherence*.

Table 25.

*Subcategories of the Main Category: Experience with Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Experience with adherence	Very positive	4
	Positive	6
	Negative	0

In summary, QCA according to guidelines of Schreier (2012), with the guidance of the theoretical foundation of the study (Rizzo, 2015), produced a coding frame with three concept-driven primary categories, which answered the first research question of this study. Research Question 1 asked, “*How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?*” Discussion of the results of QCA thus far provided sufficient detailed answers to this research question. The three primary categories summarized and described in detail the parents’ knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs. Also, discussion of the results

highlighted the participants' knowledge, beliefs, and attitudes about adherence to the HEPs according to importance, as shown by coding frequencies in the tables provided. Direct quotations from participants provided vivid details of their perception of adherence that addressed the first research question of this study. The next section addresses the study's second and last research question.

**Research question 2.** This study posed a second research question: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? A fourth concept-driven primary category emerged out of this research question, which structured the data in the study's coding frame. This section presents the results of QCA at the level of the fourth primary category, labeled *Prior experience*.

**Primary category 4: Prior experience.** The purpose of coding the data for this primary category was to capture participants' prior adherence experiences that may have influenced or led to their existing knowledge, beliefs, or attitudes about adherence to the physical therapy HEPs. Guided by the study's theoretical foundation (Rizzo, 2015), data collection inquired on participants' adherence to personal routines and prior physical therapy experiences. Two concept-driven main categories emerged from the data, which include *Personal routines* and *Prior physical therapy experience*. Table 26 on the next page displays a summary of the primary category *Prior experience*. This section presents the results of QCA following the guidelines of Schreier (2012) at the level of the fourth primary category of the coding frame labeled as *Prior experience*, to answer the second research question of this study.

Table 26.

*Main Categories and Subcategories of the Primary Category: Prior Experience and Code Frequency Counts*

Primary Category	Main Categories and Subcategories	Frequency Count
Prior experience	Personal routines	
	Types of personal routines	17
	Continuity of personal routines	10
	Facilitators to continuation of personal routines	16
	Barriers to continuation of personal routines	7
	Finding connection to adherence to HEP	10
	Connections between personal routines and adherence to HEP	10
	Prior physical therapy experience	
	Prior physical therapy	10
	Prior adherence attitudes	18
	Child's condition and responses affected prior adherence	15
	Prior experiences with child's physical therapists affected prior adherence	13
	Parents' background knowledge affected prior adherence	2

**Main category 1: Personal routines.** The main category *Personal routines* contained six subcategories, which include (1) *Types of personal routines*, (2) *Continuity of personal routines*, (3) *Facilitators to continuation of personal routines*, (4) *Barriers to continuation of personal routines*, (5) *Finding connection to adherence to HEP*, and (6) *Connections between personal routines and adherence to HEP*. All of these subcategories were concept-driven, based on responses to the interview guide questions 14 to 18 (see Appendix D). Descriptive coding, In Vivo coding, and Structural coding (Saldaña, 2016) were the primary coding approaches used to derive the labels of the codes for these subcategories. Subsumption of the units of coding (Schreier, 2012) led to the final frequency counts, which upon sorting, ranked the lesser subcategories according to how often the participants mentioned the information in the entire data set.

Participants engaged in various personal routines, the most common of which was exercise routines. Eight participants mentioned that they had a routine of *Exercising*. P01 stated, “I was an avid exerciser. I would exercise anywhere between, well, before I had my son, every, I think six days a week for 45 minutes to an hour and 30 minutes every day. Yeah. And I did that for about five years, and I kept off 40 pounds.” P02 tried to “walk a day out of the week.” P05 “used to work out.” P10, the only male participant, described his exercise routine:

I try to exercise after work at least four times. Four times a week. But it's not like a stringent routine. I don't work every... I don't work out every Monday, every Wednesday, every Friday. Kind of shifts around. Sometimes I'm too exhausted to work out. You know? So, day to day, the day will change. Maybe I'll work out Tuesday instead of Wednesday, or Monday instead of Sunday and stuff like that.

*Reading* was the next most common personal routine, according to three participants. P09 said, “For a while, I always liked to read at night.” P06 stated the same, “I used to read a lot. Every day I was reading a lot.”

*Working* was the third most common personal routine. P05 stated, “I've always worked. So, work has always been part of the routine.” According to P01, *Studying* was her routine. She said, “And I was very studious. I graduated at the top of my class in high school. I just got my master’s degree in psychology. I actually managed to do that, two semesters ago, my son was already born.” She also mentioned *Dieting*. She said, “I wouldn't leave my house to get the temptation of, you know, McDonald's or a burger or something. Everything was home-cooked.” On the other hand, P04 had a personal morning routine of *Waking up very early for "me" time*. According to her, “I do try to

wake up before everyone else does. Just to give myself a few minutes to drink my coffee alone, just enjoy the fresh breath of outside before the day has to get going.”

Four participants mentioned that they continued to engage in their personal routines at the time of the study, another four stated that they stopped doing the routines they mentioned, and two said they continued doing a part of their personal routines. P09 stated, “I had stopped for a while, and then I think now, just recently actually, I've come back to it.” P09 recently joined a local gym with her mother and said, “Just to go walk in a treadmill. That is something we are currently trying to input into our lives.” P04 talked about the continuity of her personal routine. She said, “Yes. Just not drinking the coffee as much, but I just try to wake up early.” P06 gave a reason for why she stopped doing her reading routine. She said, “I don't have time for that anymore.”

Participants also explained the factors that helped them continue engaging in their personal routines. *Physical* factors dominated the reasons given for the continuation of personal routines. P10 said, “Well, just keep motivated, and the fact that I have a child that wants to play. I need the energy and the strength and keep myself healthy.” P09 explained:

I started doing that because I wanted to try to learn or to do something. And the yoga was more targeted for losing weight to help you kind of lose a little bit of weight. And so, I started, I did one day, and I said, "Okay, I think I can do this." I liked it because it was something I could do here at my house.

Participants pointed to *Psychological* factors as facilitators to their engagement in personal routines. P01 said, “It was a more of a mental thing, more mental health, feeling better, striving just to be better for myself.” P02 articulated, “I guess rest as often as I

could, take a breather, take some time for myself. That's when I would get out and walk a little to regroup.” According to P03, “I think with the exercise for myself, what the payoff is, is feeling better.”

P06 pointed to an *Intellectual* reason as a facilitator to her personal routine of reading. She reasoned:

Because you need to kind of exercise your brain and sometimes if it's just like all the other stuff and I have to do this paperwork or I have to do this and that, and it's never anything just to learn or to focus on something and read through it and have that critical thinking. I think it's important.

Two participants mentioned that *Spiritual* factors helped them continue engaging in their personal routines. In P02's words, “Pray, pray a lot.” According to P04:

That just helps me. I talk to God and pray to him in the mornings. Ever since this happened, that's what I've done for myself. Since I don't have a sitter, or I don't work. I don't go anywhere else, but I just give myself a little time in the morning...Because then, after everyone wakes up, I have to be there for my daughter, 24/7 then. She relies on me in the wheelchair.

Just as there were facilitators to continuation of personal routines, there were barriers to continued engagement in personal routines. Participants mentioned two barriers, the most common was *Life changes*, and the other one was *No time due to family and caregiving*. P05 said, “Things just change in general when you have kids, but especially a kid that's very high needs, I guess.” P06 voiced, “Oh, gosh. Life. You start getting more things for work and other things.” In the case of P08, her husband was not around as he used to. She said, “Well, [deleted], his father got a different position at his

job, so now he's not really with us all the time.” *No time due to family and caregiving* was a barrier to continuation of personal routines. According to P03, “I don't do it now, simply because I don't have the time. My son and my other daughter, they do take up a lot of my time. Let's say take up all my free time.”

The fifth subcategory to the main category *Personal routines* was *Finding connection to adherence to HEP*. Nine participants made a connection between engagement in their personal routines and adherence to physical therapy HEPs for their children. Only one participant did not make a connection between engagement in personal routines and adherence to HEP. According to P01, “I definitely think developing a routine as a teenager can help with any type of routine that you have with anything in your life.” P02 believed that “Yes, there is a similarity.” P05 thought that “anything can be made a routine.” On the other hand, P08 believed that adherence to HEP was “Well, to us, it's a routine already.” P10 did not see the connection between HEP adherence and his routine of exercising. He stated, “Well, I hadn't thought about it.” However, later in the interview, P10 expressed a similarity between the performance of the HEP and his exercise routine. P10 stated:

Well, it's not routine. It's kind of like my working out, you know. It's not on the same day every time. It does get done, but not consistently on the same day, or the same activity, or the same duration and what not. It's kind of like my exercise routine. It's pretty much, I guess, random to inconsistent. Not a specific routine.

The sixth and last subcategory, labeled *Connections between personal routines and adherence to HEP*, contained the point of view of the participants about the similarities between engagement in personal routines and adherence to HEPs.

*Consistency* and *You get results* were the most common connections the participants made between engagement in personal routines and adherence to HEPs. P09 explained the connection between doing her child's home exercises and her personal routine of reading:

Like with the exercises, I think it's like you know that it has to be done...Because I know the times when we wouldn't do them, I'd be like, "She's not gained the exercise." I know it would be like, "Oh man," if you keep letting it go and go and go, then it's going to be hard to come back to it. So, you have to try to put it in there when you can. Just like me with the reading, sometimes yes, you are tired and... Like when I was tired, and I would stop reading, but then you're like, you miss it.

As for the similarity between her reading routine and her doing her child's HEP, P06 worded consistency in a different way:

You want to have that knowing that you're okay next week, what's on the schedule. Okay. Well, we already know, Tuesdays and Thursdays are, this time is for her, for this. So, I think it's good to incorporate things like that into your routine.

*You get results* was the equally most common connection participants made between personal routine and HEP adherence. In making the connection between working and doing her child's home exercises, P02 stated:

But there is a similarity because if you get out of routine you don't get the results that you were hoping for and you want... I mean you stop home therapy, and your

routine at home was physical therapy, you're kind of stuck. You're kind of like, "Okay, where do I go from here?"

*Prior routine helps future routine* was another connection a participant made between prior personal routine of exercising and HEP adherence for her child. She said, "I was in college exercising, you know, working all of these things at the same time. Developing that routine that I had has definitely helped my routine with my son's." *It requires willpower, A priority, and A part of life* were the other connections that the participants made between personal routine and HEP adherence. In P01's point of view, her prior routine of studying to obtain a graduate degree in psychology and doing her child's home exercises were somehow similar, saying, "Because it's more of willpower, you know." P05 talked about the connection between her routine of exercising and doing her child's home exercises as *A priority* when she explained:

I mean, you just have to make it a priority, I guess. Yeah. I mean, when it was a priority, I would do it more. I mean, yeah, I guess if I really, if I really made it a priority of myself working out, I could make time.

Table 27 on the next page provides a summary of the subcategories of the main category *Personal routines*, which include *Types of personal routines, Continuity of personal routines, Facilitators to continuation of personal routines, Barriers to continuation of personal routines, Finding connection to adherence to HEP, and Connections between personal routines and adherence to HEP*. Corresponding frequency counts are shown accordingly.

Table 27.

*Subcategories of the Main Category: Personal Routines, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Personal routines	Types of personal routines	
	Exercising	8
	Reading	3
	Working	2
	Studying	2
	Dieting	1
	Waking up very early for "me" time	1
	Continuity of personal routines	
	Yes	4
	No	4
	Partial	2
	Facilitators to continuation of personal routines	
	Physical	7
	Psychological	5
	Intellectual	2
	Spiritual	2
	Barriers to continuation of personal routines	
	Life changes	4
	No time due to family and caregiving	3
	Finding connection to adherence to HEP	
	Yes	9
	No	1
	Connections between personal routines and adherence to HEP	
Consistency	3	
You get results	3	
Prior routine helps future routine	1	
It requires willpower	1	
A priority	1	
A part of life	1	

**Main category 2: Prior physical therapy experience.** The information covered under the second main category *Prior physical therapy experience* involved participants' description of prior experiences related to physical therapy for their children. In total, this part of the coding frame contained 57 units of coding using QCA of the phone interview and sentence completion task data. This main category contained five subcategories.

These subcategories include (1) *Prior physical therapy*, (2) *Prior adherence attitudes*, (3) *Child's condition and responses affected prior adherence*, (4) *Prior experiences with child's physical therapists affected prior adherence*, and (5) *Background knowledge affected prior adherence*. The first subcategory was concept-driven from responses primarily to interview guide questions 1 and 2. The second subcategory *Prior adherence attitudes* was data-driven using logic, and summarization and subsumption according to the guidelines of Schreier (2012). The remaining three subcategories were entirely data-driven using summarization and subsumption. Table 28 provides a summary of the main category *Prior physical therapy experience*.

Table 28.

*Subcategories of the Main Category: Prior Physical Therapy Experience, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Prior physical therapy experience	Prior physical therapy	
	Yes	7
	No	3
	Prior adherence attitudes	
	Positive prior adherence attitudes	5
	Negative prior adherence attitudes	8
	Neutral prior adherence attitudes	5
	Child's condition and responses affected prior adherence	
	Child's cooperation	5
	Child's progress with physical therapy	3
	Childs' condition and growth changes	7
	Prior experiences with child's physical therapists affected prior adherence	
	Positive prior experiences	3
	Negative prior experiences	7
	Neutral prior experiences	3
Background knowledge affected prior adherence	2	

The majority of the participants' children received physical therapy services in other locations or setting in the past. Seven participants stated that their children had prior

physical therapy services somewhere else, while three participants indicated that they had no prior physical therapy for their children. P04 said, “We have moved around to different places. Just me as a parent, and researching and just learning everything and seeing the therapists at the centers and have learned so much and we've changed. I guess, three centers.” P05, on the other hand, specified that “At first, we got it through the regular early intervention program, and then now we get private therapy.” P07’s child received physical therapy much earlier than the rest of the participants’ children. P07 stated, “She started to receive therapy initially in the NICU, but once she was discharged from the NICU, she no longer qualified for the therapy, so she went back on therapy around 10 months, but it was at home, it wasn't to an outpatient rehab facility.” In contrast, P08’s child had always received physical therapy in the same clinic. She said, “He's been there since he was three months and still going there.”

*Prior adherence attitudes* was the second subcategory of the main category *Prior physical therapy experience*. This data-driven subcategory contained 17 units of coding, which captured participants’ description of their attitudes in the past about adherence to physical therapy HEPs. Participants’ prior adherence attitudes were either positive, negative, or neutral. For this subcategory, *Neutral prior adherence attitudes* included data that were not entirely positive nor negative. The predominant prior adherence attitudes of the participants were negative.

The majority of the participants’ *Negative prior adherence attitudes* revolved around skepticism. P08 voiced, “I was skeptical at first for him to... After the evaluation, I'm like you know what, maybe he's too little for physical therapy. Maybe they were going to push him too hard, and he would get tired....” The same parent voiced

skepticism in writing, when in response to the second sentence completion task question “As a parent (or legal guardian) of a child who receives physical therapy, my experience of following the home exercise plan was...”, she responded with, “I was skeptical to push my child to keep working harder at it.” P09 had the same attitude. She verbalized:

I know when she was younger, it was very hard. I was always like, "Oh my God, maybe I'm not doing this right." And I doubted some of it. And then throughout the years you kind of like, "Okay, now I know. Now this is how I can do it." But at the very beginning it was like, "Oh no," being she was very small, and I was like, I don't know if I'm going to be able to do that.

Three other negative prior adherence attitudes emerged from the data. These negative prior adherence attitudes include *Parent was in shock*, *Parent resented the HEP*, *Parent was afraid of asking*, and *Parent felt overwhelmed*. P04 admitted that she was in shock initially and wished that she did more for her child. In her words:

And like I said, going back to this, I could have done more maybe in the beginning when their talking, I wasn't fully... when I was in shock, and then you are like, "I don't want to do this," you go back and then, maybe I should have listened to them because then I know it could have helped her.

P06 resented the HEP. She said:

At first, I was hesitant to want to do anything for her like that because everybody, once you get home, you are home. If you're in a suit or tie, you take it off, if you're wearing a belt, things like that, when you get home, you don't want to, it's like home base for you, you are home, you want to relax. So, with the home exercises, kind of like resenting that.

P02 avoided communicating with physical therapists. She stated, “Before, I used to be afraid of speaking up and asking for advice, or asking for help.” On the other hand, P03 indicated that “In the beginning, it felt overwhelming.”

Most of the participants’ *Positive prior adherence attitudes* were rated as positive because the participants wanted to do more exercises for their children. These comments often centered around being hard on themselves on adherence for wanting to do more for their children. In the interview, P03 stated:

I used to be like that. I used to get so, like, so upset with myself at the end of the day, because I didn't, I didn't, you know, I least in my head I didn't plan the day wisely, and he didn't do enough of the exercises.

On paper, she wrote, “because it felt like I wasn’t doing enough.” Almost similar to P01’s statement, “And, and I felt that I wasn't doing anything.” P03 followed the HEP very strictly and focused on “following word per word PT plan.”

Four *Neutral prior adherence attitudes* towards adherence emerged from the data. Neutral adherence was coded when the participant was not expressly negative or positive, but rather simply reporting adherence activities as something they were doing and how regularly they were doing it. *HEP was not a daily routine*, according to two participants. P02 admitted, “Before, I'd say about maybe two years ago, we weren't in a routine. We were kind of just doing whatever.” P03 expressed a similar message, “Well, at first it was, it was hard to incorporate them in our daily, daily routine.” Three other infrequent responses emerged from the data, which were neither positive nor negative in describing prior adherence attitudes. P03 indicated in writing that in the past, she did not do HEP as

play, and that she did not focus on small goals. On the other hand, P01 was scared of hurting her child. She explained:

Um, at the beginning, I was scared that I was going to hurt him. So, I massaged lightly. I, you know, I didn't want him to cry. I didn't want him to fuss. So, it was just me being scared.

Table 29 shows the subcategory *Prior adherence attitudes*.

Table 29.

*Subcategory: Prior Adherence Attitudes, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Prior physical therapy experience	Prior adherence attitudes	
	Negative prior adherence attitudes	
	Parent was skeptical	3
	Parent was in shock	1
	Parent resented the HEP	1
	Parent was afraid of asking	1
	Parent felt overwhelmed	1
	Positive prior adherence attitudes	
	Parents were hard on themselves	4
	Parents followed the HEP very strictly	1
	Neutral prior adherence attitudes	
	HEP was not a daily routine	2
	Parent did not do HEP as play	1
	Parent did not focus on small goals	1
Parent was scared of hurting the child	1	

*Child's condition and responses affected prior adherence* was the third subcategory of the main category *Prior physical therapy experience*. This subcategory was entirely data-driven and contained 14 units of coding. In this subcategory, participants described how their children's medical condition, responses to physical therapy, and adherence to HEPs affected their prior HEP adherence. Three lesser subcategories emerged from the data, including *Childs' condition and growth changes*,

*Child's cooperation, and Child's progress with physical therapy.*

The lesser subcategory *Childs' condition and growth changes* contained the most responses. This subcategory has different ideas included in it but they all center around the idea that adherence changes across time and growth. Two participants indicated that they performed more HEPs to the child when the child was younger. P05 said:

I feel like I did them more when he was younger. I don't know why. Well, I guess my schedule was different back then. It has changed over time, but I feel like we did them more when he was really young, maybe in his first year or so and then I don't know, I guess life got busier and then it kind of, it just didn't happen as much.

P09 expressed the same prior experience in writing and in words. She wrote:

At first somewhat good. As my daughter grew older, it was a little more difficult to get her to do. We had to figure which were her favorite exercises to do in order for her to want to commit to the therapy.

In the interview, she said, "Yeah, when they were younger, we could do it more often."

She further explained:

And now she's in fifth grade, so it's a lot more work, it's a lot more things that she's occupied with at school. And so, it's a little bit harder than it was a few years back when she was younger.

Still under the same lesser subcategory *Childs' condition and growth changes*,

P07 told a story of regression in her child's abilities and how she coped with it:

She had a major growth spurt, and she had such a regression that it felt sort of, kind of like a slap to our face, like all this hard work, and for nothing. I felt like I

went back to square one. I went into the shower, and I cried a couple of times, where I just felt like I was not doing it enough, should I have pushed harder ... She's falling more, and now she really needs the walker, before where she was walking around the house without the walker, and now she needs it, or else she's constantly falling every two steps. At that time is when I felt like I'm not doing enough and ... When that happened, I do recall actually having, setting up a time and just working with her, and just working with her for 30 minutes or an hour if I could spare the hour, because I wanted her back to where she was. I wasn't going to accept it because I knew what she was capable of doing.

In the case of P02's child, intensive physical therapy caused a complication, as she recalled:

He got, one year we did intensive physical therapy, and that really triggered a lot of seizures for him. Sometimes I have to really think, "Okay, should we get a break from therapy today, should we do maybe a little bit less of physical therapy at home.

The lesser subcategory *Child's cooperation* contained the second most frequent responses. Three participants indicated that their children's poor cooperation with the HEPs affected their prior adherence to the HEPs. According to P03, "Then, I remembered when my son needed to be in the stander. No, he didn't like it." P04 recalled, "In the beginning, it was very hard. She would cry. Every position change, she would cry." Also, P05 remembered, "But at first, he just tightens up and doesn't want to do it." According to P02, her child's crying stopped her from doing the HEP. She stated, "If I would have

done this survey a few years back, I would have told you that once he starts crying, I stop therapy. I tell him to stop, give him a break.”

*Child's progress* was the last lesser subcategory to *Child's condition and responses affected prior adherence*. Participants recalled their child's progress in the past, which may have influenced their view of adherence. P06 related her satisfaction with her child's progress in physical therapy. She recalled, “I could see a difference. So, I was happy with her not having to continue.” P07 was proactive in looking for more options for her child when her child's progress did not meet expectation from home health physical therapists. She said:

Because I was not seeing any results, or things I was still wanting to, was searching for I guess you could say, in regards to her sitting, and her posture, and just personal goals that I had for her and wanted to see out of a 10-month-old, or even after she got to one year old I still wasn't seeing any progress.

Table 30 summarizes *Child's condition and responses affected prior adherence*.

Table 30.

*Subcategory: Child's Condition and Responses Affected Prior Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Prior physical therapy experience	Child's condition and responses affected prior adherence	
	Child's condition and growth changes	
	Adherence was easier when child was younger	5
	Regression was an eye-opener	1
	Intensive therapy triggered seizures	1
	Child's cooperation	
	Child was uncooperative	4
	Crying stops parent	1
	Child's progress	
	Satisfied with child's progress	1
Progress did not meet parent's expectation	1	

*Prior experiences with physical therapists affected prior adherence* was the fourth subcategory of the main category *Prior physical therapy experience*. This subcategory contained 13 units of coding, which were all data-driven. In this subcategory, participants detailed their prior experiences with the physical therapists that their children had in the past. Three lesser subcategories emerged from the data, including *Negative prior experiences*, *Positive prior experiences*, and *Neutral prior experiences*.

According to some participants, the prior experience they had with their children's physical therapists was mostly negative. The most common negative experience resulted from improper teaching of the HEP. P03 recalled:

I know that for my son, the first PT that he had, although I liked him, he didn't really show me much what to do. I would see what he was doing, but I felt like that just wasn't enough for my son. Since I didn't have no one to compare and he was the first PT, I was just like, "Okay, well I don't know what to do."

P07 remembered, "I know from a previous experience that I had ... A therapist that she had, she, I felt, wasn't taking the time for her and wasn't really giving me feedback."

P04 recalled an *Inconsistency in HEP education*:

The therapists are so different. Some don't say anything about home therapy, and some do. There are some who don't know the exercises, or know what they are saying, and not all of the therapists give out handout explanations about the home therapy.

Although some of this comment was about positive physical therapist behaviors, the overall point was that it was inconsistent which made it negative. P04 also commented on physical therapy staffing. She said, "And just the other places, I've noticed, they would

always switch therapists, and I didn't like that.” On the other hand, P07 thought that her child’s prior physical therapy was insufficient. She said, “I felt like the at-home therapy was just ... Because it was only three times a month it just wasn't sufficient for her.”

P03 told a story about a negative experience with a physical therapist and her insistence on what she thought was right for her child. She detailed:

The only one that I would say wasn't a positive was after we got released from inpatient rehab. The PT really, really pushed for me to use a belt gait on my son. She really pushed like he needed to have that. I knew his gait wasn't strong. I knew his walk wasn't strong. But I felt like if I give him that gait belt and I use it, and other people use it, his teachers, he's going to depend on it. My son's really good at, if you give him shoulder to lean on, he will put all his weight on you. So, I said no. They told me he's going to fall, and I go, "I know he's going to fall, but he will get up. He has to get up." We can't just, "Okay, hold onto him." I know he was fresh out of surgery. I know he needed it. But I said no, against the PT, against what the doctor said. I said, "No, we're not using a gait belt. No, he's just going to have to walk." Whether it's slow walking, whether it's walking and leaning against the wall. He's going to have to do it by himself. He's doing really good right now.

Although most of the participants’ prior experiences with physical therapists were negative, three participants shared some positive prior experiences. P07 recalled, “My child experiencing physical therapy has been great through the outpatient service. In the beginning, they would teach me very well, and they would allow me to view and see.”

P05 stated that prior physical therapists involved her more. She said, "When he was younger, when the ECI people would come to the house, they would do it a little bit more. I guess, getting me involved." P09 had positive prior experiences with her child's physical therapists. She stated:

I feel like I have always had really good therapists for her, that have gotten along with her and know how to work along with her. And so, my experience has been like a really good one for my daughter. Being there was a big part of her life. Like, her therapists really worked good with her I think.

P09 recalled prior experiences with her child's physical therapist, which were neither positive nor negative. First, she said:

And then they would ask me, "Did you do anything at home? Does she like to do it at home?" And there were times I'm like, "No, we didn't get to do anything or yeah, she likes it, or she was able to do bridges, or she was able to do a little bit of walking or sit to stands," and things like that. But it was never like, "Well you should have done this more." I've never done that. I've never, ever experienced that.

And then, she described a prior experience, which meant that the physical therapist left it up to her to decide on the performance of HEP. She said:

I think they leave it to where the parent can decide. If it's a good day, yes, do it, if it's not, then don't. So, it's not really a said time. Like it has to be this day, this day, this day. You want to set up whatever schedule works for you. And I think they leave it up to the parents.

Table 31 below shows a summary of the subcategory *Prior experiences with physical therapists affected prior adherence*.

Table 31.

*Subcategory: Prior Experiences with Physical Therapists Affected Prior Adherence, and Code Frequency Counts*

Main Category	Subcategories	Frequency Count
Prior physical therapy experience	Prior experiences with physical therapists affected prior adherence	
	Negative prior experiences	
	Prior physical therapist did not teach HEP properly	2
	Prior physical therapist did not provide feedback to parent	1
	Inconsistency in HEP education	1
	Inconsistency in physical therapy staffing	1
	Parent disliked physical therapist instruction	1
	Prior physical therapy service was insufficient	1
	Positive prior experiences	
	Prior physical therapist provided good HEP education	1
	Prior physical therapist involved the parent more	1
	Good experience with prior physical therapist	1
	Neutral prior experiences	
	Physical therapist left it up to the parent	3

Finally, the main category *Prior physical therapy experience* had a fifth subcategory labeled as *Background knowledge affected prior adherence*. Two participants provided important information for this subcategory. According to P07, her educational background was instrumental in her adherence to the HEP. She stated:

I think it's because also my years of my education... Working, still working in the field of education I'm still able to work with kids and see what needs to be done, and still get her there, and learn how to teach her it's okay, you're going to have questions, you just ask them, don't be afraid to ask them, or don't be afraid to say if you need help.

P08 responded to the second sentence completion task question, “*As a parent (or legal guardian) of a child who receives physical therapy, my experience of following the home exercise plan was ...*” with the following remark, “With my own child, I had followed every advice/plan/recommendation because, although I was told to be prepared for the unknown, I as a parent just wanted to be as independent as possible.”

This section presented the detailed results of QCA at the level of the fourth primary category of the coding frame labeled as *Prior experience*, to answer the second research question of this study. This study posed a second research question: *How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?*

Presentation of the results of QCA thus far provided sufficient detailed answers to this research question. The fourth primary category *Prior experience* summarized and described in detail the participants’ prior adherence experiences that may have contributed to their mental models of adherence to pediatric physical therapy home exercise programs. Discussion of the results of QCA underlined the participants’ prior adherence experiences related to personal routines and physical therapy according to importance as shown by coding frequencies in the tables provided. Direct quotations from the participants provided a complete picture of their prior adherence experiences that addressed the second research question of this study. The next section presents a summary of Chapter 4.

### **Summary**

The purpose of this qualitative, descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric

physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. The following research questions guided data collection and data analysis:

RQ1: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

RQ2: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

The researcher obtained qualitative data using semi-structured, phone interviews, and written, sentence completion tasks from 10 participants who were parents of children aged 18 months to 11 years old and receiving outpatient physical therapy at the time of the study. The previous sections of this chapter presented the descriptive findings, the data analysis procedures, and the narrative and tabular results of data analysis. This section presents a concise summary of the results of data analysis in relevance to the research questions of this study.

**Research question 1 summary.** The main objective of Research Question 1 was to explore parents' description of their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. Qualitative content analysis of the data following the guidelines of Schreier (2012) revealed that parents of children receiving physical therapy had numerous knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. Parents' description of their knowledge of adherence to HEPs also included strategies that facilitate adherence and knowledge of the HEPs. On the other hand, description of beliefs about adherence to HEPs included the benefits of adherence,

consequences of poor adherence, negative consequences of good adherence to the child, facilitators of adherence, beliefs about other parents' adherence, and the proper frequency of adherence. Beliefs about adherence to the HEPs also included the parents' opinions about the physical therapist's teaching of adherence and ideas on how physical therapists can improve parent adherence. Likewise, parents' description of their attitudes about adherence to HEPs also included description of their positive adherence behaviors, and overall experience with adherence.

***Knowledge of adherence to HEP.*** The most commonly described knowledge of adherence to HEPs are the following: (1) adherence benefits the child, (2) adherence requires consistency, and (3) the child's autonomy and motivation is important for adherence. Likewise, the most commonly described strategies that facilitate adherence included: (1) knowing the HEP well, (2) making the HEP a daily routine, (3) communicating properly with the child's physical therapists, (4) incorporating the HEP in the child's daily activities, and (5) involving the whole family with adherence to the HEP. These findings were the most important knowledge of adherence to the HEP, according to the participants in this study.

***Beliefs about adherence to HEP.*** The most commonly described beliefs about adherence to HEPs are the following: (1) adherence to the HEP is a routine, (2) good adherence is ideal, (3) children can learn to do the HEP independently, (4) parent's motivation affects adherence, and (5) adherence is a hard balance for the family. Parents believed that adherence leads to the child's overall progress, improved functional abilities, and faster recovery. On the other hand, as a consequence of poor adherence, the child will not improve, and the child will experience regression in status.

Continuing on *Beliefs about adherence to HEP*, the most commonly described beliefs about the negative consequences of good adherence to the child are the following: (1) the child dislikes doing the HEP, and (2) the child never gets to rest. Likewise, parents believed that their adherence could improve if the physical therapists would do the following: (1) provide more demonstration of the HEP, (2) positively encourage parents, and (3) provide more ideas about the HEP. Most of the parent participants in this study believed that their children's physical therapists spent enough time to teach them the HEPs properly. On the contrary, most of them believed that the physical therapists did not emphasize to them the ideal frequency of performance of the HEPs.

Parent participants most commonly described the following facilitators of adherence to the HEPs: (1) being a stay a home parent, (2) having similar physical therapy clinic equipment to use at home, (3) and making the HEP a routine. Most of the parent participants in this study believed that other parents' adherence to HEPs is poor. Furthermore, the most commonly described ideal frequency of adherence to the HEPs was doing the HEP every day. These findings were the most important beliefs about adherence to the HEPs, according to the participants in this study.

***Attitudes about adherence to HEP.*** The attitudes about adherence to HEPs among the participants in this study was largely positive. The most common positive attitudes about adherence are the following: (1) adherence is important to see progress in the child's condition, (2) adherence is a responsibility of the parents, (3) parents feel good from adhering to the HEP, and (4) adherence can be better. On the other hand, the most common negative attitudes about adherence include the following: (1) it is hard to find

time to do the HEP, and (2) it is exhausting to do the HEP. Uncertainties were the most commonly described neutral attitudes about adherence to the HEP.

The most commonly described positive adherence behaviors include: (1) persisting in adherence, (2) encouraging the child, (3) doing the HEP regularly, and (4) involving the whole family in adherence. Overall, the experience with adherence to HEPs among the participants in this study was largely positive. These findings were the most important attitudes about adherence to the HEPs according to the participants in this study.

**Research question 2 summary.** The main objective of Research Question 2 was to explore parents' description of describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? Qualitative content analysis of the data following the guidelines of Schreier (2012) revealed that parents' description of their adherence to personal routines was relevant to understanding their adherence to pediatric physical therapy home exercise programs. More importantly, data analysis revealed that parents' prior experience of physical therapy for their children may have shaped their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs.

**Personal routines.** Parents' described that exercising and reading were the most common personal routines that they followed. An equal number of participants continued their personal routines as those who discontinued following their personal routines at the time of the study. Physical and psychological reasons were the main facilitators to continued adherence to personal routines. On the other hand, life changes and having no time due to family reasons were the main barriers to continued adherence to personal

routines. The majority of the participants recognized a connection between adherence to their personal routines and adherence to their children's HEPs. These connections revolve around the ideas that adherence to both required consistency and was related to obtaining results.

***Prior physical therapy experience.*** At the time of the study, the majority of the participants' children received physical therapy in other settings or clinics. The prior adherence attitudes among the participants in this study were largely negative. The most common negative prior adherence attitude revolved around skepticism about participation in physical therapy and the performance of the HEPs. On the other hand, the most common positive prior adherence attitude was that parents put a lot of pressure on themselves in adhering to the HEPs. Furthermore, participants described a neutral attitude that in the past, the HEPs were not part of their children's daily routine.

Data analysis revealed that three factors influenced the participants' prior adherence to HEPs. These factors include: (1) the child's condition and growth changes, (2) prior experiences with the child's physical therapists, and (3) parents' background knowledge. Regarding the child's condition and growth changes, participants described that their adherence to the HEPs was better when their children were younger and smaller. According to the participants, their children's cooperation during the performance of the HEPs and overall progress with physical therapy affected their prior adherence to the HEPs.

The predominant participants' prior experiences with their children's physical therapists, which affected their prior adherence to the HEPs, were negative. Improper teaching of the HEPs was the primary negative experience of the participants with their

children's prior physical therapists. On the other hand, positive prior experience with physical therapists related to the prior physical therapists who provided good HEP education and involved the parent more with the HEPs. Furthermore, participants described a neutral prior experience with physical therapists who left adherence up to the parent's discretion.

Finally, according to participants, their background knowledge influenced their prior adherence to HEPs. The participant whose educational background was related to educating children reported a high level of prior adherence to the HEPs. Conversely, the participant who was informed by healthcare professionals to prepare for the unknown regarding the child's condition exhibited a low level of prior adherence to the HEPs. The collective findings stated thus far concerning adherence to personal routines, and prior physical therapy experience addressed Research Question 2 of this study.

**Data analysis limitations.** The main source of limitation related to data analysis procedures was related to researcher bias. As discussed in Chapter 3, the researcher is the instrument of research (Patton, 2015), and this in itself was a delimitation when it comes to data analysis and interpretation of the results of the study. The researcher of this study is an experienced physical therapist who is a board-certified clinical specialist in pediatric physical therapy. The clinical expertise of the researcher in communicating with parents of children with disabilities was evident in the significant amount of collected data from the phone interviews. More importantly, this clinical experience allowed the researcher to understand and interpret the perceptions of parents of children with disabilities as expressed in the sentence completion tasks and phone interviews in such depth and complexity which may differ from the understanding and interpretation of researchers

who do not have the same experience with this patient population. This issue on researcher bias warrants consideration when evaluating the trustworthiness of the data analysis for this study.

Another major limitation in data analysis involves the paucity of data collected from the sentence completion tasks. Unlike the significantly high volume of data collected from the phone interviews, the amount of data collected from sentence completion tasks was small and incomprehensive. This shortcoming was due primarily to the instrument developed and used for the study. The volume of collected data from the phone interviews allowed the researcher to successfully employ data categorization and summarization using QCA according to the guidelines of Schreier (2012). However, this cannot be stated for the data from the sentence completion tasks. Although the sentence completion task, as employed in this study, provided important written qualitative data that came directly from the participants and served the purpose of triangulation of verbal responses obtained from the phone interviews, the majority of findings of this study came from the data analysis of the phone interviews. Therefore, this limitation on the paucity of data collected using sentence completion tasks warrants consideration when evaluating the trustworthiness of the results of this study.

According to Patton (2015), the rigor of data analysis depends on the skills of the researcher. For this study, the researcher performed the data analysis by himself and did not seek assistance from experts in data analysis, particularly in QCA. The researcher made the best effort to achieve proficiency in conducting QCA according to the guidelines of Schreier (2012) and in using MAXQDA to assist with data coding and organization. Schreier (2012) claimed that QCA could be performed properly by one

person and beginners in QCA. The researcher took advantage of the written guidelines, which Schreier (2012) provided sufficiently on how to conduct QCA in that manner, especially regarding repetitive coding and ensuring unidimensionality, mutual exclusiveness, and saturation of the coding frame. Despite the stated preparation and expressed adherence to guidelines, the researcher was a beginner in QCA and analyzed the data on his own. The results of data analysis should be viewed in consideration of this limitation.

Chapter 4 concludes at this point. Qualitative content analysis of the data following Schreier's guidelines (2012) organized the results section of this chapter according to the descriptions of the categories of the coding frame. In this study, the coding frame is the most important result of QCA which answered the study's research questions. Chapter 5 presents the conclusions, implications, and recommendations based on the results of this study.

## Chapter 5: Summary, Conclusions, and Recommendations

### Introduction and Summary of Study

Adherence is a key concept to the success of medical interventions, including physical therapy. According to the World Health Organization (2003), patient adherence to healthcare recommendations is “the extent to which a person’s behaviour ... corresponds with agreed recommendations from a health care provider.” For children with long-term medical conditions, non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure (WHO, 2003). In pediatric physical therapy, evidence shows that parents’ adherence to the prescribed HEPs is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). This societal problem achieves a heightened significance when considering that failure to achieve optimal outcomes in pediatric physical therapy now may have negative repercussions on the quality of life of these children in the future. Therefore, pediatric home exercise adherence is an important topic of research in the field of physical therapy.

Despite the existence of numerous studies on the topic of exercise adherence, more information is needed to know how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences (Medina-Mirapeix et al., 2017; Rizzo & Bell, 2018; Tanner et al., 2017). This study addressed this gap in the literature. The problem that this study addressed was that it was not known how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent

perceptions to ultimately improve parent adherence to HEPs. This study was timely and significant, as it took the opportunity to contribute to filling a significant gap in knowledge in understanding adherence to physical therapy HEPs in the pediatric population.

The mental models of physical therapy patient adherence to HEP (Rizzo, 2015) served as the theoretical foundation for this study. According to Rizzo (2015), patients hold mental models of how physical therapy intervention works, and these mental models influence the way patients make decisions regarding adherence to physical therapy recommendations. In the context of this study, the physical therapy recommendation of interest is to adhere to the physical therapist-prescribed HEPs. The parents' perceptions (i.e., knowledge, beliefs, and attitudes) about adherence to HEPs are their mental models of adherence to the HEP which influence their adherence decisions and behavior.

The purpose of this qualitative, descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs, in a suburban region in a southern state of the United States. From a general population of all parents of children receiving physical therapy, 10 adult parents of children receiving outpatient physical therapy consented in writing to participate in semi-structured phone interviews and written sentence completion tasks.

This study employed qualitative content analysis (QCA) following the approach of Schreier (2012) in data analysis of the phone interview and sentence completion task data. Combining data-driven and concept-driven approaches to building a

multidimensional coding frame, the researcher followed the guidelines of Schreier (2012) to successfully summarized, interpreted, and described in detail the relevant parts of the data to answer two research questions. This study's research questions were:

RQ1: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

RQ2: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

Understanding parents' knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs was a major effort in this study to promote HEP adherence among parents of children with physical therapy needs. This effort carried a vision of long-term improvement of the clinical outcomes for all children who receive physical therapy in the United States. While Chapter 4 presented a detailed account of data analysis procedures and the summary of the results of QCA, Chapter 5 provides an interpretation of the results to arrive at conclusions, which have implications for theory, future research, and clinical practice. The next section conveys the specific findings and conclusions of this study.

### **Summary of Findings and Conclusion**

The purpose of this qualitative, descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. The researcher obtained qualitative data using semi-structured, phone interviews, and written,

sentence completion tasks from 10 participants with children aged 18 months to 11 years old, who were receiving outpatient physical therapy at the time of the study. This section presents a summary of findings and conclusions in light of the existing literature on pediatric physical therapy HEP adherence.

**Research question 1 summary of findings and conclusions.** How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? Three concept-driven primary categories resulted from this research question, which structured the data in the coding frame: (1) *Knowledge of adherence to HEP*, (2) *Beliefs about adherence to HEP*, and (3) *Attitudes about adherence to HEP*.

***Knowledge of adherence to HEP summary of findings.*** In building the coding frame using QCA, the researcher employed the following category definition of Knowledge: *Something that one knows, understands, or learned about a particular subject that is based on facts or credible information, gained from personal experience or education. A belief that is justifiable or reliable, as opposed to opinion.* Data analysis of all the phone interview and sentence completion task data from the 10 participants in this study using QCA generated three main categories: (1) *Knowledge of adherence to HEP*, (2) *Strategies that facilitate adherence*, and (3) *Knowledge of the HEP*. The most commonly described knowledge of adherence to HEP are the following: (1) adherence benefits the child, (2) adherence requires consistency, and (3) the child's autonomy and motivation is important for adherence.

Participants acknowledged in writing and in words that their most common knowledge of adherence was that it benefits the child. P02 stated, "I've grown to where I

know it helps him.” Adherence requires consistency, according to the participants of this study. P03 wrote, “In my experience, following the PT plan at home requires a lot of consistency.” The third most common knowledge of adherence to HEPs highlighted the importance of the child's autonomy and motivation. P09 expressed this idea in the interview and the sentence completion task when she referred to her 11-year-old child who had been receiving physical therapy for over 10 years for a diagnosis of cerebral palsy.

The main knowledge of adherence finding of this study was that parents understood that adherence to HEPs helps their children make progress in physical therapy. This finding resonates in a backward fashion with the findings of Birt et al. (2014), Peek et al. (2018), and Medina-Mirapeix et al. (2017). Birt et al. (2014) found that the perceived benefits of physical improvement enhanced parent's adherence to their children's HEPs. Peek et al. (2018) suggested that positive patient perception of the benefits of the HEPs affects adherence. Similarly, Medina-Mirapeix et al. (2017) identified that providing parents information about their child's progress can help enhance adherence to the HEPs. In this study, participants expressed their knowledge that adherence was beneficial to their children's condition.

The second main finding in this study on knowledge of adherence to HEPs was that adherence requires consistency. To the researcher's knowledge, this finding is novel in the literature on parent's perceptions of adherence to pediatric physical therapy HEPs. The demographic characteristic of the participants' children in the study may explain this finding. In this study, the average length of time that the children were receiving physical therapy was four years and six months at the time of the study. This duration may have

allowed the participants to learn from experience that consistency was needed to obtain benefits from adherence.

The third main finding under the first main category *Knowledge of adherence to HEP* was that the child's autonomy and motivation are important for adherence. According to Bérubé et al. (2017), autonomy is important to older children and adolescents in managing their chronic conditions. The finding of this study aligns with the finding of Babatunde et al. (2017) that younger individuals who receive autonomy support tended to be more adherent to their treatment regimen. This study maintains the relevance of the concept of autonomy for older children with chronic conditions.

In the second main category *Strategies that facilitate adherence*, participants delineated the actions that they have done, which proved useful in helping them adhere to the HEPs. According to the participants, the most common strategies that facilitate adherence to the HEPs included: (1) knowing the HEP well, (2) making the HEP a daily routine, (3) communicating properly with the child's physical therapists, (4) incorporating the HEP in the child's daily activities, and (5) involving the whole family with adherence to the HEP.

Knowing the HEP well was the most commonly cited parent strategy that facilitates adherence. Participants noted that knowing the HEP well can be accomplished most commonly by asking questions and demonstrations, being present during the therapy session, and doing own research. P06 explained:

I don't sit out in the waiting room. So, maybe that's why I feel like, well, it's not that hard, but because I'm there every day... the whole year I go, and I watch.

Because I want to see how she's doing. I want to know how to do certain exercises properly because I don't want to hurt her, and I don't want her to hurt herself.

Three participants in the interviews and four participants in the sentence completion tasks gave importance to making the HEP a daily routine. P02 stated, “Like now he has a strict routine, and that's helped. I think routine at home is beneficial and crucial. You have to have a routine.”

Communicating with the physical therapists was the third most common strategy known to the participants as a facilitator of their adherence. As P09 stated, “Always keep an open communication with the therapist with what is working and what is not working.” For the strategy of incorporating the HEP in the daily activities, P01 used bath time as an opportunity to do the HEP when she wrote, “Find any activity as an opportunity to help them. I use bath time as a way for my son to use both hands to splash water.” As for the strategy of involving the whole family, P03 uttered, “But it hasn't just been me. It's been a whole family effort. My husband, my daughter, my mom, everybody who has contact with my son.”

The main finding under the main category *Strategies that facilitates adherence*—knowing the HEP well—echoes the finding that parents’ knowledge and ability about the HEPs can overcome the barriers to adherence (Medina-Mirapeix et al., 2017). The second main finding that making the HEP a daily routine is an enabler of adherence aligns with the finding of Scorrano et al. (2018). On the other hand, according to Pallazo et al. (2016), patients failed to adhere to their HEPs when they experienced difficulties communicating with their healthcare providers and when they did not receive proper supervision. This study supports that statement, as participants acknowledged that

communicating properly with the child's physical therapists was an important facilitator of adherence.

This study also found that incorporating the HEP in the child's daily activities is a parental strategy that facilitates adherence. It is similar to one of the findings of Birt et al. (2014), which showed that parents made the HEP a part of the child's routine.

Furthermore, this study found that, according to the participants, involving the whole family helps adherence to the HEPs. This finding aligns with the finding of Scorrano et al. (2018) that the lack of family and social support is a common barrier to adherence.

The third main category *Knowledge of the HEP* captured the participants' perceptions of the prescribed HEPs to their children. According to Medina-Mirapeix et al. (2017), sufficient knowledge of the HEPs is crucial to adherence to the HEPs. In this study, all participants described in lengths of paragraphs the detailed account of the specific exercises that were a part of the HEP plan for their children. In terms of how often participants typically performed the HEP in a given week, one out of 10 participants in this study performed the HEP throughout the day, three performed the HEP daily, another three performed the HEP four to six times a week, and two participants only had time to do the HEP one to three days a week. Studies have shown that parent adherence to the prescribed HEPs for their children is variable (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004).

***Knowledge of adherence to HEP conclusions.*** Based on the synthesis of the findings under the primary category *Knowledge of adherence to HEP*, the researcher of this study advances the following conclusions:

1. Parents understood that adherence to the HEPs helps their children make progress in physical therapy. However, consistency in adherence is needed to obtain this benefit.
2. Parents realized that sufficiently knowing the HEPs is a prerequisite for good adherence to the HEPs.
3. Parents learned that good knowledge of the HEPs is achievable primarily by asking questions and learning from exercise demonstrations.
4. Parents recognized that making the HEPs a part of the daily routine of the child and the family is an important strategy for good adherence.

These conclusions provide partial answers to the study's first research question, which asked: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

*Beliefs about adherence to HEP summary of findings.* In building the coding frame using QCA, the researcher employed the following category definition of Belief: *Something that one accepts, believes, or knows as true, but may not be based on fact, truth, or certainty. An assumption. A common sense reasoning. An opinion. An ideal. Can be revised if an evidence or truth is presented.* Nine concept-driven main categories emerged from QCA of the phone interview transcripts and sentence completion task data. These main categories are labeled as follows: *Beliefs about adherence to HEP, Benefits of adherence, Consequences of poor adherence, Negative consequences of good adherence to the child, How can physical therapists improve parent adherence?, Physical therapist's teaching of adherence, Facilitators of adherence, Beliefs about other parents' adherence, and Proper frequency of adherence.*

Under the first main category *Beliefs about adherence to HEP*, the participants of this study described their most common beliefs about adherence to HEPs, which include the following: (1) adherence to the HEP is a routine, (2) good adherence is ideal, (3)

children can learn to do the HEP independently, (4) parent's motivation affects adherence, and (5) adherence is a hard balance for the family. The most common finding is that adherence to the HEPs is a routine. One participant wrote, "The more it is practiced during therapy and at home, the more it becomes a normal routine." In another participant's words, "A routine I think, is crucial when you do PT. You have to do it at home and continue doing it." Good adherence is a good idea, from the words of P05: "Like doing it all the time, right? I think that's good. I think they should be."

Participants believed that children could learn to do their HEPs independently. As P06 stated, "I want her to know that those are important. And even if she's not at therapy, she's going to be able to do this on her own." P08 opined that adherence depends on the parent's motivation. She said:

I guess it depends maybe on the child or the parents' view on it. I'm more of a person that likes to motivate my child, so I think if I had just an ugly attitude towards it, "Come on, hurry up, let's get this over with," then my child wouldn't be so motivated. But since I just, I have a different view on it, it motivates my child to do it.

Participants also believed that adherence is a hard balance for families. P03 stated, "It is really hard balance. You know, I'm fortunate that I have only one other child. I know some, some families have more than multiple kids, and when you have one special needs kid, that one child takes up a lot of your time."

The finding of this study that adherence to the HEPs is a routine agreed with the findings of Scorrano et al. (2018) and Lillo-Navarro et al. (2015). Scorrano et al. (2018) identified that having a specific routine was an important enabler of adherence to HEPs,

while Lillo-Navarro et al. (2015) found that parents believed that having the HEPs as a routine was important to adherence. This study also found that parent's motivation affects adherence, lending further support to the evidence in the literature that self-motivation was one of the predictors of adherence to HEPs (Essery et al., 2017). Furthermore, Birt et al. (2014) and Santer et al. (2014) revealed that parents encountered multiple challenges in balancing multiple competing family and personal concerns, which affected their adherence decisions. The belief finding of this study that adherence is a hard balance for the children's family validates the findings of Birt et al. (2014) and Santer et al. (2014).

In the second main category *Benefits of adherence*, the participants of this study described their beliefs that adherence leads to the child's overall progress, improved functional abilities, and faster recovery. The overwhelming belief about the benefits of adherence to the child was that the child's condition would improve due to adherence. P05 voiced, "Well, I would assume the benefits would be better outcomes, better progress, better, for us, range of motion." P08 trusted that adherence would help her child's abilities. She said, "And say he couldn't do this at first, but if we keep at it, he's eventually going to get there." On the other hand, P01 believed that adherence could speed up her child's recovery, when she said, "The recovery could be more advanced, and then you can just move on to something else. The benefit is how quickly your child can recover or gain strength."

Adherence not only benefits the child; it also benefits the family. P06 found a way to connect with her child during exercises. She said, "So, when she does her exercises and stuff, it's just like a little time we spend together. So, I think it's a good bonding experience for you get to know them a lot more by doing that." P08 wrote, "to help them

in the long run and not only would it be beneficial for the child, it will be beneficial for the parents, the family.”

The primary belief finding in this study that adherence benefits the child supports existing evidence that HEP is beneficial in promoting improvement in strength (Birt et al., 2014) and performance of functional goals (Ferre et al., 2017). Peek et al. (2018) found that the most commonly reported adherence enabler to prescribed self-management strategies is when patients perceive that the exercise program helps their conditions. This study found support for this finding as participants reported multiple perceived benefits, not only to the child but also to the family.

In the third main category *Consequences of poor adherence*, participants revealed that their most common beliefs about the result of poor adherence were: (1) the child will not improve, and (2) the child will experience regression in status. According to P08, “as far as the goals, he won't reach it as quick or maybe not even at all if we don't do it.” P01 talked about regression of the child's status when she said, “I think it will backtrack my child. Personally, I think it will backtrack him. I think it will just kind of bring him back to not wanting to use his arm or to use his leg.” These belief findings have no similarities with the existing findings in the literature, making these findings unique to this study.

The fourth main category *Negative consequences of good adherence to the child* captured the participants' most common beliefs that (1) the child dislikes doing the HEP, and (2) the child never gets to rest. According to P05, “Sometimes he doesn't like it. Sometimes he doesn't want to do it, and he just wants to play. He wants to do with easy.” On the other hand, P08 explained, “Well, the only negative thing I would say is just sometimes after a hard day, he might just not want to... He's just not up for it...I know

they go to school almost all day.” These findings reinforce the findings of Lillo-Navarro et al. (2015). In their study, Lillo-Navarro et al. (2015) found that one of the reasons why parents unintentionally reduce their adherence to the HEPs overtime was because the program places an excessive burden on the children and taking time away from the children’s daily activities, such as school and play.

Participants in this study expressed their beliefs about how physical therapists can help them improve adherence to HEPs. Captured under the fifth main category *How can physical therapists improve parent adherence?*, participants believed that their adherence could improve if the physical therapists would do the following: (1) provide more demonstration of the HEP, (2) positively encourage parents, and (3) provide more ideas about the HEP. P02 stated, “I wish we could put aside 30 minutes just strictly for parents hands-on with the therapist there” and added that “I wish they could do it on me and then I could do it back to them.” P03 spoke about encouragement from physical therapists when she said, “Sometimes I feel like, if the PT is laid back like, ‘Oh, just do this and do that, he’ll be fine’ then the parent becomes laid back.” P08 wanted more ideas from physical therapists. She commented, “Maybe take a little bit more time, maybe an extra five, 10 minutes to go more in-depth or other ways that we could help him.”

Providing a demonstration of the HEP to the parents is a valuable physical strategy that could enhance parent adherence to the HEPs. This primary belief found in the present echoes a similar finding of Lillo-Navarro et al. (2015) that providing a demonstration of the exercises to the parents during treatment helps build parents’ confidence in performing the HEPs. Also, the findings of this study that positive encouragement of the parents and provision of more ideas about the HEPs are supportive

of the statement of Bassett (2015) that verbal feedback and reinforcement are valuable strategies in promoting adherence to HEPs.

In the sixth main category *Physical therapist's teaching of adherence*, two subcategories summarized how participants perceived the physical therapists' educational efforts concerning adherence to HEPs. In the first subcategory *Physical therapists spend time to teach HEP properly*, seven participants in this study believed that their children's physical therapists spent enough time to teach them the HEPs properly. P08 believed that the effort was not enough:

I mean, they went over it briefly. I don't go in with him so at the end of his hour, they come out and for about two, three minutes, they'll be like, okay, we worked on this, we worked on that.

Contrary to the previous findings, second subcategory *Physical therapists emphasize HEP frequency* revealed that the majority of the participants believed that the physical therapists did not emphasize to them how often the HEPs was supposed to be performed on a given day or week. In P07's words, "I haven't been told a certain timeframe that's suggested that I sit down or set aside for her, and this is the time we're going to do this, no, for this long, I have never been instructed like that." These belief findings under the main category *Physical therapist's teaching of adherence* have no similarities with the existing findings in the literature, making these findings unique to this study. However, these findings highlight an inconsistency in the practice of pediatric physical therapy, particularly in the area of patient education about HEP adherence.

In the next main category *Facilitators of adherence*, participants expressed their opinions about the various means, which they believed could help them improve their

adherence to the physical therapy HEPs. The most common facilitators were: (1) being a stay a home parent, (2) having similar physical therapy clinic equipment to use at home, (3) and making the HEP a routine. P05 voiced, “But yeah, I know some parents that actually are really involved and, especially ones that get to stay at home with their kids, they seem to, in my opinion, they seem to just have more time.” P03 said, “I wish we had a treadmill, that would be good.” P07 talked about routine when she expressed, “That's how I can improve. Like doing it more consistently and making it a part of their routine.”

The findings that being a stay a home parent and having similar physical therapy clinic equipment at home are unique findings of this study. Adherence to the HEP as a routine, the third most common parent belief under *Facilitators of adherence*, appeared as the primary belief under the first main category *Beliefs about adherence to HEP*. As discussed earlier, the finding relating adherence to a routine supports the findings of Scorrano et al. (2018) and Lillo-Navarro et al. (2015). These findings reveal a significant connection between the perceptions of adherence to the HEPs and the perceptions of routine.

The eight main category *Beliefs about other parents' adherence* captured the participants' opinions on how other parents, whose children also received physical therapy, adhered to HEPs. Most of the parent participants in this study believed that other parents' adherence to HEPs was poor. P05 stated, “Whereas other people that I know don't do it at all, or just do it when they can kind of thing.” Three participants believed that other parents' adherence was 50/50. P02 said, “I'm pretty sure half of the parents don't do it just by analyzing and just seeing kids at therapy that have been there as long as we have.” Parents expressing their opinions about other parents' adherence to physical

therapy HEPs is unique to this study. However, the parents' belief that parents' adherence to HEPs was poor coincides with existing evidence that parents' adherence to pediatric physical therapy HEPs is poor (Başaran et al., 2014; Houghton et al., 2018; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004).

Finally, the ninth main category *Proper frequency of adherence* captured the participants' beliefs about the ideal number of times during the day or the week that parents should do the HEPs on their children. Most participants acknowledged that daily adherence to physical therapy HEPs was ideal. "I think that ideally would be every day," according to P03. In the words of P05, adherence should be "as much as possible." Similar to the previous main category, the expression of parents' perspectives of the proper frequency of parent adherence to the HEPs for children receiving physical therapy for chronic conditions is distinctive in this study.

***Beliefs about adherence to HEP conclusions.*** Based on the synthesis of the findings under the primary category *Beliefs about adherence to HEP*, the researcher of this study advances the following conclusions:

1. Parents believed that physical therapists should provide sufficient demonstrations of the exercises so that parents will have a good knowledge of the HEPs, which in turn, will help them adhere better to the HEPs.
2. Parents had faith that good adherence to HEPs will help their children make progress in physical therapy.
3. Parents believed that making the HEPs a routine will improve their adherence.
4. Parents perceived that physical therapists devote enough time to teach the HEPs but fail to emphasize the proper frequency of doing the HEPs in a given week.

These conclusions provide partial answers to the study's first research question, which asked: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

*Attitudes about adherence to HEP summary of findings.* In building the coding frame using QCA, the researcher employed the following category definition of Attitude: *A way of thinking, position, judgment, inclination, feeling, emotion, or point of view about something that is reflected in a person's behavior.* In this primary category, three main categories emerged from the QCA of the phone interview transcripts and sentence completion task data. The main categories are labeled as follows: (1) *Attitudes about adherence to HEP*, (2) *Parents' positive adherence behaviors*, and (3) *Experience with adherence*.

The first main category *Attitudes about adherence to HEP* contained three subcategories, which include *Positive attitudes*, *Negative attitudes*, and *Neutral attitudes*. This study found that the general attitude about adherence to HEPs among the participants in this study was largely positive. The most common positive attitudes about adherence to HEPs are the following: (1) adherence is important to see progress in the child's condition, (2) adherence is a responsibility of the parents, (3) parents feel good from adhering to the HEP, (4) adherence can be better, and (5) seeing progress is rewarding.

The predominant positive participant attitude was that adherence was important to see progress. On paper, P04 wrote, "It only benefits her if I continue services at home. Continuing therapy at home rather than just at therapy is super beneficial!" P05 spoke about responsibility when she said, "It's something I have to do." On the other hand, good adherence created a positive feeling, as P06 stated, "She knows what it's for because she feels that herself. She'll tell me, "Mom, I feel strong." And that feels good to hear that."

Adherence can be better was also the third most common positive attitude of adherence. P04 expressed that attitude when she verbalized, “I wish I could do more for her like I said. More time in the day or, just like I said, more different exercises.” P05 said, “I wish I could do it more.” P08 spoke about the rewards of adherence. She said:

Well, when I see my son accomplish something that he wasn't doing before, then that motivates me, and motivates me to want to continue doing the home program. And it also encourages me that all the work that we're putting is actually, you know, it's not, it's not in vain. It's, it's worth something. We're seeing gains, and improvements are always like, “wow, I can't believe it.”

This study found that the predominant parents' positive attitude was that adherence was important to see progress. This finding reinforces the study's primary findings under the primary categories *Beliefs about adherence to HEP* and *Knowledge of adherence to HEP* that adherence benefits the child. The connectedness of findings across the three primary categories in the coding frame supports the conclusion that parents perceive that adherence to HEPs is beneficial to their children's condition.

Under the first main category *Attitudes about adherence to HEP*, the researcher also captured the negative attitudes of the participants about adherence. The two most common findings describing parents' negative attitudes about adherence are the following: (1) it is hard to find time to do the HEP, and (2) it is exhausting to do the HEP. Difficulty finding time was the predominant negative participant attitude about adherence, according to eight of the 10 participants. In the words of P05:

But I mean for us, for the parents, it's just time-consuming. It's hard to... We both work. Me and my husband both work full time, so it's very hard. I mean, that's

part of the reason why we can't do it every day because well, we're gone most of the day and then by the time you get home, it's just very time-consuming. It's hard to make it into every day.

P02 talked about exhaustion when she said, “It takes a beating on our body, being a special needs parent with a child that needs physical therapy. It's exhausting. It takes a lot mentally and physically to do it at home.”

This study found that the most common negative attitude about adherence to HEPs was the difficulty of finding time to perform the HEPs. Difficulty in finding time is a known barrier to adherence to HEPs in the literature. Peek et al. (2018) found that patient perception of being too busy was the most frequently reported barrier to adherence. This study further extends this perception. Furthermore, the second most common negative attitude about adherence in this study was that doing the HEPs was exhausting. This finding validates existing findings that caregiver stress (Rone-Adams et al., 2004; Scorrano et al., 2018) and burn-out (Başaran et al., 2014) have a negative impact on adherence to HEPs.

Uncertainties were the most commonly described neutral attitude about adherence to the HEPs. P04 expressed uncertainty by saying, “I don't know if she's bored, or I'm bored,” and adding “or if it's helping her, or that's her exercises not helping her.” P09 articulated the same uncertainty. She said:

I think for me it was always thinking that, am I doing it right? Or am I going to hurt my child if I do a certain event? Or am I going to push her too hard to where she's not going to like it?... And I think that's, for me sometimes it'd be like, "No

way we can do it that way." Sometimes I'll be like, "No, it has to be this way, it has to be like this."

This study found that having uncertainties concerning adherence to the HEPs was neither a positive nor a negative attitude about adherence to the HEPs. Although the participants expressed feelings of uncertainties about adherence to the HEPs, the same participants also expressed positive and negative attitudes about adherence. Lillo-Navarro et al. (2015) stated that uncertainty is one of the early signs of poor adherence. Although this study did not find support for that statement, the finding on uncertainty supports Lillo-Navarro et al.'s (2015) finding that having concerns or feelings of uncertainty about adherence was common among parents of children with disabilities.

The second main category *Parents' positive adherence behaviors* captured the participants' descriptions of their behaviors, which reflected their positive attitudes about adherence. The most commonly described positive adherence behaviors include: (1) persisting in adherence, (2) encouraging the child, (3) doing the HEP regularly, and (4) involving the whole family in adherence.

*Persist* and *Encourage the child* were the two equally most common positive adherence behaviors in this study. P02 wrote, "Eventually everything works out for the best interest of their child(ren). Never give up!!" P01 expressed commitment to persistence when she said, "I am not going to stop doing the exercises, you know. Because this is this." Concerning the behavior of encouraging the child, P08 wrote, "Encourage the patient to reach their goals," as a piece of advice for parents who were having difficulty following the physical therapy home exercise plan. P05 spoke about

doing the HEP regularly when she said, “I should be doing them every day.” P05 also talked about her family’s involvement with adherence in her statement:

I guess it's kind of like a team, a lot of times. Usually, when we are doing it, we're both doing it together. One of us is holding him and doing stuff, and the other one is like helping with play with toys or something.

This study also found that involving the whole family in adherence was one of the most commonly described positive adherence behaviors. This finding supports the findings of Scorrano et al. (2018), which identified that external motivation from family was a common enabler of adherence to HEPs. It also validates one of the results of the systematic review of Bachmann et al. (2018), which highlights the importance of social support from family members in improving adherence to home-based exercises.

The third and final main category *Experience with adherence* captured the participants’ descriptions of their overall experience with adherence to the HEPs. This study found that all the participants in the study had a positive overall experience with adherence to the HEPs. Four participants described their adherence experience as very positive, while six said that theirs was positive. No participant expressed a negative adherence experience. P07 voiced:

We've had a pleasant experience with her journey. I mean, I love being involved with her. There isn't a moment I would want to miss because I'm like, "Oh, she accomplished this!" Because we work so hard at it, at accomplishing where she's at. It's been an amazing thing; she gets there, and she gets her goal.

As for P01, her adherence experience was “Oh, positive. All the way through. A positive exercise. It's positive. Just, I mean, I feel like I'm just repeating myself now because it's true.”

Overall, the experience of adherence to HEPs among the participants in this study was overwhelmingly positive. As shown in the previous main category *Parents' positive adherence behaviors*, participants described numerous positive adherence behaviors that reflected this general positive attitude about adherence. In consideration of the existing literature on parent adherence to HEPs, the finding that revealed the parents' expression of their experience with adherence to HEPs is unique to this study.

***Attitudes about adherence to HEP conclusions.*** Based on the synthesis of the findings under the primary category *Attitudes about adherence to HEP*, the researcher of this study advances the following conclusions:

1. The parents' positive attitudes about adherence to HEPs revolved around the acknowledgment that good adherence to HEPs helps their children make progress in physical therapy.
2. Parents admitted that adherence to HEPs is a parental responsibility.
3. The parents' negative attitudes about adherence to HEPs revolved around the difficulty of finding the time to follow the HEPs.
4. The parents' positive attitudes about adherence involved persistence, child encouragement, and routine performance of the HEPs.

These conclusions provide additional answers to the study's first research question, which asked: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

**Research question 2 summary of findings and conclusions.** How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes

about adherence to pediatric physical therapy home exercise programs? A fourth concept-driven primary category labeled *Prior experience* emerged out of this research question, which structured the data in the coding frame. This section presents a summary of the results of QCA at the level of this fourth primary category.

***Prior experience summary of findings.*** In building the coding frame using QCA, the researcher employed the following category definition of Prior experience: *Only prior experiences that have relevance to present knowledge, belief, or attitude about adherence to HEP.* Two concept-driven main categories emerged from the data, which include *Personal routines* and *Prior physical therapy experience*. As discussed below, the results of QCA revealed that parents' description of their adherence to personal routines was relevant to understanding their adherence to pediatric physical therapy HEPs.

***Personal routines.*** For the first main category labeled *Personal routines*, participants described that exercising and reading were the most common personal routines that they followed. Eight participants mentioned that they had a routine of exercising. P01 stated:

I was an avid exerciser. I would exercise anywhere between, well, before I had my son, every, I think six days a week for 45 minutes to an hour and 30 minutes every day. Yeah. And I did that for about five years, and I kept off 40 pounds.

Reading was the next most common personal routine, according to three participants. P06 stated, "I used to read a lot. Every day I was reading a lot."

An equal number of participants continued their personal routines as those who discontinued following their personal routines at the time of the study. P09 stated, "I had stopped for a while, and then I think now, just recently actually, I've come back to it."

P04 talked about the continuity of her personal routine when she said, “Yes. Just not drinking the coffee as much, but I just try to wake up early.” P06 gave a reason for why she stopped doing her reading routine. She stated, “I don't have time for that anymore.”

This study found that physical and psychological reasons were the main facilitators to continued adherence to personal routines. Talking about the physical factors, P10 said, “Well, just keep motivated, and the fact that I have a child that wants to play. I need the energy and the strength and keep myself healthy.” P01 described a psychological reason when she expressed, “It was a more of a mental thing, more mental health, feeling better, striving just to be better for myself.”

This study also found that life changes and having no time due to family reasons were the main barriers to continued adherence to personal routines. P05 said, “Things just change in general when you have kids, but especially a kid that's very high needs, I guess.” P03 talked about having no time for personal routines due to family and caregiving. She said, “I don't do it now, simply because I don't have the time. My son and my other daughter, they do take up a lot of my time. Let's say take up all my free time.”

Nine out of 10 participants recognized a connection between adherence to their personal routines and adherence to their children's HEPs. According to P02, “Yes, there is a similarity.” P08 believed that adherence to HEP was “Well, to us, it's a routine already.” These connections revolve around the ideas that adherence to both required consistency and obtaining results. This study found that consistency and obtaining results were the most common connections the participants made between engagement in personal routines and adherence to HEPs. P06 described consistency when she stated:

You want to have that knowing that you're okay next week, what's on the schedule. Okay. Well, we already know, Tuesdays and Thursdays are, this time is for her, for this. So, I think it's good to incorporate things like that into your routine.

P02 spoke about obtaining results when she stated:

But there is a similarity because if you get out of routine you don't get the results that you were hoping for and you want... I mean you stop home therapy, and your routine at home was physical therapy, you're kind of stuck. You're kind of like, "Okay, where do I go from here?"

The findings of the first main category concerning participants' recognition of the connection between adherence to their personal routines and adherence to their children's HEPs validate the conclusion of Rizzo and Bell (2018) that parallels exist between mental models of adherence to HEPs and personal routines. Rizzo and Bell (2018) suggested that adherence to prescribed routines, such as HEPs, may be influenced by adherence experiences in other aspects of one's life, such as personal routines. This study found that the connections the participants made between adherence to personal routines and adherence to their children's HEPs revolve around the ideas that adherence to both required consistency and leads to results. The finding that adherence to both personal routines and HEPs leads to positive results was congruent with Rizzo and Bell's (2018) findings that perceptions of realized results and expectations for results were components of mental models of adherence. This study adds to Rizzo and Bell's (2018) findings on mental models of adherence the concept that adherence requires consistency.

*Prior physical therapy experience.* The second main category *Prior physical therapy experience* contained five subcategories. These subcategories include: (1) *Prior physical therapy*, (2) *Prior adherence attitude*, (3) *Child's condition and responses affected prior adherence*, (4) *Prior experiences with child's physical therapists affected prior adherence*, and (5) *Background knowledge affected prior adherence*. In this study, the majority of the participants' children received physical therapy in the past from other pediatric physical therapy providers. This study found that the predominant prior adherence attitude among the participants was largely negative.

Under the second subcategory *Prior adherence attitude*, the most common negative prior adherence attitude revolved around skepticism about participation in physical therapy and the performance of the HEPs. P08 voiced, "I was skeptical at first for him to... After the evaluation, I'm like you know what, maybe he's too little for physical therapy. Maybe they were going to push him too hard, and he would get tired." Four other negative prior adherence attitudes emerged from the data, including the feeling of being in shock, parent resenting the HEP, being afraid of asking questions, and feeling overwhelmed.

On the other hand, the most common positive prior adherence attitude was that parents put a lot of pressure on themselves in adhering to the HEPs. P03 stated:

I used to be like that. I used to get so, like, so upset with myself at the end of the day, because I didn't, I didn't, you know, I least in my head I didn't plan the day wisely, and he didn't do enough of the exercises.

Following the HEPs very strictly was the second most common positive prior physical therapy adherence attitude. P03 wrote that she focused on “following word per word PT plan.”

Furthermore, this study found that the HEP not being a part of their children’s daily routine was the most commonly described neutral prior physical therapy adherence attitude. P02 admitted, “Before, I’d say about maybe two years ago, we weren’t in a routine. We were kind of just doing whatever.” P03 expressed a similar message, “Well, at first it was, it was hard to incorporate them in our daily, daily routine.”

The second main category *Prior physical therapy experience* concerning prior adherence attitude revealed a primarily negative prior adherence attitude among the participants in this study. To the researcher’s knowledge, no prior studies exist on exercise adherence in physical therapy which explored prior adherence attitudes to physical therapy and HEP. The finding that parents of children receiving physical therapy primarily have negative prior adherence attitudes is unique to this study.

Three more data-driven subcategories to *Prior physical therapy experience* represent three factors that influenced the participants’ prior adherence to HEPs. In the subcategory *Child’s condition and responses affected prior adherence*, participants described that their adherence to the HEPs was better when their children were younger and smaller. P09 wrote:

At first somewhat good. As my daughter grew older, it was a little more difficult to get her to do. We had to figure which were her favorite exercises to do in order for her to want to commit to the therapy.

This study also found that the cooperation of the child and overall progress with physical therapy affected their prior adherence to the HEPs. P02 stated, “If I would have done this survey a few years back, I would have told you that once he starts crying, I stop therapy. I tell him to stop, give him a break.” Describing that the lack of progress in her child with physical therapy affected her prior adherence, P07 stated:

Because I was not seeing any results, or things I was still wanting to, was searching for I guess you could say, in regards to her sitting, and her posture, and just personal goals that I had for her and wanted to see out of a 10-month-old, or even after she got to one year old I still wasn't seeing any progress.

According to John-Henderson (2015), prior life experiences, in conjunction with instructions and observations, shape patients' cognitions and exert a strong influence on the treatment decisions they make. This study supports this statement. Overall, the findings in the subcategory *Child's condition and responses affected prior adherence* reveal that child-related factors, such as growth, cooperation, and progress, are important components of parents' prior physical therapy experience, which shape their cognitions and behaviors regarding adherence.

In the fourth subcategory *Prior experiences with physical therapists affected prior adherence*, this study found that the participants' predominant prior experiences with their children's physical therapists were negative. Improper teaching of the HEPs was the primary negative experience of the participants with their children's prior physical therapists. P03 recalled:

I know that for my son, the first PT that he had, although I liked him, he didn't really show me much what to do. I would see what he was doing, but I felt like

that just wasn't enough for my son. Since I didn't have no one to compare and he was the first PT, I was just like, “Okay, well I don't know what to do.”

Participants described more negative experiences with their children’s prior physical therapists, including not receiving feedback, inconsistency in HEP education, inconsistency in physical therapy staffing, insufficiency of physical therapy services, and disliking physical therapist instructions.

Three participants shared positive prior experiences. Participants had positive prior experiences of their children’s prior physical therapists who provided good HEP education and involved the parent more with the HEPs. P07 recalled, “My child experiencing physical therapy has been great through the outpatient service. In the beginning, they would teach me very well, and they would allow me to view and see.” While P05 said, “When he was younger, when the ECI people would come to the house, they would do it a little bit more. I guess, getting me involved.” Furthermore, one participant described a neutral prior experience with physical therapists who left adherence up to the parent’s discretion. P09 recalled, “I think they leave it to where the parent can decide. If it's a good day, yes, do it, if it's not, then don't.”

Findings from the fourth subcategory *Prior experiences with physical therapists affected prior adherence* support the evidence that parents’ perception of their experience with their children’s physical therapists, particularly concerning the physical therapists’ teaching style, has an influence on parent adherence to HEPs. Lillo-Navarro et al. (2015) found that parents of children with disabilities who perceived that their children’s physical therapists were encouraging, supportive, and provided good HEP teaching and ideas were more successful in their adherence to the prescribed HEPs. This study found

that prior experiences with physical therapists revolved around HEP parent education. Improper teaching of the HEPs was the main source of negative prior experiences with physical therapists, while good HEP education and involving the parent more with the HEPs were the main sources of positive prior experiences with physical therapists. A major finding of this study that the parents' prior experiences with their children's physical therapists were predominantly negative is new in the extant literature.

Finally, in the fifth and last subcategory labeled *Background knowledge affected prior adherence*, participants described that their background knowledge influenced their prior adherence to HEPs. P07 expressed that her educational background was instrumental in her adherence to HEP. She stated, "I think it's because also my years of my education... Working, still working in the field of education I'm still able to work with kids and see what needs to be done...." Conversely, P08 received information about uncertainties concerning her child's growth trajectory due to the child's multiple congenital medical conditions. In the sentence completion task, she wrote, "I was told to be prepared for the unknown." Again, the findings in this subcategory *Background knowledge affected prior adherence* are unique to this study.

***Prior experience conclusions.*** Based on the synthesis of the findings under the primary category *Prior experience*, the researcher of this study makes the following conclusions:

1. Parents acknowledged that adherence to HEPs and personal routines both bring results. However, consistency in adherence is needed to obtain this benefit.
2. Parents developed negative prior adherence attitudes from having uncertainties about their children's condition, physical therapy, and the benefits of adherence.
3. Parents experienced a decline in adherence to HEPs over time as their children grow and continue to need long-term physical therapy.

4. Parents' negative prior experiences with their children's previous physical therapists were mainly due to issues surrounding the proper instruction of the HEPs.

These conclusions provide answers to the study's second research question, which asked: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs?

**Conclusions summary of the study.** In summary, the collective findings of the first three primary categories *Knowledge of adherence to HEP*, *Beliefs about adherence to HEP*, and *Attitudes about adherence to HEP* addressed Research Question 1 of this study. Research question 1 asked: How do parents describe their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? In this study, participants described both in words and in writing multiple knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. While many findings of this study support existing findings of the extant literature, some findings are new and unique to this study. Rizzo (2015) advocates for the elucidation of the physical therapy patients' mental models of adherence to HEP. Only after patients articulated these mental models that physical therapists will have the opportunity to intervene in ways that will promote positive adherence behaviors. This qualitative study elucidated parents' mental models of adherence to pediatric physical therapy HEP.

The collective findings of the fourth primary category *Prior experience* addressed Research Question 2 of this study. Research question 2 asked: How do parents describe prior adherence experiences that led to their knowledge, beliefs, and attitudes about adherence to pediatric physical therapy home exercise programs? This study revealed that multiple prior experiences related to adherence to personal routines and physical therapy

for their children in the past contributed to shaping parents' knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs. Parents in this study described prior adherence experiences with personal routines, which contributed to their perceptions of adherence to HEP. In this study, the connections that the participants made between adherence to personal routines and adherence to their children's HEPs revolve around the ideas that adherence to both required consistency and obtaining results. Parents in this study also described prior physical therapy experiences, which contributed to their perceptions of adherence to HEPs. In this study, parents' knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs were influences of their prior adherence attitudes, experiences of their child's condition and responses, prior experiences with their children's physical therapists, and background knowledge.

Finally, thorough synthesis of all the conclusions provided in the four primary categories of this study narrows down all the findings of the study into several major conclusions, which collectively describe parents' perceptions of adherence to pediatric physical therapy HEPs. The researcher of this study advances the following study conclusions:

1. Parents of children who receive physical therapy perceive that consistency in adherence to HEPs helps their children make progress in physical therapy.
2. Parents of children who receive physical therapy perceive that making the performance of HEPs a routine helps with adherence.
3. Parents of children who receive physical therapy perceive that physical therapists could help parents achieve good adherence to HEPs by providing proper HEP education through sufficient exercise demonstrations and good communication with parents.
4. Parents of children who receive physical therapy perceived that physical therapists should emphasize teaching the proper frequency of doing the HEPs in a given week.

5. Parents of children who receive physical therapy have difficulty in finding the time to follow the HEPs.
6. Parents of children who receive physical therapy perceive similarity in adherence to HEPs and personal routines as both need consistency in adherence to obtain the desired results.
7. Parents of children who receive physical therapy perceive that their prior experiences related to the children's condition and physical therapists' instructions influence their adherence to HEPs.

### **Implications**

This section presents the implications of the study findings to theory, professional practice, and future research. It also presents a discussion of the strengths and weaknesses of the study, based on the study's methodology, research design, data analysis, and results.

**Theoretical implications.** The theoretical foundation of this study was that patients possess mental models of physical therapy HEP adherence and that these mental models are recalled in future adherence decision-making (Rizzo, 2015). According to Rizzo (2015), patients hold mental models of how physical therapy intervention works, and these mental models influence the way patients make decisions regarding adherence to physical therapy HEPs. According to Rizzo (2015), prior adherence experiences help shape patients' mental models, which influence adherence to the prescribed HEPs. This theoretical model grounded the two research questions of this study which illuminated parents' mental models (i.e., knowledge, beliefs, and attitudes) of adherence, and the connection between prior experiences and these mental models of adherence. Therefore, the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) was the fitting theoretical foundation for this study.

In cognitive psychology, mental models refer to cognitive representations of implicit assumptions, perceptions, values, and beliefs that people have about the world (Johnson-Laird, 1983). Johnson-Laird (1983) conceptualized mental model formation as a dynamic cognitive process wholly formed by experiences. According to Rizzo (2015), physical therapy patients may hold mental models of adherence to HEPs based on prior experiences, and these mental models may not be supportive of optimum adherence to HEPs. It is important that physical therapists elucidate, assess, and modify if needed, the patients' mental models of adherence for the benefit of supporting adherence to HEPs (Rizzo, 2015). This study elucidated parents' mental models of adherence to pediatric physical therapy HEPs.

Rizzo and Bell (2018) applied Rizzo's (2015) theoretical model to understand HEP adherence among adult physical therapy patients with acute orthopedic conditions. To date, the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) has been applied to adult physical therapy and yet to find application in the field of pediatric physical therapy. To the researcher's best knowledge, this study was the first study to extend the application of Rizzo's (2015) theoretical model in pediatric physical therapy. This study was a major research initiative in advancing Rizzo's (2015) mental models of physical therapy patient adherence to HEP.

**Practical implications.** Non-adherence to medical treatment regimens, including physical therapy, is a primary cause of treatment failure in children with long-term medical conditions (WHO, 2003). In pediatric physical therapy, evidence shows that parents' adherence to the prescribed HEPs is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). This healthcare problem achieves a

heightened societal significance when considering that failure to achieve optimal outcomes among physical therapy pediatric patients now may have negative repercussions on the quality of life of these children in the future. The purpose of this qualitative descriptive study was to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences, in an effort to understand parent perceptions to ultimately improve parent adherence to HEPs. The study's purpose statement embodied the most important practical implication of the results of this study; that is, improvement of parents' adherence to pediatric physical therapy HEPs.

In the field of physical therapy, there is an emerging interest on the important role of prior experiences in patients' adherence behaviors to physical therapy recommendations (Alewijnse et al., 2003; Bachmann et al., 2018; Ormel et al., 2018; Rizzo & Bell, 2018; Schoo et al., 2005). This study is timely and significant, given the existing clinical challenges that the profession has been facing due to the problem of poor adherence. The results of this study add further validation to the importance of prior experiences on adherence to HEPs in the pediatric population. Physical therapy clinicians who seek to improve their patients' clinical outcomes through the use of the HEPs might consider exploring patients' prior adherence experiences as a clinical strategy to understand and promote patient adherence to HEPs.

The results of this study may serve as an impetus to physical therapists to incorporate mental models assessment in their daily practice. Elucidation of patients' mental models of adherence to HEPs may be accomplished through structured or semi-structured questioning using interviews or written forms during usual patient encounters.

Considering the dynamic nature of mental models, physical therapists who seek to improve patient adherence to HEPs are encouraged to revise their patient's mental models during the treatment episode. The numerous findings of this study, in combination with the specific recommendations given by Rizzo (2015), may support this clinical effort.

Finally, this study elucidated an inconsistency in the practice of pediatric physical therapy from the perspectives of the parent participants in the study. This inconsistency revolves around the area of patient education about HEP adherence. The conclusions summary of the study in this chapter delineated important findings that would allow pediatric physical therapists to better understand the parents of the children they serve. Pediatric physical therapists should know that the parents of their patients acknowledge the importance of consistency in adherence to HEPs, as well as the value of making the HEPs a part of the child and family's daily routine. In addition, pediatric physical therapists should keep in mind that the parents of their patients encounter difficulties in finding the time to follow the HEPs. The conclusions summary in this chapter also provides guidance to pediatric physical therapists on how to effectively improve parent adherence to HEPs. According to the parents in this study, pediatric physical therapists can support parent adherence to HEPs through proper education of the HEPs and the frequency of performance of the HEPs in a given week, sufficient exercise demonstrations, effective communication with parents, and helping parents make the HEPs a part of their daily routine. Doing so might mitigate the inconsistency in the practice of pediatric physical therapy as identified in this study.

**Future implications.** This study explored parent perceptions of adherence to pediatric physical therapy HEPs using semi-structured phone interviews and written sentence completion tasks. The combination of these data collection methods is novel to this study. Future studies on the same topic and population may consider other methods of data collection, individually or in combination, such as face-to-face interviews, focus groups, verbal sentence completion tasks, and repeated interviews. According to Rizzo (2015), “future research will need to identify the most effective ways to uncover these prior experiences” (p. 258). Exploring other methods to collect data on participants’ mental models of adherence may add fruitful information to the findings of this study. This endeavor may also allow researchers to make future conclusions on the most effective way to elucidate patient’s mental models of adherence and prior adherence experiences.

The participants in this study shared similar characteristics, but the participants’ children did not. The age range of the participants’ children was wide, and the children had physical therapy services for several years at the time of the study. These factors may have led to significant variations on parent experiences of adherence to pediatric physical therapy HEPs. Future studies may explore perceptions of adherence to HEPs from a sample of parents whose children have a narrow age range such as the very young children aged less than three years old who are typically under ECI physical therapy services, as well parents whose children are adolescents with ages 12 years and up. In addition, the children of the participants in this study were receiving outpatient physical therapy at the time of the study. Future studies may seek a sample of parents whose

children receive physical therapy in other settings such as ECI and home health physical therapy. These endeavors may contribute more information to the findings of this study.

This study employed QCA according to the guidelines of Schreier (2012) to analyze the data from phone interviews and sentence completion tasks. The application of this data analysis approach on the collected data on parents' perceptions of adherence to HEPs is unique to this study. Future studies may employ a different data analysis approach, such as thematic analysis or other QCA approaches. These endeavors may add more information to the findings of this study and enable researchers to make future conclusions on the most appropriate data analysis approach to use on similar qualitative data as in this qualitative study. Future studies may also consider building upon the shortcomings of the data collection employed in this study for the sentence completion tasks to collect comprehensive data of sufficient volume to allow descriptive detail and depth.

Furthermore, according to Schreier (2012), QCA is insufficient to make conclusions about the units of analysis (i.e., individual participants), especially about the actual adherence level of each participant to the HEP. In this study, conclusions were made at the level of the categories, and not at the level of individual participants. Future studies may consider adding an in-depth analysis focused on the units of analysis (i.e., individual participants), especially about the actual adherence level of each participant to the HEP using other data analysis approaches such as the use of quantitative measures, in addition to QCA.

Depending on the goals of the study and the available resources to conduct the study, all the future implications discussed are possible. However, the most rewarding

recommendation may be the second recommendation, which is the exploration of perceptions of adherence to HEPs and prior experiences of parents whose children belong to a specific age range or receiving physical therapy in the ECI or home health settings. The reason for this selection is indisputable, as this endeavor will have targeted benefits to professional practice in different clinical settings.

**Strengths and weaknesses of the study.** This study has strengths and weaknesses which need consideration in evaluating the applicability of the results of this study. All participants consented to audio-recording of phone interviews. Audio-recording supported the accurate representation of participants' views, which ensured credibility in the data collected. Data sufficiency is another strength of this study. As shown in Table 2 in Chapter 4, the total number of transcript pages for all ten participants was 100 pages, with an average of 10 pages long. Ten pages of transcribed data exceeded the minimum GCU requirement of five pages for a qualitative descriptive study. In addition, participants provided qualitative data in two different formats: verbal from phone interviews and written from sentence completion tasks. These methods support triangulation, which adds credibility to the data. Furthermore, data collection of the two sources of data occurred at intervals of a few to several days. This process reduces the social desirability bias inherent in interview studies (Guest et al., 2013).

In compliance with Ezzat et al.'s (2015) recommendation on using appropriate theories to guide research endeavors on strategies to improve adherence, this study employed a suitable theoretical foundation to ground the research questions (Rizzo, 2015). Finally, this qualitative, descriptive study employed a suitable data analysis approach. "Qualitative content analysis is the analysis strategy of choice in qualitative

descriptive studies” (Sandelowski, 2000, p. 338). This study followed the guidelines of Schreier (2012) in detailed summarization, description, and interpretation of the data. The detailed description of the QCA, as employed in this study and discussed in Chapters 3 and 4, supports dependability.

The sample size of this study was a weakness. Ten participants, as in this study, met the minimum GCU guidelines for qualitative descriptive studies. Although the researcher believed that a sufficient amount of qualitative data was collected to satisfy the concept of saturation in a qualitative study (Patton, 2015), it was unknown if additional participants would have provided different or additional information. As discussed, no new information for subcategories emerged after coding the data from P10. It was at this point that the researcher believed that saturation was reached in building the coding frame. According to Patton (2015), a relatively small sample size can be a strength of qualitative studies if the sampling was purposeful and sought information-rich cases. Convenience sampling was the sampling procedure employed in this study. Therefore, the small sample size and convenience sampling in this study will need consideration when thinking about the transferability of the findings of the study to similar population and contexts.

A major part of the collected data in this study were products of participants’ recall of events and situations which occurred in the past. Therefore, participant recall bias is a weakness of this study. The motivations of the participants in agreeing to participate in this study were unknown. Arguably, the parents who agreed to participate in this study were the ones who were highly adherent to the prescribed HEPs. In such a case, the resultant corpus of data for this study may not have included the views of those

who were less adherent to the HEPs. Furthermore, the findings indicated that the participants in this study have predominantly negative prior adherence attitudes and prior experiences with their children's physical therapists. It is unknown if these attitudes and prior experiences are the same for all parents whose children receive pediatric physical therapy.

Finally, the limited data from sentence completion tasks was a notable weakness of this study. Unlike the high volume of data collected from the phone interviews, the amount of data collected from sentence completion tasks was small due primarily to the instrument developed and used for the study. This weakness was reflected in the limited depth and volume of participants' written responses, as well as on the resultant number of codes generated from QCA. Nevertheless, the researcher believed that the sentence completion tasks, as employed in this study, provided important written qualitative data that came directly from the participants and served the purpose of triangulation of verbal responses obtained from the phone interviews.

This section of Chapter 5 delineated the implications of this study. The study's strengths and weaknesses, in combination with the discussed implications of the study findings to theory, professional practice, and future research, provide relevant guidance on evaluating the application and contribution of this study to the existing literature. The next and final section of this paper delineates the researcher's recommendations for future research and practice.

### **Recommendations**

This dissertation study culminates with a list of recommendations for future research and future practice. The goal of this qualitative descriptive study was to

elucidate parents' perceptions, in the form of knowledge, beliefs, and attitudes about adherence to pediatric physical therapy HEPs with an emphasis on prior adherence experiences. Improvement of parent adherence to HEPs was the ultimate aim of this study. This study revealed that parents have multiple and detailed mental models of adherence to HEPs. This study also found that parents have experiences of adherence to personal routines and prior physical therapy for their children, which may have influenced their mental models of adherence to HEPs. The following sections delineates the recommendations based on the results on this study.

**Recommendations for future research.** For the researchers, this study makes the following recommendations:

1. **Continue further exploration of mental models of adherence to HEPs.** This study elucidated mental models of adherence to HEPs by exploring knowledge, beliefs, and attitudes about adherence to HEPs of parents whose children receive outpatient pediatric physical therapy. This study employed the mental models of physical therapy patient adherence to HEP (Rizzo, 2015) as a theoretical foundation. To date, this study was the first to apply this new theory in the field of pediatric physical therapy and the second in the entire field of physical therapy. More qualitative studies are needed to add information to the findings of this study on mental models of adherence to HEPs in different patient populations in physical therapy.
2. **Continue further exploration of prior experiences related to adherence to HEPs.** This study explored parents' descriptions of prior experiences, which may have influenced their knowledge, beliefs, and attitudes about adherence to HEPs. The prior experiences that parents described were related to adherence to personal routines and prior physical therapy for their children. There is an emerging interest on the important role of prior experiences in patients' adherence behaviors to physical therapy recommendations (Alewijnse et al., 2003; Bachmann et al., 2018; Ormel et al., 2018; Rizzo & Bell, 2018; Schoo et al., 2005). More qualitative studies are needed to understand further the important role of prior experiences on the adherence behaviors of various patient populations presenting to physical therapy.
3. **Identify the most effective ways to uncover prior adherence experiences.** According to Rizzo (2015), "future research will need to identify the most effective ways to uncover these prior experiences" (p. 258). Rizzo and Bell (2018) explored the parallel between orthopedic patients' mental models of adherence to

the prescribed HEPs and mental models of adherence to personal routines through repeated face-to-face interviews with each participant. This qualitative study adds to the existing literature the feasibility of using semi-structured phone interviews and written sentence completion tasks to elucidate parents' prior adherence experiences. Identification of the most effective ways to uncover prior adherence experiences is an opportunity for future research.

4. **Examine the inconsistency in the practice of pediatric physical therapy in the area of HEP education and prescription.** This study identified an inconsistency in the practice of pediatric physical therapy in the area of HEP education and prescription from the perspectives of the parent participants in the study. One conclusion of this study is that parents of children who receive physical therapy perceive that physical therapists could help parents achieve improved adherence to HEPs by providing a proper HEP education through sufficient exercise demonstrations to parents and good communication with parents. Another conclusion is that parents of children who receive physical therapy perceived that physical therapists should emphasize teaching the proper frequency of doing the HEPs in a given week. The inconsistency in the practice of pediatric physical therapy concerning HEP education and prescription is a topic for future research for both qualitative and quantitative researchers.
5. **Develop a survey for a quantitative study on parent adherence to HEPs.** The findings of this study may support the creation of surveys for quantitative studies on parent adherence to HEPs. This study produced lists of items which may support future survey studies on topics such as strategies that pediatric physical therapist may employ in clinical practice to support parent adherence, barriers and facilitators to parent adherence to HEPs, specific ways that parents perform the HEPs, and parents' adherence levels to HEPs among others. The thorough understanding of parent adherence to pediatric physical therapy HEPs by combining empirical findings from quantitative and qualitative studies may move the field of pediatric physical therapy towards effectively solving the problem of poor parent adherence to HEPs in the future.

**Recommendations for future practice.** For the pediatric physical therapy

clinicians, this study advances the following recommendations:

1. **Elucidate, assess, and modify if needed, parents' mental models of adherence to HEPs.** According to Rizzo (2015), physical therapy patients may hold mental models of adherence to HEP, and these mental models may not be supportive of optimum adherence to HEP. It is important that physical therapists elucidate, assess, and modify if needed, the patients' mental models of adherence for the benefit of supporting adherence to HEP (Rizzo, 2015). This study revealed multiple parents' mental models of adherence to pediatric physical therapy HEPs. Pediatric physical therapy clinicians who seek to improve parents' adherence to the HEPs that they prescribe will benefit from this recommendation as an additional clinical intervention.

2. **Explore parents' prior physical therapy adherence experiences.** The ultimate aim of this study was the improvement of parent adherence to HEPs to benefit the clinical outcomes of children who receive physical therapy. Considering that prior adherence experiences contributed to shaping parents' knowledge, beliefs, and attitudes about adherence to HEPs, exploration of prior physical therapy adherence experiences is a clinical strategy that pediatric physical therapy clinicians may employ to understand parents' current and future adherence to HEPs. This study revealed that parents had multiple negative prior physical therapy adherence experiences and prior experiences with their children's physical therapists. Direct verbal inquiry on these negative prior experiences is worth considering to be a part of the routine questions that pediatric physical therapists ask parents during the initial evaluation visit to inquire about physical therapy treatments that their children received in the past.
3. **Improve clinical strategies in facilitating HEP adherence.** In pediatric physical therapy, evidence shows that parents' adherence to prescribed HEP is suboptimal (Başaran et al., 2014; Medina-Mirapeix et al., 2017; Rone-Adams et al., 2004). Pediatric physical therapists are the direct beneficiaries of the findings of this study. This study provided information about parents' knowledge, beliefs, and attitude about adherence to HEP, in addition to the role of prior experiences in understanding parent adherence. Pediatric physical therapists may use the findings on the strategies that may support parent adherence to the HEPs from the perspective of the parents. Doing so may help move the profession towards solving the problem of poor parent adherence to pediatric physical therapy HEPs.
4. **Improve consistency in HEP education and prescription.** This study identified an inconsistency in HEP education and prescription among pediatric physical therapists. This inconsistency is a topic for future research and future practice. As discussed earlier, two study conclusions support the need to address this inconsistency in HEP education and prescription. Pediatric physical therapists may learn from the findings of this study on parents' need for proper HEP instruction and prescription. Since providing HEP education and prescription as an integral part of usual physical therapy care, this recommendation for improvement of clinical practice is applicable easily and immediately for all pediatric physical therapists.
5. **Help parents make adherence to HEPs a part of the daily family routine.** Lastly, this study advances the recommendation for all pediatric physical therapy clinicians to enable parents to adopt adherence to HEPs as a part of their daily family routine. The concept that adherence to HEPs is a routine occurred consistently in multiple categories across all the primary categories of the coding frame of this study. Undoubtedly, adherence to HEPs as a routine was a consistent mental model of adherence of the parents in this study, showing in the descriptions of their knowledge, beliefs, attitudes, and prior experiences. This recommendation holds promise in addressing the problem of poor adherence in pediatric physical therapy. Only by adopting adherence to HEPs a part of daily

routine that parent adherence may become consistent enough to gain the benefit of improvement in the clinical outcomes of children who receive physical therapy.

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**Appendix A.**

**Site Authorization Letters**

Site authorizations on file at Grand Canyon University.

**Appendix B.**

**IRB Approval Letter**

IRB approval letter on file at Grand Canyon University.

## Appendix C.

### Informed Consent

## INFORMED CONSENT FORM

### INTRODUCTION

The title of this research study is “Parents’ perceptions of adherence to pediatric physical therapy home exercise program: A qualitative description.”

I am Richard Narvadez, a doctoral student under the supervision of Dr. Jennifer Seymour in the College of Doctoral Studies at Grand Canyon University.

The purpose of this research study is to explore how parents of children receiving physical therapy describe their perceptions of adherence to pediatric physical therapy home exercise programs, with an emphasis on prior adherence experiences. The goal of the study is to understand parent perceptions that might help improve parent adherence to home exercise programs for their children.

This is not a clinical research study.

### KEY INFORMATION

This document defines the terms and conditions for consenting to participate in this research study.

- **How do I know if I can be in this study?** You are eligible to participate in this research study if you meet all of the following criteria:
  - You are an adult mother, father, or legal guardian of a child.
  - Your child’s age is between one month to 17 years old.
  - Your child receives physical therapy.
  - You received instruction on home exercises for your child.
  - You speak, read, and write English.

You cannot participate in this research study if:

- Your child is my patient.
  - Your child was my patient within the last 12 months.
  - Your child is a patient in a clinic where I work.
  - You do not have access to a telephone.
- **What am I being asked to do?** This research study involves the following:
    - Sign this consent form.
    - Send the signed consent form to me by mail or DocuSign.
    - Complete the written sentence completion task form, which may take about five minutes of your time.
    - Send the completed sentence completion task form to me by mail.
    - I will schedule the phone interview at a convenient time for you.
    - I will interview you by phone, which may take about one hour of your time.
    - You can be at your home or any locations that you prefer for the phone interview.
    - Twenty parents will be participating in this study.

Audiotaping: I will record the phone interview using an app called Rev Call Recorder. You cannot participate if you do not wish the phone interview to be recorded.

- **Who will have access to my information?** Only me, my dissertation committee, and GCU dissertation body.

- **What is the role of the researcher?** My role as a researcher is to conduct research and collect data for this research. I am also a pediatric physical therapist, but I will not act in this capacity. I will not provide any physical therapy advice or instructions. I will not answer any of your questions regarding physical therapy for your child.

Participation in this research study is completely voluntary. You may decline to participate. You may decline to answer some questions during the phone interview. You may stop participation at any time. If you decide to stop participation at any time during the entire research participation, you may do so by simply telling me. I will not use your information if you decide to stop participation.

- **Any possible risks or discomforts?** The only risk or discomfort you can expect is the loss of your time during participation. I will not review your child's medical chart or obtain any personal information about you from your physical therapy provider or healthcare provider.
- **Any direct benefits for me?** Although there are no direct benefits to you, an indirect benefit from this study includes the improvement of the way physical therapists and physical therapist assistants provide home exercise programs to their patients. This improvement may lead to better rehabilitation results for all children receiving physical therapy.
- **Any paid compensation for my time?** You will receive a \$75 Amazon e-gift card by text immediately after the phone interview. You will have the option to receive a \$75 Visa gift card by regular mail instead of the Amazon e-gift card.
- **How will my information and/or identity be protected?** Your information will be kept strictly confidential.

### PRESENTATION OF INFORMATION COLLECTED

The information collected in this research study from all participants will be analyzed as a group. I will use research ID numbers instead of names for identification purposes. The results of this research study may be used in reports, presentations at a conference, and publications. The research findings from this study will be published as a part of my dissertation through ProQuest.

### PRIVACY AND DATA SECURITY

- **Will researchers ever be able to link my data/responses back to me?** No.
- **Will my data include information that can identify me (names, addresses, etc.)?** No.
- **Will the researcher assign my data/responses a research ID code to use instead of my name?** Yes.
  - **If yes, will the researcher create a list to link names with their research ID codes?** Yes.
  - **If yes, how will the researcher secure the link of names and research ID codes? How long will the link be kept? Who has access? Approximate destroy date?** I will protect all of your research information to the best of my ability, including the list which links your name to a research ID number. All research information will be maintained in a secure location for three years. No entities other than the GCU dissertation body will have access to your research information. All research information will be destroyed after three years.
- **How will my data be protected (electronic and hardcopy)? Where? How long? Who will have access? Approximate destroy or de-identification date?** I will keep a secure filing system for all research information. All digital information will have computer password-protection. I will maintain all research information for three years. No entities other than the GCU dissertation body will have access to this information. After three years, all research information will be destroyed.

- **Where and how will the signed consent forms be secured?** The signed consent forms will be secured in the same filing system as stated above.

### FUTURE RESEARCH

Data from this research study will not be used for future research.

### STUDY CONTACTS

Any questions you have concerning the research study or your participation in the research study, before or after your consent, will be answered by Richard Narvadez at [REDACTED].

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the College of Doctoral Studies at [IRB@gcu.edu](mailto:IRB@gcu.edu), (602) 639-7804.

### VOLUNTARY CONSENT

#### **PARTICIPANT'S RIGHTS**

- You have been given an opportunity to read and discuss the informed consent and ask questions about this study;
- You have been given enough time to consider whether or not you want to participate;
- You have read and understand the terms and conditions and agree to take part in this research study;
- You understand your participation is voluntary and that you may stop participation at any time without penalty.

**Your signature means that you understand your rights listed above and agree to participate in this study**

\_\_\_\_\_  
Signature of Participant or Legally Authorized Representative

\_\_\_\_\_  
Date

### INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Grand Canyon University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) you a copy of this signed consent document."

Signature of Investigator \_\_\_\_\_

Date \_\_\_\_\_

## Appendix D.

### Interview Guide

#### Interview Questions

1. Let's start by talking about your child's physical therapy.  
When did your child start getting physical therapy?  
What was the physical therapy for?
2. Can you tell me what has been your experiences of your child receiving PT?
3. Can you tell me the home exercises that the physical therapist recommended for you to do on your child?  
How often are you supposed to do the home exercises?  
How often are you able to do the home exercises in a regular week?
4. What do you think are the benefits of the home exercises for your child?  
(Can you please explain it more?)
5. What do you think are the benefits of doing the home exercises as often as the PT recommended?  
(Can you please explain it more?)
6. Can you think of anything negative about doing your child's home exercises?  
(Can you please explain it more? Can you give an example?)
7. Can you tell me how well you know your child's home exercises?  
(Can you please explain it more?)
8. Can you tell me your idea about parents doing their child's home exercises regularly?  
(Can you please explain it more?)
9. For you personally, how do you feel about doing your child's home exercises regularly?  
(What made you feel like that?)
10. So far, what can you say about your experiences of following the home exercises from physical therapy?  
(Can you please explain it more? Can you give an example?)
11. Overall, would you say it was a positive or a negative experience?  
(Can you please explain it more?)
12. Is there anything you would change in your child's home exercises from physical therapy?  
(Can you please explain it more?)
13. For you personally, how do think you have been following your child's home exercises?  
(Can you please explain it more?)
14. Now, all of us follow some routines in our lives. Can you tell me about a personal routine or something that you used to do for a long time?  
(Can you give more examples?)
15. What do you think helped you do it for a long time?  
What do you think stopped you from doing it?  
(Can you please explain it more?)
16. How about exercise routines? Can you tell me about any exercise routines that you used to do in the past?  
(Can you give more examples?)
17. What do you think helped you do it for a long time?  
What do you think stopped you from doing it?  
(Can you please explain it more?)
18. Now, thinking about your past experiences following personal routines, do you see any connection with that and following your child's home exercises now?  
(Can you please explain it more?)

## Appendix E.

### Sentence Completion Task Form

#### Original Sentence Completion Task Form

#### Sentence Completion Task

#### Directions:

- Please complete the sentences so that they describe how you feel, your opinions and experiences. Respond quickly without thinking too long.
- Do not be concerned with correct spelling, grammar, or use of complex words.
- Erasures are acceptable.
- Please feel free to add more sentences to explain your opinions and experiences.

---

1. As a parent (or legal guardian) of a child who receives physical therapy, I **believe** that following the home exercise plan is ...

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2. As a parent (or legal guardian) of a child who receives physical therapy, my **experience** of following the home exercise plan was ...

---



---



---



---

3. For any parents who are having difficulty following the physical therapy home exercise plan, my **advice** for them would be ...

---



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## Final Sentence Completion Task Form

## Sentence Completion Task

## Directions:

- Please complete the sentences so that they describe how you feel, your opinions and experiences.
- Respond quickly without thinking too long.
- Do not be concerned with correct spelling, grammar, or using complex words. Any corrections are acceptable.
- Please feel free to add more sentences to explain how you feel, your opinions and experiences.

1. *I **believe** that following the PT home exercise plan is ...* \_\_\_\_\_

---



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---



---

2. *My **experience** of following the PT home exercise plan was ...* \_\_\_\_\_

---



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3. *For any parents who are having difficulty following the PT home exercise plan, my **advice** for them would be ...* \_\_\_\_\_

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## Appendix F.

### Expert Panel Credentials

#### 1. Linda Birt, PhD

Current appointment: Senior Research Associate, School of Health Sciences, University of East Anglia, England

Research experience: Extensive experience on health and social care research, with a specialist interest in qualitative research methods. Used a variety of data collection tools including questionnaire surveys, semi-structured interviews, drawings and focus groups on various populations such as parents and children, patients, older people, people with dementia, caregivers, and healthcare professionals.

Relevant Publication:

Birt, L., Pfeil, M., MacGregor, A., Armon, K., & Poland, F. (2014). Adherence to home physiotherapy treatment in children and young people with joint hypermobility: A qualitative report of family perspectives on acceptability and efficacy. *Musculoskeletal Care*, 12(1), 56-61. doi:10.1002/msc.1055

#### 2. Paul S. Jansons, PhD

Current appointment: Research Fellow, Bone and Muscle Group in the School of Medicine Monash University, Melbourne, Australia.

Research experience: Strong research skills and experience across a range of areas including design, management, and analysis of randomised controlled trials; systematic analysis and meta-analysis; and qualitative research methods including thematic analysis.

Relevant Publication:

Jansons, P. S., Robins, L., Haines, T. P., & O'Brien, L. (2018). Barriers and enablers to ongoing exercise for people with chronic health conditions: Participants' perspectives following a randomized controlled trial of two interventions. *Archives of Gerontology and Geriatrics*, 76, 92-99. doi:10.1016/j.archger.2018.02.010

#### 3. Michael Pfeil, PhD

Current appointment: Senior Lecturer, School of Health Sciences, University of East Anglia, England

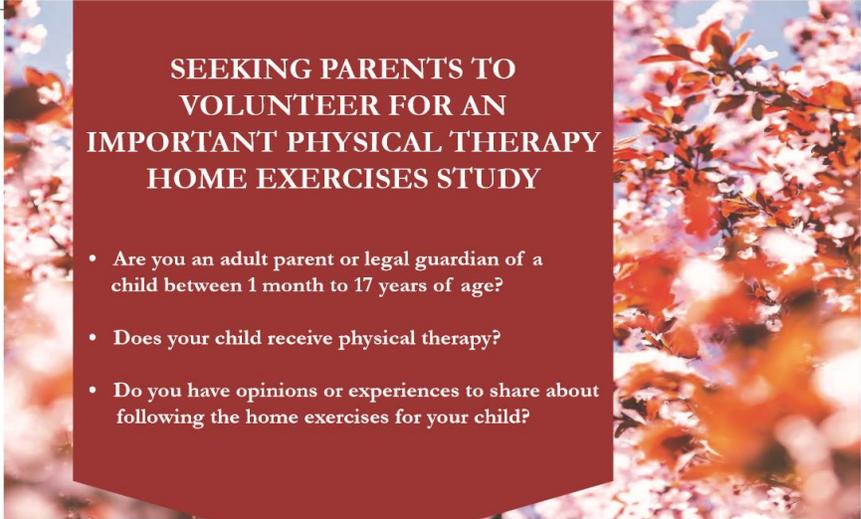
Research experience: The experience of healthcare by patients, their families and healthcare professionals. Used qualitative methodologies on their own or as a complement to randomised trials.

Relevant Publication:

Birt, L., Pfeil, M., MacGregor, A., Armon, K., & Poland, F. (2014). Adherence to home physiotherapy treatment in children and young people with joint hypermobility: A qualitative report of family perspectives on acceptability and efficacy. *Musculoskeletal Care*, 12(1), 56-61. doi:10.1002/msc.1055

## Appendix G.

### Recruitment Posters



**SEEKING PARENTS TO  
VOLUNTEER FOR AN  
IMPORTANT PHYSICAL THERAPY  
HOME EXERCISES STUDY**

- Are you an adult parent or legal guardian of a child between 1 month to 17 years of age?
- Does your child receive physical therapy?
- Do you have opinions or experiences to share about following the home exercises for your child?

**If you answered YES to these questions, YOU ARE INVITED to participate in this local research study.**

**Participation in this study involves:**

- A one-time phone interview in English
- A simple 3-question written sentence completion task
- Amazon e-gift card as an incentive for participation

**Call or email today for more information!**

**CALL:** [REDACTED]

**EMAIL:** [REDACTED]

Study Title: Parents' perceptions of adherence to pediatric physical therapy home exercise program: A qualitative description.

Study purpose: To understand parents' perceptions of adherence to pediatric physical therapy home exercise programs.

Researcher: Richard Narvadez, PT, DPT, PCS

**SEEKING PARENTS TO  
VOLUNTEER FOR AN  
IMPORTANT PHYSICAL THERAPY  
HOME EXERCISES STUDY**

- Are you an adult parent or legal guardian of a child between 1 month to 17 years of age?
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Study purpose: To understand parents' perceptions of adherence to pediatric physical therapy home exercise programs.

Researcher: Richard Narvadez, PT, DPT, PCS

**Appendix H.**  
**Demographic Information Form**

Participant ID number: \_\_\_\_\_

1) Child's age (in months or years): \_\_\_\_\_

2) Reason/s for receiving physical therapy: \_\_\_\_\_  
\_\_\_\_\_

3) Date when child started receiving physical therapy: \_\_\_\_\_

4) Person that is mainly responsible for doing the home exercises:

Mother    Father    Both    Legal guardian

## Appendix I.

### Codebook

Primary Category	Category Definition	Phone Interview Example	Sentence Completion Task Example
Knowledge of adherence to HEP	Something that one knows, understands, or learned about a particular subject that is based on facts or credible information, gained from personal experience or education. A belief that is justifiable or reliable, as opposed to opinion.	<i>So, you've got to roll with the punches. It comes a part of our life, and we've learned to adjust and to work around it, and to give him a break when he needs a break.</i>	<i>I would also acknowledge that consistency is the key in order to see progress and accomplish one goal at a time.</i>
Beliefs about adherence to HEP	Something that one accepts, believes, or knows as true, but may not be based on fact, truth, or certainty. An assumption. A common sense reasoning. An opinion. An ideal. Can be revised if an evidence or truth is presented.	<i>I had one friend that was doing that, and I don't know that she ever did it at home. She also has quite a plateful. She has a lot of other children, and she's also caring for her father that lives with her now, and she has grandkids as well. So, I can't honestly say that I've ever heard her saying that, "Oh, well I'm going to do them."</i>	<i>The more it is practiced during therapy and at home, the more it becomes a normal routine.</i>
Attitudes about adherence to HEP	A way of thinking, position, judgment, inclination, feeling, emotion, or point of view about something that is reflected in a person's behavior.	<i>And I go, "I don't want to be seven years older and still changing somebody's diapers." Since he was two years old, I had been potty training him. Sometimes he gets it, sometimes he doesn't get it. And then we're back to pull-ups. Of course, it's easier to change a diaper, it's easier. "Okay, just lay down and let me change you clean." It's easier for him, it's easy for me when I'm in the bind. But if I don't put the work right now, I am going to be changing diapers on a 20-year-old.</i>	<i>When following a PT plan word per word, I feel can sometimes make a parent lose patience if they feel their child is not progressing fast enough.</i>
Prior Experience	Only prior experiences that have relevance to present knowledge, belief, or attitude about adherence to HEP	<i>I know when she was younger, it was very hard. I was always like, "Oh my God, maybe I'm not doing this right." And I doubted some of it. And then</i>	<i>At first somewhat good. As my daughter grew older, it was a little more difficult to get her to do. We had to figure which were her favorite</i>

Primary Category	Category Definition	Phone Interview Example	Sentence Completion Task Example
		<p><i>throughout the years you kind of like, "Okay, now I know. Now this is how I can do it." But at the very beginning it was like, "Oh no," being she was very small, and I was like, "I don't know if I'm going to be able to do that."</i></p>	<p><i>exercises to do in order for her to want to commit to the therapy.</i></p>