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Identification of Infant Feeding Practices in Eastern Kentucky and Southern West Virginia That Correlate with High Weight-for-Length

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Identification of Infant Feeding Practices in Eastern Kentucky and Southern West Virginia That Correlate with High Weight-for-Length

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By

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Abstract

Background: Approximately 20% of children in the United States are obese. West Virginia and Kentucky rank in the top 10 for obesity rates in children as young as 2-4 years old. Obesity increases the risk for numerous short-term health problems and impacts long-term health, development, quality of life, and life expectancy. Research indicates that obesogenic behaviors can be addressed prior to the development of obesity or significant health problems to prevent, rather than treat. Interventions targeting caregivers of infants younger than 2-years can promote early development of healthy feeding habits that persist through the developmental stages of nutrition. Before a community can make healthy changes, an assessment is required to determine current practices and needs.

Methods: Sixty-three caregiver-infant dyads were enrolled. Demographics were obtained from infant medical records and caregiver report. Caregivers completed two surveys (Infant Feeding Styles Questionnaire, Infant Feeding Questionnaire) via telephone. Surveys assessed beliefs and practices of infant feeding, especially as they related to 5 characteristic feeding styles.

Results: Twenty-seven dyads completed study visits. At least 1/3 of the infant sample population was considered high weight-for-length (HWFL). Caregivers of HWFL infants had lower Responsive Feeding (RF) scores ($p = .035$), and these infants had a higher number of siblings ($p = .017$) and fell later in birth order ($p = .012$). Though not statistically significant, the rate of HWFL was at least twice as high among infants whose caregivers utilized WIC.

Discussion: This study confirmed the presence of high weight status early in life in this community. It confirmed RF association with weight status and revealed potentially high-risk groups.

Conclusion: Primary care interventions should be implemented that focus on early prevention through overall healthy feeding practices. Individual community needs may differ, and an assessment facilitates customized care and reduces “trial and error.” Community interventions should incorporate these findings and similar assessments should continue in other communities.

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Dedication

I would like to dedicate this project to the families of rural Appalachia who, too often, find themselves an afterthought in healthcare planning and must rely on services and interventions designed by outsiders with little understanding of their culture, challenges, or needs. I would like to dedicate it to those who have been left feeling like quality healthcare is inaccessible to them or like they must choose between their sense of community and their health. I would, also, like to dedicate it to the like-minded local professionals working to change the wellness narrative and demonstrate that healthy living can be incorporated into Appalachian culture and the two do not have to be mutually exclusive. I hope that by pushing for greater understanding first, interventions will naturally evolve that preserve the Appalachian identity while improving the health of individuals and communities.

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Background and Significance

Worldwide nearly 400 million children are overweight or obese for their age and gender, with over 40 million younger than 5 years (WHO, 2018). In 2016, the United States (U.S.) reported almost 14 million obese children, accounting for approximately 20% of U.S. children (CDC, 2018a). Within the U.S., rates of childhood overweight and obesity vary by age and location. Rates among states range from 9.5% to 21.7% among high school-age children and 7.9% to 19.8% for children aged 2-4 years (CDC, 2018b; Robert Wood Johnson Foundation, 2019). West Virginia and Kentucky fall in the top ten highest rates for both age groups with further disparities seen among regions; adjacent regions of Eastern Kentucky and Southern West Virginia have higher obesity rates than the opposite ends of each state (CDC, 2018b; National Institute for Children's Health Quality, 2008a, 2008b; Robert Wood Johnson Foundation, 2019).

Overweight and obesity in pediatrics are determined by anthropomorphic measurements and correlation to gender and age-based norms (Berry, 2017). The Centers for Disease Control and Prevention (CDC) provide standardized growth charts for children ages 2-19 years, matched for age and gender; a body mass index (BMI) at the 85th percentile or higher is considered overweight and a BMI at or above the 95th percentile is considered obese (Berry, 2017; Skinner & Skelton, 2014). World Health Organization (WHO) standardized growth charts for weight-for-length are utilized for children 24 months and younger; these patients are not classified as overweight or obese, but weight-for-length above the 98th percentile (2 standard deviations) is considered high (Berry, 2017; CDC, 2015). The American Academy of Pediatrics (AAP) has utilized the 85th and 98th percentiles as a two-tiered classification of high weight-for-length in children under 24 months of age as these cutoffs correlate with later risks for obesity (Roy et al., 2016).

In the U.S., childhood overweight and obesity negatively impact healthcare costs. Higher annual rates of prescription medication spending (up to 35% increase), outpatient care costs (up to 32% increase), and emergency department expenses (up to 20% increase) have been correlated with childhood overweight and obesity (Trasande & Chatterjee, 2009). This translates to up to $14.1 billion for

medication, outpatient care, and emergency visits, in addition to an estimated $237.6 million in inpatient costs (Cawley, 2010; Trasande & Chatterjee, 2009). Indirect costs include decreased skill attainment and negative impact on income and productivity into adulthood (Cawley, 2010; Cawley & Spiess, 2008; Hammond & Levine, 2010). This data highlights the value of financial investment by government, business, and healthcare entities in promoting healthy weight early in life.

As stewards of health and wellness, pediatric providers are motivated further by the non-monetary impact of childhood overweight and obesity. Childhood obesity is associated with increased risks for cardiovascular disease, type 2 diabetes, sleep apnea, asthma, mobility issues, certain cancers, and other disease processes (National Institute of Diabetes and Digestive and Kidney Diseases, 2018). Childhood obesity can interfere with normal growth and development and is associated with greater risks for excess weight and increased disease processes later in life (Barton, 2012; Marcovecchio & Chiarelli, 2013; Reinehr, 2011). Obesity in childhood presents a risk for depression, decreased quality of life, and various other psychological and social ailments (Hagan et al., 2017). Rapid weight gain and high weight-for-length (≥85th percentile) as early as the first two years of life are associated with higher rates of obesity in childhood and adulthood (Odegaard et al., 2013).

Context

Early childhood obesity is associated with immediate health problems and increased risk for overweight and obesity later in life along with related health repercussions (Sahoo et al., 2015). Children in West Virginia (WV) and Kentucky (KY) are statistically more likely to experience obesity, with West Virginia ranking 3rd and Kentucky 7th for obesity rates among children aged 2-4 years (Robert Wood Johnson Foundation, 2019). This puts them at disproportionately greater risk for health problems and complications related to weight than many of their peers throughout the U.S.; children of Southern WV and Eastern KY fare worse, still, than others throughout their own states (National Institute for Children's Health Quality, 2008a, 2008b).

Obesity is influenced by a wide range of interrelated factors including non-modifiable genetics and more alterable diet and lifestyle habits; this complicates efforts to identify underlying causes of

excess weight (Hagan et al., 2017; Styne et al., 2017). Additional discrepancies emerge through interaction of multiple factors and demographics (Amarasinghe et al., 2009). Further research is not only warranted but vital to identify why children in this region maintain higher obesity rates even with efforts to balance inequalities through national endeavors like The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and updates to food labels and school nutrition programs (FDA, 2020; National Information Center on Health Services & Health Care, 2012; Robert Wood Johnson Foundation, 2018; USDA, n.d.).

If modifiable risk factors or behaviors which correlate with unhealthy weight gain in children can be identified, then interventions can be better tailored to the needs of the population. Targeting prevention of harmful habits and promotion of healthy behaviors instead of treating obesity or addressing unhealthy habits after they produce detrimental effects may lead to better community outcomes (Fawcett & Desanto-Madeya, 2012). This will lead to more effective interventions that produce positive health effects in the community, reduce unnecessary healthcare costs, and reduce wasteful investments in ineffective interventions (Styne et al., 2017).

Common Practice

The intention is that knowledge gained through this study will lead to improvements over current practices. Pediatric primary care providers offer anticipatory guidance to all caregivers, especially during well-child visits. This guidance covers a wide range of topics related to growth, development, and safety with much of the information standardized to ensure caregivers receive sufficient information at appropriate times (French et al., 2012). Guides such as the AAP's Bright Futures provide a reliable framework for such education (Hagan et al., 2017). Nutritional guidance traditionally focuses on food selection (e.g., encouraging breastfeeding in infancy, offering a balanced diet as solid foods are introduced), intake volume (e.g., feeding routine for formula feeds in infancy, milk intake in toddler years), and screening for and treating deficiencies. The commonality is a focus on elements with clear guidelines that are easily evaluated and require information sharing rather than in-depth education (Black & Abound, 2011). Providing accurate information and reminding caregivers of evidence-based standards

has proven beneficial but may result in lingering gaps. In terms of behavioral guidance related to healthy eating habits, greater attention is given to treatment of obesity and unhealthy eating than to prevention or deliberate development of healthy habits. Specific actions are scrutinized with less focus given to understanding the greater context in which poor nutrition develops, including why caregivers may not be following guidelines or what obstacles may be hindering healthy nutrition. These approaches are conducive to easy implementation on a large scale but may leave educational gaps or fail to motivate action (French et al., 2012).

Evidence-Based Intervention

Feeding practices as early as infancy have been shown to influence later weight status and developing nutrition habits (Gruber & Haldeman, 2009; Skouteris et al., 2011). Earlier interventions have a greater chance to form positive habits, instead of trying to modify existing habits (Black & Abound, 2011). A literature review found that effective interventions for reducing early childhood obesity tended to focus on general healthy nutrition and parenting, as opposed to specific weight concerns (Adkins, 2019). This supports the systems approach to analyzing health problems and the importance of looking beyond the immediate issue for broader influencing factors. In the literature, responsive parenting or feeding stood out as the optimal approach to promoting healthy relationships and psychosocial experiences with food for long-lasting health benefits (Perez-Escamilla et al., 2017; USDA, 2019). Responsive feeding emerged from the more general concept of responsive parenting which refers to reciprocal interactions between caregiver and infant that lead to healthy psychosocial development and development of a trusting relationship (Black & Abound, 2011). This is in contrast to controlling or authoritarian styles of parenting as well as overly permissive or indulgent approaches. Responsive feeding specifically promotes healthy relationships with food and nutrition and an increasing ability to properly self-regulate intake. These assets are carried forward into childhood and adulthood.

For a population with high obesity rates early in life, promoting effective responsive feeding may lead to improved overall nutrition and reduction in unhealthy weights. Before planning a responsive feeding intervention, it must be determined how local caregivers currently fare in utilizing these skills,

what gaps exist, and whether other factors exert more significant influence on weight status in this population. Validated questionnaires can be utilized for caregivers of infants along with collection of demographic and anthropomorphic data (Baughcum et al., 2001; Thompson et al., 2009). The findings can provide a better picture of the system as a whole and facilitate interventions specifically targeting the needs of the community.

Purpose

The purpose of this study was to describe a geographically specific population in terms of infant weight-for-length (WFL) and current infant feeding styles. The initial objective was to estimate the percent of otherwise healthy infants (1-24 months) with high weight-for-length (HWFL) in the population. This outcome would potentially provide justification for further intervention and establish baseline data for future evaluations. The second objective was to administer standardized feeding questionnaires to caregivers of otherwise healthy HWFL and not high weight-for-length (NHWFL) infants. Third was to analyze responses to identify feeding styles and/or other characteristics related to HWFL after completion of data collection. The final objective was to translate findings into practice recommendations appropriate to the patient base that would promote healthy nutrition in patients 24 months of age and under. Study results would comprise the evidence used to promote potential changes in current practice.

This project was expected to aid in addressing the challenge of unhealthy weight in the region of interest by revealing current system characteristics that lead to obesity and exposing opportunities for early prevention. First, a problem had to be identified and documented. The project obtained representative data for the youngest community members to determine if the problem was present at this stage. With over a third of infants in the sample population qualifying is HWFL, it could be stated that opportunity exists to improve nutrition in infancy. The validated questionnaires collected more than standard information on feeding habits and elicited useful data on the presence of Laissez-Faire, Pressuring, Restrictive, Responsive, and Indulgent feeding habits among caregivers, as well as caregiver perceptions of size and growth concerns. This provided insight into greater dynamics of the feeding

experience and confirmed that, within this population, a greater utilization of Responsive Feeding (RF) techniques was associated with healthier WFL. The inclusion and analysis of demographic data allowed for identification of characteristics beyond feeding style that may put patients at increased risk for HWFL and later obesity. Ultimately, the PI was able to develop a more thorough picture of current infant nutrition in the area, identify key targets for intervention, and demonstrate the utility of performing such an analysis which could prove valuable in other communities.

Theoretical Model

Dorothy Johnson's Behavioral System Model (BSM) served as a basis for this project. This model presents a person as a system, intrinsically connected to his or her environment, with many parts interacting to produce specific outcomes, and identifies subsystems in which persons strive for balance through their actions (Alligood, 2018; Fawcett & Desanto-Madeya, 2012; Zaccagnini & Pechacek, 2019). This is a holistic approach to nursing and patient care that considers how various components influence a particular problem or phenomenon of interest. Johnson built upon previous findings of other researchers who made similar observations that both internal and external factors can influence how individuals respond to similar stimuli and that some patterns of response may be predictable (Alligood, 2018). Each person is a system, with 7 subsystems identified. These subsystems represent the fundamental tasks that maintain the system as a whole. The subsystems were labeled Attachment or Affiliative, Dependency, Ingestive, Eliminative, Sexual, Aggressive Protective, and Achievement (Fawcett & Desanto-Madeya, 2012).

The Ingestive Subsystem serves appetite satisfaction and includes biological as well as social and psychological considerations (Fawcett & Desanto-Madeya, 2012). According to Johnson, a problem cannot be properly addressed if seen as an isolated disease process, but must be treated as a product of a complex system that may require intervention in various aspects of life (Alligood, 2018). BSM highlights the importance of understanding why people make choices in their respective situations and not just what the immediate decision is or what the consequences of these choices are (Fawcett & Desanto-Madeya, 2012; Zaccagnini & Pechacek, 2019). Challenges faced by current obesity treatment and prevention

programs may result in part from a failure to address all components of the subsystem that contributed to development of unhealthy weight. In line with Johnson's theory, this study looked at elements surrounding the food itself and psychosocial factors that produce unhealthy dietary habits (Alligood, 2018; Fawcett & Desanto-Madeya, 2012; Zaccagnini & Pechacek, 2019).

Review of Literature

Obesity is a dynamic health concern with extensive psychological and physical implications (Hagan et al., 2017; National Institute of Diabetes and Digestive and Kidney Diseases, 2018). Early obesity intervention is key to promoting healthy lifestyles and reducing the impact of obesity on individuals and communities (Styne et al., 2017). Due to the complex origin of obesity, a single standard does not exist for the best method of prevention. Weight is influenced by the interaction of multiple patient behaviors, which are shaped by parenting characteristics and resources, which are further modulated by community and demographic factors (Birch & Ventura, 2009). Pediatric primary care providers are faced with questions of whether interventions in primary care can affect the incidence of obesity and how early interventions can or should be implemented. A literature review was undertaken to answer the question, "In pediatric patients, does an obesity prevention program before 2 years of age, compared to routine health care, reduce obesity within the first six years of life?"

Method

The literature review was conducted through the Cochrane Database, which pulled information from Embase, PubMed, ClinicalTrials.gov and other sources, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). Search criteria included reviews, meta-analyses, and completed clinical trials with a patient population aged birth to six years with the full text available in English. Exclusion criteria included a focus on treatment rather than prevention, focus on identification of risk factors that could not be modified with intervention, population limited to patients with another medical diagnosis, and intervention initiation after two years of age. No limitation was placed on publication years as research in this age range is sparse and newly evolving; without limitation all studies identified were found to have been published no earlier than 2011 (within the last ten years).

The Cochrane Database was searched first with the keywords “childhood AND obesity AND prevention.” This produced 12 Cochrane reviews, with one related to prevention of childhood obesity. This review considered research on prevention of obesity in all children, however, it presented findings in sections with ages 0-5 years assessed independently of others. An additional 1136 articles were identified. A screening of abstracts and more thorough assessment of the full articles produced 32 articles that were highly relevant to the research question. A CINAHL search was conducted with the same terms, “childhood AND obesity AND prevention.” CINAHL allowed other restrictions to be built into the search; “apply related words,” “apply equivalent subjects,” “full text,” “English,” and age range “infant” through “preschool 2-5” were utilized. A total 434 results were returned which were screened for inclusion and exclusion criteria as well as previous identification through the Cochrane search. Six articles were selected for full-text review and one of these was found to be inappropriate for the research question, leaving 5 additional articles. A combined 38 sources formed the literature base.

Synthesis

Based on the available literature, it is reasonable that implementing an intervention within the first two years of life will have a positive effect on obesity (healthy BMI and/or reduced incidence of obesity) as well as dietary habits during the first six years of life. An effective program will treat obesity as a product of a complex system and address multiple parenting and feeding domains to promote overall wellness. Three meta-analyses addressed obesity prevention in early childhood (Askie et al., 2014; Brown et al., 2019; Yavuz et al., 2015). All noted some degree of reduction in obesity from intervention before six years of age, though Yavuz et al. (2015) and Brown et al. (2019) grouped interventions before 2 years with those occurring in the toddler and preschool years. Redsell et al. (2016) conducted a systematic review which addressed benefits of programs initiated in the first two years of life with results followed through the first seven years and, also, reported positive outcomes. In addition to the general positive impact of interventions, these analyses, along with the remaining studies, identified strategies associated with greater benefit and those that proved less effective.

More effective programs addressed parenting skills and behaviors that promote wellbeing through more than one facet of health (Askie et al., 2014; Brown et al., 2019; Cloutier et al., 2018; Daniels et al., 2012; Daniels et al., 2013; Daniels et al., 2015; Gaffney et al., 2012; Hohman et al., 2018; Messito et al., 2020; Morandi et al., 2019; Ordway et al., 2018; Paul et al., 2018; Redsell et al., 2016; Rosenstock et al., 2021; Savage et al., 2016; Taylor et al., 2018; Verbestel et al., 2014; Wen et al., 2012; Yavuz et al., 2015). Hohman et al. (2018), Wood et al. (2016), Escribano et al. (2012), and Weber et al. (2014) identified clear differences in weight based on single modifiable behaviors that could be incorporated into broader interventions. Other researchers described healthier feeding practices even in the absence of clear weight differences (Doring et al., 2016; French et al., 2012; Gross et al., 2016; Helle et al., 2019; Hesketh et al., 2020; McCormick et al., 2020; Schroeder et al., 2015; Vlasblom et al., 2020). Four studies included no improvement in weight and either no improvement in other habits or failure to determine if other habits were influenced (Jiang et al., 2019; Shah et al., 2016; Taina et al., 2018; Wake et al., 2011). Two follow-up studies included initial benefits that were not sustained in the years after intervention ended (Enö Persson et al., 2018; Wen et al., 2015).

The identified studies spanned a considerable range of specific interventions, but together provided a reasonable foundation on which to build future programs. Successful programs were easily accessible to parents, either through home-based visits or in pediatric care homes (Brown et al., 2019). In-person education was consistently more effective than online or text message programs. The frequency and convenience of providing education in conjunction with the existing schedule of well-child visits was a practical approach for pediatric providers that proved effective (French et al., 2012; Messito et al., 2020; Morandi et al., 2019; Schroeder et al., 2015). Compliance with existing recommendations for infant feeding further promoted healthy growth (Gaffney et al., 2012). Ideal programs addressed fundamental concepts of healthy parenting and feeding with responsive parenting underpinning multiple effective programs (Redsell et al., 2016). Greater benefits were seen in high-risk populations (Brown et al., 2019; French et al., 2018).

The variety of interventions tested provide strong evidence that primary care providers can implement successful obesity prevention programs with their patients in the first two years of life. There is poor evidence for use of one particular intervention over all others as studies were not reproduced or tested in multiple populations. However, there is strong evidence to support a focus on responsive parenting techniques as this was incorporated in multiple successful studies and proved valuable as a component of different interventions. The research supports pediatric providers including education with well-child visits, promoting compliance with existing dietary recommendations, teaching responsive parenting and feeding practices, and approaching change as an overall health promotion and not solely obesity prevention.

Gap

The evidence demonstrates that interventions can be successful in promoting healthy behaviors to reduce early childhood obesity, however, it is not certain which behaviors are most crucial to address or whether one intervention is ideal for all communities. To best meet the needs of patients and exercise responsible use of resources, further research is needed to identify which practices require the most immediate focus in intervention. This gap could be addressed with extensive research comparing interventions to one another. However, some existing studies already note interventions having greater effect in subgroups within the study population. Given the likely variation among populations, this gap may be better addressed through an assessment of current practices in the patient base as they relate to proven interventions to identify needs. This type of evaluation is not yet found in the literature for the current population of concern in Appalachia.

This study reduces the literature gap by providing an analysis of a specific high-risk population and a basis for intervention and continued research. The study is focused on a key period of development that is currently under-researched for obesity prevention (24 months and under). The assessment includes occurrence rate of high weight-for-length (an indication of future obesity risk) and utilization of desirable responsive feeding practices. By identifying actual gaps in practices and characteristics associated with the highest risk for high weight-for-length, it is possible to determine the best approach for intervention.

With a more comprehensive knowledge base programs can be planned with increased efficiency and sustainability, matching the feasible scale to the foci that will yield the greatest improvement. Research into applied obesity prevention programs is thereby expedited. Similar assessments can be replicated in other communities to promote faster development of effective programs and increased generalizability.

Methods

This study was designed as a cross-sectional, observational analytic, using a convenience sample. No medication (test or placebo) was utilized. Subjects were not randomized into alternate groups. This was not a community-based participatory research or establishment of a research repository. The researcher sought to generate new evidence with a goal of determining the prevalence of high infant weight-for-length (WFL) and examining the relationship between high weight-for-length (HWFL) and infant feeding styles among otherwise healthy patients of Coalfield Health Center in Chapmanville, WV. A comparison was undertaken of characteristics in the HWFL group and a matched group with normal WFL, or not high weight-for-length (NHWFL). This design was intended to facilitate identification of any correlation between specific feeding styles and presence of HWFL within the target population. To maintain consistency, the PI conducted all interviews ("study visits"), collected all chart data, and performed analyses of data. Study approval was obtained through the University of Kentucky IRB on October 9, 2020 under protocol #60410.

Setting

This research study was completed in the pediatric clinic of Coalfield Health Center (CHC) in Chapmanville, WV. CHC is a non-profit Federally Qualified Health Center serving rural Southern West Virginia (Rural Health Access Corporation, 2018). The payor mix of patients seen at CHC is Uninsured (2.60%), Medicare (19.52%), Medicaid/CHIP (38.24%), and Other Public and Private (39.64%). Approximately 46.67% of patients are at or below the Federal Poverty Guideline and 99.05% are at or below 200% of the Federal Poverty Guideline. Approximately 42% of patients seen are under 18 years of age. Less than 1% of patients represent an ethnic minority (Dial, 2021). Located in Logan County (WV),

CHC primarily serves patients from the Chapmanville area (68%) along with other residents of Logan County (WV) and neighboring Mingo County (WV) (Rural Health Access Corporation, 2018).

Logan and Mingo County demographics represent the target patient base. Both counties are at least 96% non-Hispanic White with over 20% of the population 18 years or younger (Community and Economic Development Initiative of Kentucky, 2019; PRIDE Community Services, 2019; United States Census Bureau, 2019). The median household income is approximately $31,000 in Mingo County and $36,000 in Logan County, compared to over $43,000 for West Virginia (Community and Economic Development Initiative of Kentucky, 2019; United States Census Bureau, 2019). The rate of children living in poverty is higher than state and national rates for both counties (Mingo 39%, Logan 30%, WV 24%, U.S. 20%). In the U.S., 28% of adults are obese, compared to 36% in WV, 38% in Mingo County, and 41% in Logan County (Community and Economic Development Initiative of Kentucky, 2019; PRIDE Community Services, 2019). On a state level, WV has higher rates of teen births, low birth weight, and infant mortality than national averages (Community and Economic Development Initiative of Kentucky, 2019). These and other characteristics shape the services required of and provided by Coalfield Health Center. These data illustrate the necessity of the current research.

The project is in line with the mission of CHC to provide "primary health care to all individuals with dignity and respect within a caring environment" (Coalfield Health Center, 2021). This project focuses on identifying the unique characteristics and needs of the population treated at CHC, as opposed to imposing interventions designed for other communities that may not be appropriate to their circumstances. This is the best way to respect the dignity of the community and drive action through caring instead of personal agenda. The investigation looks beyond diet and encompasses psychosocial and community factors that influence overall nutrition (Alligood, 2018). The findings are vital to identifying the specific needs of the community that will inherently lend themselves to family-centered and community-based interventions. This is in line with the goals of CHC and will help the organization better serve its population while maintaining system integrity.

Stakeholders

This study was developed to serve the needs of various stakeholders, with consideration given in program planning and utilization of results. The primary stakeholder was the health system in which the project was deployed. The CHC administration and staff provided the site for project implementation through permission to access the electronic health record, access the physical facility, interact with patients, and alter clinic proceedings. The long-term results of the project may influence the CHC patient base and utilization of services. Buy-in from CHC was crucial to the existence of the project and they will see the most widespread benefit from the information obtained.

The pediatric providers in the office were responsible for care at all points surrounding the project, influencing the outcomes and the use of the resultant findings. The primary pediatric provider's support for the project may have positively influenced the willingness of caregivers to participate and provide accurate information. The provider's cooperation with changes in patient flow facilitated project completion. The provider is expected to utilize the study results most directly in shaping future patient care. The provider and PI influenced the administration of the project. The PI was responsible for screening possible participants for inclusion and exclusion criteria, conducting interviews to collect data, compiling data, analyzing data, and disseminating results.

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) serves nearly 35,000 individuals in West Virginia (USDA, 2021). WIC provides a program of supplemental resources and education in an effort to improve the nutrition of pregnant women, infants, and children throughout the country (USDA, n.d.). In West Virginia, WIC serves 75% of infants, but only 33% of pregnant women and 25% of children between one and five years of age (State of West Virginia, 2021). WIC may have significantly influenced the behaviors assessed through the project and may be able to employ the findings to further improve and increase utilization of existing programs. Though utilization for infants is high, only 50% of eligible persons in West Virginia are covered by WIC (Henchy, 2019).

The patient and caregiver were the final stakeholders as the source of information and subject of research. The purpose of the project was to understand factors related to the patient and caregiver that

influenced weight so that future interventions can be designed around their specific needs. Patient and caregiver participation was crucial to the success of the project. Participants were less likely to directly benefit than future families, although individuals may have received satisfaction or a sense of accomplishment in contributing to healthcare improvements. The project succeeded in eliciting insights into the needs of the population which will inform future patient care. Minimal direct impact was expected for study participants.

Facilitators and Barriers

Site specific facilitators and barriers influenced project implementation and success. There were three key facilitators. The project aligned with CHC's existing mission and values. The staff and providers were from the community served and maintained close connections to the people and businesses; all had a strong motivation to facilitate a program that promoted the health and wellbeing of the people in the area. Providers and staff in the area already had some recognition that feeding practices may differ from other regions and that certain practices have a negative impact on health. Primary barriers were related to the population of interest with a low motivation or interest to participate in research activities in the general community.

Sample Population

Study participants included patients presenting for well-child checks (WCC) believed to be generally healthy with no chronic health problems or feeding complications that would otherwise alter feeding habits and risk for unhealthy weight. The target population included patients 1-24 months in age, along with a primary caregiver, from Southern West Virginia being seen for primary care WCC in a pediatric clinic (Coalfield Health Center). Based on schedule review, 133 potentially qualifying infant visits were identified with 63 infant-caregiver dyads enrolled and 27 study visits completed. The target population included patients in a region of Appalachia with a particularly high risk for early obesity and distinct socioeconomic characteristics. Study participants included the medical records of infants and caregivers of infants. Caregivers were allowed to enroll with multiple qualifying infants being seen for well-child exams, but multiple surveys and measurements were not accepted for the same infant being

seen for subsequent visits. For an accurate representation, no limitation was placed on participants based on guardian age, caregiver label (parent, grandparent, other), household income, insurance, ethnicity, or other demographic that could unduly skew the study population's representation of the region. Participants were enrolled October 20, 2020-January 29, 2021. During the enrollment period, 133 well-child exams were completed at the clinic for 1-24-month visits. It was necessary that the caregiver be able to read and understand English to be appropriately informed and consented and utilize the validated questionnaires. Exclusion criteria included medical record of patient <1 month or >24 months, sick visit or visit for a procedure, infant being accompanied by someone other than a primary caregiver, or caregiver unable to read or understand English. Sixty-three infant-caregiver dyads were consented. Patients were excluded for the following reason:

Age ineligible (completing 1-month visit early, 24-month visit late)

Patient previously enrolled

Patient ineligible (failure to gain weight under investigation, recent foster placement)

Caregiver declination

When caregivers consented to participate, basic infant data was obtained from charts and appointments were scheduled to complete surveys over the phone. Appointments were made at caregivers' convenience including evening and weekend times and multiple attempts were made to contact participants if they did not answer for scheduled appointments. Twenty-seven full study visits were successfully completed.

An informational flyer was designed for the caregivers of infants (1-24 months) presenting for a well-child visit at Coalfield Health Center. Interested participants were identified by the provider at the end of the visit and the PI was invited into the room to discuss the study. A convenience sample was utilized to obtain patients who were otherwise healthy and within the required age range. After the child completed his or her regular visit activities the PI met with the caregiver to explain the study, answer questions, obtain informed consent, and schedule a phone call to complete the study visit. COVID precautions were utilized including appropriate PPE use (mask worn by PI and participants), restriction of

only PI and participants in the visit room, sanitation of ink pens and clipboard, and consistent hand hygiene before and after participant visits.

Informed Consent

The PI was authorized to obtain consent and did so for all participating dyads. Research did not include emancipated minors. Research did not include non-English speaking subjects as the questionnaires being utilized were validated in English and the informed consent document was available only in English. The validity of results for non-English speaking individuals could not be assumed. Proper informed consent could not be assured in any language other than English. Excluding non-English speaking subjects did not have a significant impact on population representation as Logan County reports less than 1% of residents speaking a language other than English (PRIDE Community Services, 2019). No prospective participants presented that were excluded based on primary language. The proposal did not include establishment of a research repository.

Procedures

Slight variation in procedure was due only to infant age; the demographic questionnaire and Infant Feeding Styles Questionnaire (see Appendix B) was utilized for all patients while the Infant Feeding Questionnaire (see Appendix D) was added for patients 12 months and older. There was no control group. Infant weight and length were measured as a part of routine care. The measurements utilized were made during the concurrent well-child visit. The study had no impact on the performance of measurements. The surveys represented the research procedure and involved the PI asking the caregiver previously validated questionnaires and documenting answers. The answers along with measurements were analyzed for trends or correlations.

Specific COVID related precautions were implemented for added safety of the PI and patients. Patients were not seen for well-visits if they had COVID-like symptoms. Guidelines were provided to families of patients and screenings were performed prior to patient and guardian entry into the facility. No patients or guardians were seen for well-child visits, and therefore were not seen for study visits, if they had a fever or COVID-like symptoms. The PI completed a screening through the University of Kentucky

before each clinical day along with a second temperature monitoring at the clinic site and would not have been present in clinic if positive for fever or other symptoms. At no point during the course of the study was the PI febrile or positive for symptoms.

Clinic staff provided an informational flyer to prospective participants with routine check-in papers before the scheduled visit. The provider completed the routine visit; after completion of the visit the provider asked if the caregiver was interested in participating in the study described in the flyer. If the caregiver agreed, the PI was invited into the exam room. The PI explained the study, provided an informed consent document for the caregiver to read, and answered any questions posed. If the caregiver agreed to participate, the PI and caregiver signed the informed consent document, and a phone interview was scheduled. A previously generated list of randomized alphanumeric codes was utilized to de-identify patients. Only the PI had access to the key to identify data. The patient's weight and length measurements were obtained from the chart for the corresponding visit. The caregiver was called at the scheduled time to obtain demographic information and administer the study questionnaires (IFSQ and IFQ). If the caregiver did not answer, a voicemail was left (if voicemail was available) with the PI's name and phone number and a brief message stating that the purpose of the call was to complete previously discussed surveys. If the caregiver did not return the call, at least 2 additional attempts were made to reach the caregiver. Anonymized data was stored for analysis. Results were prepared for dissemination and discussion as they relate to aggregate data only and not individual responses.

Measures and Instruments

Three surveys were employed. One exclusively collected infant and family demographic information and was designed specifically for this study. Two were previously validated questionnaires related to feeding. The demographic form included the infant age, gender, weight, and length as collected from the patient chart. The caregiver was asked to answer the additional questions about health problems not documented, birth measurements and gestation, ethnicity, birth order and number of siblings (caregivers were instructed to include half- and stepsiblings), utilization of WIC services (during

pregnancy with the infant being discussed, immediately after the infant's birth, and at the time of the survey), and caregiver data (age, gender, ethnicity, height, weight, education).

The Infant Feeding Styles Questionnaire (IFSQ) was a part of all study visits. Permission was obtained from the lead developer to use the tool for the purposes of this study (see Appendix A). This questionnaire contained 39 questions related to caregiver beliefs and 44 questions related to caregiver behaviors for 83 total questions. Some questions were not applicable to infants younger than 6 months. For "belief" items, caregivers were asked to respond to statements using a Likert scale to indicate agreement (1-Disagree, 2-Slightly Disagree, 3-Neutral, 4-Slightly Agree, 5-Agree) or to state if they did not know or refused to answer. For "behavior" items, caregivers responded to statements with a similar Likert scale to indicate frequency (1-Never, 2-Seldom, 3-Half of the Time, 4-Most of the Time, 5-Always) or to state if they did not know, refuse to answer, or if the statement did not apply to the infant being discussed. All items for both sections were categorized by representative feeding styles so that answers to individual items were grouped to produce a score for each feeding style (see Appendix B). The 5 styles assessed were Laissez-Faire (subcategories Attention and Diet Quality), Pressuring (Finishing, Cereal, and Soothing), Restrictive (Amount and Diet Quality), Responsive (Satiety and Attention), and Indulgence (Permissive, Coaxing, Soothing, and Pampering). The IFSQ was validated to confirm that the included questions and subcategories accurately assessed the intended feeding style with internal reliability of 0.75-0.95 (Thompson et al., 2009).

The Infant Feeding Questionnaire (IFQ) was a part of study visits related to infants 12 months of age and older as it required reflection over the infant's first year of life. Permission was obtained from the lead developer to use the tool for the purposes of this study (see Appendix C). The IFQ was composed of 41 questions including 29 related to habits, beliefs, and perceptions that were scored on a Likert scale, similar to that of the IFSQ, and 12 related to specific practices that included yes/no responses and multiple choice (see Appendix D). Select items from the first 29 questions were used to weight the following factors:

Factor 1 (Concern about infant undereating or becoming underweight)

Factor 2 (Concern about infant's hunger)

Factor 3 (Awareness of infant's hunger and satiety cues)

Factor 4 (Concern about infant overeating or becoming overweight)

Factor 5 (Feeding infant on a schedule)

Factor 6 (Using food to calm infant's fussiness)

Factor 7 (Social interaction with the infant during feeding)

The IFQ was validated to determine which questions most accurately reflected the intended constructs with the questions used for scoring demonstrating internal validity of 0.63-0.88 (Baughcum et al., 2001).

Data Analysis

Routine health information collected as a part of the well-child visit included infant weight, infant length, infant age, and presence of known health conditions. Results of surveys conducted explicitly for the study by PI included additional demographic information for infant and caregiver and answers to the Infant Feeding Styles Questionnaire (IFSQ) and Infant Feeding Questionnaire (IFQ). Data was organized in a Microsoft Excel spreadsheet and uploaded to IBM SPSS for analysis. Both programs were made available to the PI as a student at the University of Kentucky. Descriptive Statistics were calculated for infants and caregivers and are presented in Tables 1-2. Out of 63 infants that were enrolled, 39.7% were classified as high weight-for-length (44.4% of the no survey group, 33.3% of the survey group). Approximately 11.1% of infants were very high weight-for-length (16.7% of the no survey group, 3.7% of the survey group). Due to the low number of very high weight-for-length (VHWFL), especially among those whose caregivers completed the study surveys, further analysis was not conducted separately for VHWFL infants. A Chi-Square analysis of independence was completed for HWFL and completion of surveys which determined that the difference between groups was not statistically significant. Approximately 40.5% of female and 38.5% of male infants were HWFL with no statistically significant difference based on a Chi-Square analysis.

Further analysis was conducted of IFSQ and IFQ responses as well as certain demographics to determine if significant correlations were present with HWFL. The Mann-Whitney U Test for

Independent Samples (MWU Test) was used to compare scores from the IFSQ for the 5 feeding styles between HWFL and NHWFL infants (see Table 3) due to the lack of a normal distribution (as determined by SPSS Descriptive Statistics). No statistically significant difference was found for scores between HWFL and NHWFL in Laissez-Faire (sig- .631), Pressuring (sig- .145), Restrictive (sig- .781), or Indulgence (sig- .160). A statistically significant difference was identified between groups for Responsive style (sig- .035) with means scores of 4.1167 (HWFL) and 4.4894 (NHWFL). The MWU Test was used to compare scores from the IFQ for the 7 factors related to infant feeding between HWFL and NHWFL infants (see Table 4) due to the lack of normal distribution (as determined by SPSS Descriptive Statistics). No statistically significant difference was found for scores between HWFL and NHWFL in any factor, however only 2(12.5%) IFQs were completed for HWFL infants.

Analysis of demographic data was completed to determine if any factors beyond feeding styles demonstrated a statistically significant difference between HWFL and NHWFL infants (see Tables 5-6). There was minimal difference between HWFL and NHWFL infants in mean caregiver BMI (31.850; 32.778), caregiver age (30.56; 30.50 years), gestation at birth (37.00; 38.00 weeks), and birth WFL (36.783; 36.724%). The MWU Test identified no statistically significant differences among these demographics (caregiver BMI, sig- .531; caregiver age, sig- .940; gestation at birth, sig- .426; birth WFL, sig- .865). The MWU Test was utilized for caregiver education which was categorized according to increasing stages of completion. No statistically significant difference was found for caregiver education (sig-.781). The MWU Test results for birth order and number of siblings indicated statistically significant differences (birth order, sig- .012; siblings, sig- .017) with a higher mean birth order (4.00; 2.28) and higher mean number of siblings (3.00; 1.39) for HWFL compared to NHWFL. Chi-Square analyses were performed for use of WIC (during pregnancy, immediately after birth, and at the time of the survey – "now") and HWFL (see Table 7). A higher percentage of infants across all three WIC groups were found to be HWFL compared to infants whose caregivers reported not receiving WIC (pregnancy- 40%,20%; birth- 44%,11%; now- 44%,18%). In other terms, at least three-quarters of caregivers of HWFL infants reported utilizing WIC while approximately half of caregivers of NHWFL infants reported doing so

(pregnancy- 75%,53%; birth- 89%,56%; now- 78%,50%). Clinical significance was noted, however, no statistical significance was found (pregnancy, sig- .540; birth, sig- .194; now, sig- .332).

Results

Demographic data were collected for the infants and participating caregivers. Infant age, gender, and anthropomorphic measurements were obtained from the infant medical record. Additional details related to the infant and all caregiver demographics were obtained via the survey. Demographic data is documented in Tables 8-9. Sixty-three caregivers consented with 27 successfully completing appropriate questionnaires. Caregivers who completed a study visit were Caucasian (100%) and female (100%) with an age range of 21-47 years. Caregiver body-mass-index was calculated with a range of 18.9-46.3. Caregiver education included some high school education (3.7%), high school graduate or completion of GED (40.7%), a 2-year degree or some college (44.4%), and completion of a 4-year degree (11.1%). Over half of caregivers reported utilizing WIC services during the related pregnancy (60%), immediately after birth (66.7%), and/or currently (59.3%). Fifty percent of responding caregivers identified a doctor or other healthcare professional as their main source of feeding information.

Chart data was obtained for all infants with consenting guardians (63); additional demographic and historical data were obtained via survey completion (27) which varied by age group (1-11 months, 12-24 months). The age range for enrolled infants matched the target age range (1-24 months) with 58.7% female. Additional information was available only for infants whose guardians completed surveys. Two-thirds were full-term deliveries (66.7%), all were Caucasian (100%), and the majority had at least one sibling (85.2%) and no known history of health problems (77.8%). Two had a reported history of reflux (1 with additional “tied” tongue and lip), 2 had laryngomalacia, 1 had hydronephrosis and a benign cardiac murmur, 1 had a hemangioma on the chest. All caregivers reported these conditions as being “monitored” or resolved at the time of the interview.

Analysis was conducted to determine if associations were present between infant weight-for-length and parenting styles or demographics. Even though all caregivers reported high responsive feeding techniques, lower scores were associated with high or very high weight-for-length. No statistically

significant association was found with other feeding styles. A statistically significant difference was noted with birth order and number of siblings between normal weight-for-length and high weight-for-length infants. High weight-for-length infants were more likely to have a higher number of siblings and fall later in birth order. Apparent differences were observed between rates of WIC utilization and incidence of high weight-for-length (higher WIC utilization among high weight-for-length infants) however, no statistical significance was identified. No significant difference was noted between normal and high weight-for-length infants for caregiver age, caregiver BMI, infant gender, gestation at birth, or birth weight-for-length.

In this population of interest positive attributes were identified along with room for improvement. The majority of caregivers reported having a doctor or other healthcare provider as their primary source of feeding information indicating trust and utilization of this resource. This supports the practicality of basing intervention in the primary care setting where caregivers already seek information. Responsive feeding techniques were being utilized which may reflect improvements already in progress. However, differences were still noted between HWFL infants and NHWFL infants with caregivers of HWFL infants achieving lower scores. No significant association was found with caregiver age or BMI which may indicate that female caregivers with diverse personal characteristics embrace similar feeding habits for infants and may not transfer their own personal habits at this age. Birth order and number of siblings were significantly different between groups which may indicate differences in family dynamics (changes in habits and beliefs based on increasing responsibility) or social perception (changes in education and assistance offered based on perceived experience). Though not statistically significant, the difference in WIC utilization is clinically important. This may reflect an appropriate focus on utilization by high-risk patients or insufficient impact (either due to deficiencies in resources offered or poor utilization of offered resources after enrolling). Due to the homogeneity of participants results can only be generalized for the population of Caucasian female caregivers in the region.

Discussion

The study results support the main literature findings and practicality of using other interventions to guide program planning in this population. The study contributes additional information regarding this particular population that can be used to build on the existing literature and personalize an educational plan for the community. As suggested in the literature, the use of RF techniques was associated with healthier WFL in sample infants. This type of analysis had not previously been conducted in rural Appalachian communities and its inclusion expands the generalizability of existing findings. Confirming this link, also, suggests that interventions developed elsewhere to increase the use of RF styles can be adapted to this population. The added knowledge regarding impact of family size and WIC utilization in the region can factor into subsequent feeding interventions and further research.

A great deal was learned from the study process and results that will influence future activity at the study site. Multiple surveys were employed that required up to 45 minutes to complete. The majority of caregivers who declined to participate expressed willingness to participate if not for the inconvenience of the study visit duration. Additional caregivers consented but could not be reached after leaving the office. Greater participation is likely in future studies if the questions are streamlined to reduce time commitment and facilitate in-office completion during visits. This will reduce possible disparities between those that participate and those that do not, providing increased accuracy and increasing sustainability of the project to continue if desired. Additional research is warranted based on findings. Though, RF styles were confirmed to be related to healthy versus high WFL, other potentially influencing factors were identified that should be further investigated. Since scores for RF were relatively high for both groups, additional research should be executed to identify caregiver perceived barriers to healthy nutrition and how existing resources are utilized (e.g., WIC). This should include both infant and toddler populations to determine changes with age.

The information gained can guide caregiver education. Based on these results it would be valuable to include RF education with existing anticipatory guidance to all parents at CHC. Providers should attempt confirmation that caregivers understand how to implement best practices to identify areas

for additional education. This may aid in narrowing the gap between those who participate in WIC and those that do not and between those with fewer children and those with larger families. Repeat analysis can be completed after implementation of educational interventions to determine improvements from baseline data as found in this study.

Implications

The research findings have implications for current practice, parent education, and future research. CHC's well-child education should implement deliberate inclusion of repeat mothers to ensure they are not inadvertently overlooked as "experienced" caregivers. The content of parent education should be updated based on findings to include more dynamic topics including creating a positive feeding environment and responding to infants' cues for satiety and hunger. Basic education on content and volume of feeds should not be displaced. Future research should be simplified to the extent possible while maintaining information integrity to be more inclusive of potential participants. Research in this region should focus on long-term follow-up and identification of obesogenic influences at the community system level. It is crucial to identify the needs of larger families and WIC participants that may contribute to unhealthy environments. Once streamlined, similar research should be completed in other communities to determine which common elements persist that can be built into an intervention framework and which require more customized approaches.

Limitations

Limitations of the research must be taken into consideration when appraising the results. Certain limitations were associated with the timing of research and impact of COVID-19 whereas others were related to study design. The COVID-19 pandemic resulted in changes in many healthcare practices including furloughed providers, reduced primary care visits, and greater restrictions on nonessential presence in clinics. This study was designed for a practice that predominantly served two border counties (one each in Kentucky and West Virginia) however this facility was no longer able to accommodate student research by the start of the project. Two alternate practices were identified, one each serving Southern West Virginia and Eastern Kentucky, to achieve a similar population. The Eastern Kentucky

practice was ultimately unable to schedule days for the principal investigator to be in the office. Research was therefore restricted to a clinic serving Southern West Virginia and did not include data specific to Eastern Kentucky as desired.

The project was designed for surveys to be completed in a private setting within the clinic immediately following well-child visits. The participating clinic did not have extra space available to provide a private environment separate from the exam room. It was necessary to complete all surveys by phone which resulted in a portion of participants consenting but failing to follow through with the study visit. Additional potential effects of COVID-19 must be considered as they relate to family dynamics. In the period surrounding the study many families experienced significant changes in routine, changes in income, and changes in access to various activities. Changes in family finances and routines may have influenced feeding habits and access to feeding resources. It is possible that findings obtained at this point in time may not reflect findings that would be obtained prior to or after the pandemic.

The sample size was smaller than desired and differed some from the target population. This limited the ability to determine significance of some variables. The sample demographics included higher caregiver education and lower WIC utilization than the population of interest. Due to small sample size, some raw data that suggested relevant relationships could not be properly analyzed for significance. Differences were noted in infant weight-for-length between caregivers that completed the full survey and those that did not so it must be considered that other differences could have been present if all caregivers had completed surveys. It is possible that additional differences could have been present among caregivers who chose not to consent. The surveys used were reliant on self-reported data which allowed for possible bias due to inaccurate recall and desire to present the most positive self-image possible. These limitations provide context for results obtained and may be considered in planning subsequent projects.

Conclusion

Though the challenge of childhood obesity is of concern to pediatric providers throughout the country, individual communities have unique needs that must be considered. A literature review revealed

that a systems approach to healthy infant feeding is more effective than a strict focus on weight or education restricted to diet content. This study was conducted to improve understanding of the system that currently produces higher rates of obesity and worse health outcomes for patients in Southern West Virginia from an early age so that interventions can be designed with the proper targets. Sixty-three infant-caregiver dyads were enrolled with 27 completing study visits from the patient base of CHC. Demographic data were collected for infants and caregivers; caregivers completed surveys related to feeding practices and beliefs. High rates of responsive feeding were found with higher scores related to infants of healthy weight and lower scores related to HWFL. Statistical significance was found for the relationship with responsive feeding as well as number of siblings and birth order. A clinically significant, though not statistically significant, relationship was seen with WIC participation. Caregivers were homogenous (Caucasian, female) and no relationship was noted between WFL and caregiver age, caregiver BMI, infant's gestation at birth, or infant's WFL at birth.

The most direct benefit of this research is for providers in the region of interest. Results highlight possible improvement already in progress (with high responsive feeding scores across groups) and areas that deserve the most dedicated focus. By increasing understanding of the existing system providers can isolate areas for intervention to improve health outcomes. This is more efficient and effective than trialing interventions that may be geared toward problems that are not relevant to this community. Pediatric primary care providers in this region should provide responsive feeding guidance in conjunction with well-child checks to promote healthy feeding practices that may reduce high weight-for-length and risk for future obesity while promoting overall wellness. For other regions, this study provides an example that can be improved and adapted to complete similar analyses and facilitate customized intervention. The contribution to the existing body of knowledge is necessary to advance patient-centered care and address the root causes of obesity before they take hold.

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Table 1: Infant Descriptive Statistics

Infant Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age (months)	63	1	24	10.97	7.023
Length (%)	63	1	99	51.65	37.809
Weight (%)	63	1	99	56.71	30.831
WFL (%)	63	1.3	99.9	67.868	28.7809
Gestation (wks)	26	32	41	37.65	2.244
Birth WFL (%)	23	.0	92.5	36.739	30.4357
Birth Order	27	1	6	2.85	1.512
Siblings	27	0	5	1.93	1.492
Valid N (listwise)	22				

Table 2: Caregiver Descriptive Statistics

Caregiver Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age (years)	27	21	47	30.52	6.886
Height (cm)	27	106.0	182.9	162.144	13.2852
Weight (kg)	26	49.9	142.4	88.154	20.5279
BMI	26	18.9	46.3	32.492	6.7474
Valid N (listwise)	26				

Table 3: Hypothesis Test Summary for IFSQ Styles

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of LF is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.631[c]	Retain the null hypothesis.
2	The distribution of P is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.145[c]	Retain the null hypothesis.
3	The distribution of Rs is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.781[c]	Retain the null hypothesis.
4	The distribution of Rp is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.035[c]	Reject the null hypothesis.
5	The distribution of I is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.160[c]	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

c. Exact significance is displayed for this test.

Table 4: Hypothesis Test Summary for IFQ

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of Factor 1 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.700[c]	Retain the null hypothesis.
2	The distribution of Factor 2 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.267[c]	Retain the null hypothesis.
3	The distribution of Factor 3 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.933[c]	Retain the null hypothesis.
4	The distribution of Factor 4 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.700[c]	Retain the null hypothesis.
5	The distribution of Factor 5 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.417[c]	Retain the null hypothesis.
6	The distribution of Factor 6 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.200[c]	Retain the null hypothesis.
7	The distribution of Factor 7 is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.333[c]	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

c. Exact significance is displayed for this test.

Table 5: Group Statistics and Significance

Group Statistics

	HWFL (≥85%)	N	Mean	Std. Deviation	Std. Error Mean	Sig [a,b]
Caregiver BMI	No	18	32.778	5.7520	1.3558	
	Yes	8	31.850	9.0314	3.1931	.531[c]
Caregiver Age	No	18	30.50	6.879	1.621	
	Yes	9	30.56	7.316	2.439	.940[c]
Birth Order	No	18	2.28	1.074	.253	
	Yes	9	4.00	1.658	.553	.012[c]
Siblings	No	18	1.39	1.092	.257	
	Yes	9	3.00	1.658	.553	.017[c]
Gestation (wks)	No	17	38.00	1.969	.477	
	Yes	9	37.00	2.693	.898	.426[c]
Birth WFL (%)	No	17	36.724	32.5837	7.9027	
	Yes	6	36.783	26.0466	10.6335	.856[c]

a. The significance level is .050.

b. Asymptotic significance is displayed.

c. Exact significance is displayed for this test.

Table 6: Hypothesis Test Summary for Caregiver Education

Hypothesis Test Summary

	Null Hypothesis	Test	Sig [a,b]	Decision
1	The distribution of Caregiver Education is the same across categories of HWFL (85+).	Independent-Samples Mann-Whitney U Test	.781[c]	Retain the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

c. Exact significance is displayed for this test.

Table 7: WIC Participation and Significance

WIC Participation by WFL

	Not HWFL	HWFL	Total	p-value
No WIC during Pregnancy	8	2	10	
WIC during Pregnancy	9	6	15	
Total	17	8	25	.294[a]
No WIC after Birth	8	1	9	
WIC after Birth	10	8	18	
Total	18	9	27	.083[b]
No WIC Now	9	2	11	
WIC Now	9	7	16	
Total	18	9	27	.166[c]

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.20.
b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.00.
c. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.67.

Table 8: Infant Demographic Data

Infant Demographics

Gender	Male	Female		Total
	26	37		63
Age	1-5 months	6-11 months	12-24 months	
	17	13	33	63
Weigh-for-Length	Not HWFL	High (≥85%)	Very High (≥98% - subset of High)	
	38	25	7	63
Survey Completed	Yes	No		
	27	36		63
Ethnicity (survey)	Caucasian			
	27			27
Gestation (survey)	32-37 weeks (premature)	38-41 weeks (full-term)		
	9	18		27

Table 9: Caregiver Demographic Data

Caregiver Demographics

Gender	Male	Female				Total
	0	27				27
Age	21-29	30-39	40-47			
	14	9	4			27
Ethnicity	Caucasian					
	27					27
Education	Some High School	HS Graduate/ GED	2-year Degree	4-year Degree		
	1	11	12	3		27
BMI	18.5-24.9	25-29.9	30-34.9	35-39.9	40+	
	3	6	9	5	3	26

Appendix A

Permission to Use IFSQ

Re: Use of IFSQ Request

Thompson, Amanda Logan <althomps@email.unc.edu>
Tue 4/21/2020 8:05 AM
To: Adkins, Havilah R. <Havilah.Adkins@uky.edu>

2 attachments (142 KB)
IFSQ questionnaire.doc; IFSQ Scoring schema.docx;

CAUTION: External Sender

Hi Havilah,

The IFSQ and scoring guide are attached. We are asking groups interested in the IFSQ not to take individual items out of the constructs as these constructs have been validated and, more importantly, to remember that this questionnaire was developed with a particular population. It may require some pretesting in your sample.

Please let me know if you had any questions about the instrument.

Regards,
Amanda

--
Amanda Thompson, Ph.D. MPH
Associate Professor, Department of Anthropology
Associate Professor, Department of Nutrition, Gillings School of Global Public Health
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Appendix B

Scoring for IFSQ

Scoring Schema for IFSQ

To create a factor score for each of the 13 constructs, calculate the mean score for the items loading on that factor.

Behaviors are scored: ascending 1-never, 2-seldom, 3-half of the time, 4-most of the time, and 5-always; descending 5-never, 4- seldom, 3-half of the time, 2-most of the time, 1-always.

Belief items are scored: ascending 1-disagree, 2-slightly disagree, 3-neutral, 4-slightly agree, and 5-agree; descending 5-disagree, 4- slightly disagree, 3-neutral, 2-slightly agree, 1-agree.

Feeding Style		Item Description	Scoring	Model
LAISSEZ-FAIRE				
Attention		*Behavior items*		
	LF1	When (name of child) has/had a bottle, I prop/propped it up	Ascending	All child and >6mo
	LF2	(Child) watches TV while eating	Ascending	All child and >6mo
	LF3	I watch TV while feeding (child)	Ascending	All child and >6mo
		Belief items		
	LF4	I think it is okay to prop an infant's bottle	Ascending	All child and >6mo
	LF5	It's okay for a toddler to walk around while eating as long as s/he eats	Ascending	All child and >6mo
Diet quality		*Behavior items*		
	LF6	I keep track of what food (child) eats	Descending	All child and >6mo
	LF7	I keep track of how much food (child) eats	Descending	All child and >6mo
	LF8	I make sure (child) does not eat sugary food like candy, ice cream, cakes or cookies	Descending	> 6mo only
	LF9	I make sure (child) does not eat junk food like potato chips, Doritos and cheese puffs	Descending	>6mo only
		Belief items		
	LF10	A toddler should be able to eat whatever s/he wants for snacks	Ascending	All child and >6mo
	LF11	A toddler should be able to eat whatever s/he wants when eating out at a restaurant	Ascending	All child and >6mo
PRESSURING				
Finishing		*Behavior items*		
	PR1	Try to get (child) to finish his/her food	Ascending	All child and >6mo
	PR2	If (child) seems full, encourage to finish anyway	Ascending	All child and >6mo

	PR3	Try to get (child) to finish breastmilk or formula	Ascending	All child and >6mo
	PR4	Try to get (child) to eat even if not hungry	Ascending	All child and >6mo
	PR5	Insist re-try new food refused at same meal	Ascending	>6mo only
	PR6	Praise after each bite to encourage finish food	Ascending	>6mo only
		Belief Items		
	PR7	Important for toddler finish all food on his/her plate	Ascending	All child and >6mo
	PR8	Important for infant finish all milk in his/her bottle	Ascending	All child only
Cereal		*Behavior items*		
	PR11	Give/gave (child) cereal in the bottle	Ascending	All child and >6mo
		Belief items		
	PR12	Cereal in bottle helps infant sleep thru the night	Ascending	All child and >6mo
	PR13	Putting cereal in bottle good b/c helps infant feel full	Ascending	All child and >6mo
	PR14	An infant <6 mo needs more than formula or breastmilk to be full	Ascending	All child and >6mo
	PR15	An infant <6 mo needs more than formula or breastmilk to sleep through the night	Ascending	All child and >6mo
Soothing		*Behavior items*		
	PR16	When (child) cries, immediately feed him/her	Ascending	All child and >6mo
		Belief items		
	PR17	Best way to make infant stop crying is to feed	Ascending	All child and >6mo
	PR18	Best way to make toddler stop crying is to feed	Ascending	All child and >6mo
	PR19	When infant cries, usually means s/he needs to be fed	Ascending	All child and >6mo
RESTRICTIVE				
Amount		*Behavior items*		
	RS1	I carefully control how much (child) eats	Ascending	All child and >6mo
	RS2	I am very careful not to feed (child) too much	Ascending	All child and >6mo
		Belief Items		
	RS3	Important parent has rules re: how much toddler eats	Ascending	All child and >6mo
	RS4	Important parent decides how much infant should eat	Ascending	All child and >6mo
Diet Quality		*Behavior items*		
	RS5	I let (child) eat fast food	Descending	>6mo only
	RS6	I let (child) eat junk food	Descending	>6mo only
		Belief items		
	RS7	A toddler should never eat fast food	Ascending	All child and >6mo

	RS8	An infant should never eat fast food	Ascending	All child and >6mo
	RS9	A toddler should never eat sugary food like cookies	Ascending	All child and >6mo
	RS10	A toddler should never eat junk food like chips	Ascending	All child and >6mo
	RS11	A toddler should only eat healthy food	Ascending	All child and >6mo
RESPONSIVE				
Satiety		*Behavior items*		
	RP1	(Child) lets me know when s/he is full	Ascending	All child and >6mo
	RP2	(Child) lets me knows when s/he is hungry	Ascending	All child and >6mo
	RP3	I let (child) decide how much to eat	Ascending	All child and >6mo
	RP4	I pay attention when (child) seems to be telling me that s/he is full or hungry	Ascending	All child and >6mo
	RP5	I allow (child) to eat when s/he is hungry	Ascending	All child and >6mo
		Belief Items		
	RP6	Child knows when s/he is full	Ascending	All child and >6mo
	RP7	Child knows when hungry, needs to eat	Ascending	All child and >6mo
Attention		*Behavior items*		
	RP8	Talk to (child) to encourage to drink formula/breastmilk	Ascending	All child and >6mo
	RP9	Talk to (child) to encourage him/her to eat	Ascending	All child and >6mo
	RP10	Show (child) how to eat by taking a bite or pretending to	Ascending	>6mo only
	RP11	I will retry new foods if they are rejected at first	Ascending	>6mo only
		Belief items		
	RP12	Important to help or encourage a toddler to eat	Ascending	All child and >6mo
INDULGENCE				
Permissive		*Behavior items*		
	ID1	Allow child watch TV while eating if s/he wants	Ascending	All child and >6mo
	ID2	Allow child to eat fast food if s/he wants[c]	Ascending	>6mo only
	ID3	Allow child to drink sugared drinks/soda if s/he wants	Ascending	>6mo only
	ID4	Allow child to eat desserts/sweets if s/he wants	Ascending	>6mo only
		Belief Items		
	ID5	Toddlers should be allowed to watch TV while eating if they want	Ascending	All child and >6mo
	ID6	Toddlers should be allowed to eat fast food if they want	Ascending	All child and >6mo

	ID7	Toddlers should be allowed to drink sugared drinks/soda if they want	Ascending	All child and >6mo
	ID8	Toddlers should be allowed to eat desserts/sweets if they want	Ascending	All child and >6mo
Coaxing		*Behavior items*		
	ID9	Allow child watch TV while eating to make sure s/he gets enough	Ascending	All child and >6mo
	ID10	Allow child to eat fast food to make sure s/he gets enough	Ascending	>6mo only
	ID11	Allow child to drink sugared drinks/soda to make sure s/he gets enough	Ascending	>6mo only
	ID12	Allow child to eat desserts/sweets to make sure s/he gets enough	Ascending	>6mo only
		-Belief Items		
	ID13	Toddlers should be allowed to watch TV while eating to make sure they get enough	Ascending	All child and >6mo
	ID14	Toddlers should be allowed to eat fast food to make sure they get enough	Ascending	All child and >6mo
	ID15	Toddlers should be allowed to drink sugared drinks/soda to make sure they get enough	Ascending	All child and >6mo
	ID16	Toddlers should be allowed to eat desserts/sweets to make sure they get enough	Ascending	All child and >6mo
Soothing		*Behavior items*		
	ID17	Allow child watch tv while eating to keep him/her from crying	Ascending	All child and >6mo
	ID18	Allow child to eat fast food to keep him/her from crying	Ascending	>6mo only
	ID19	Allow child to drink sugared drinks/soda to keep him/her from crying	Ascending	>6mo only
	ID20	Allow child to eat desserts/sweets to keep him/her from crying	Ascending	>6mo only
		Belief Items		
	ID21	Toddlers should be allowed to watch tv while eating to keep them from crying	Ascending	All child and >6mo
	ID22	Toddlers should be allowed to eat fast food to keep them from crying	Ascending	All child and >6mo
	ID23	Toddlers should be allowed to drink sugared drinks/soda to keep them from crying	Ascending	All child and >6mo
	ID24	Toddlers should be allowed to eat desserts/sweets to keep them from crying	Ascending	All child and >6mo
Pampering		*Behavior items*		
	ID25	Allow child watch tv while eating to keep him/her happy	Ascending	All child and >6mo
	ID26	Allow child to eat fast food to keep him/her happy	Ascending	>6mo only
	ID27	Allow child to drink sugared drinks/soda to keep him/her happy	Ascending	>6mo only
	ID28	Allow child to eat desserts/sweets to keep him/her happy	Ascending	>6mo only
		Belief Items		

ID29	Toddlers should be allowed to watch tv while eating to keep them happy	Ascending	All child and >6mo
ID30	Toddlers should be allowed to eat fast food to keep them happy	Ascending	All child and >6mo
ID31	Toddlers should be allowed to drink sugared drinks/soda to keep them happy	Ascending	All child and >6mo
ID32	Toddlers should be allowed to eat desserts/sweets to keep them happy	Ascending	All child and >6mo

Appendix C

Permission to Use IFQ

Request for Infant Feeding Questionnaire

Baughcum, Amy <Amy.Baughcum@nationwidechildrens.org>
Wed 1/15/2020 2:32 PM
To: Adkins, Havilah <Havilah.Adkins@uky.edu>

3 attachments (620 KB)
ifqgirlf.doc; ifqboyf.doc; Baughcumjdbp2001.pdf;

Dear Havilah

Thank you for reaching out. I found copies of the questionnaires and feel free to edit/use. I can't believe it has been almost 20 years ago!
The scoring criteria are spelled out in our article in Journal of Developmental and Behavioral Pediatrics (2001). You will also want to look at Jain et al (2004) in Appetite that looks at some of the concerns about this measure. It has not been widely used and there may be better options now. I am focused in a different area of research now so I am less familiar.
I wish you the best in your studies.

Sincerely,
Amy

Amy Baughcum, Ph.D.
Pediatric Psychologist
Clinical Lead, Neonatal Psychosocial Services
Assistant Professor, Ohio State University College of Medicine
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Appendix D

IFQ

INFANT FEEDING QUESTIONNAIRE

INTRODUCTION:

The questions below are about how you fed your child **during the first year of life.** Listen carefully to each question and decide how you feel based on your experience.

Section 1

During your child's first year of life…

Did you let him/her eat whenever (s)he wanted to?

Did you worry that (s)he was not eating enough?

Did you only allow him/her to eat at set times?

Did you let him/her decide when (s)he was finished eating?

Did you feed him/her extra just to be sure (s)he got enough to eat?

When (s)he got fussy, was feeding him/her the first thing that you would do?

Did you worry that (s)he was eating too much?

Never/Rarely/Sometimes/Often/Always

During your child's first year of life…

Was it a struggle to get him/her to eat?

Did you get upset if (s)he ate too much?

To make sure (s)he did not get fussy, did you feed him/her even if you did not think (s)he was hungry?

Did you talk or sing to your child while you fed him/her?

Did you get upset if (s)he did not eat enough?

Did you put infant cereal in the bottle so (s)he would sleep longer at night?

Did you hold him/her when giving the a bottle?

When (s)he was under 4 months old, was (s)he hungry for more than just formula and/or breastmilk?

Did you put infant cereal in the bottle so (s)he would stay full longer?

If you saw a baby who was the same age as yours, but weighed more, did you feel like you were not doing a good job feeding your child?

Never/Rarely/Sometimes/Often/Always

Section 2

During your child's first year of life…

If I did not encourage him/her to eat, then (s)he would not eat enough.

Feeding him/her was the best way to stop his/her fussiness.

I knew when (s)he was hungry.

(S)he ate enough.

Feeding him/her was the best way to get him/her to sleep longer.

I believed it was important for him/her to finish all of the formula in the bottle.

During your child's first year of life…

I was worried that (s)he would become underweight.

I knew when (s)he was full.

(S)he knew when (s)he was hungry.

I was worried that (s)he would become overweight.

(S)he knew when (s)he was full.

Disagree a lot/Disagree a little/No strong feeling/Agree a little/Agree a lot

I think my child is…

☐	☐	☐	☐	☐
Very Underweight	**A Little Underweight**	**About the Right Weight**	**A Little Overweight**	**Very Overweight**

Section 3

Directions: These questions are about what you fed your child.

30. Did you breastfeed your child? Check one.

Yes ❒ No ❒

If No, skip to question #36.

31. If Yes, how old was your child when you stopped breastfeeding? Check one.

❒ under 1 month old

❒ 1 to 2 months old

❒ 3 to 5 months old

❒ 6 months to 1 year

❒ over 1 year old

32. If you stopped breastfeeding before your baby was 6 months old, please tell us why you stopped. Check as many as you like.

❒ I was worried (s)he was not getting enough.

❒ His/her grandmother was worried (s)he was not getting enough.

❒ (S)he wasn't growing fast enough.

❒ (S)he always seemed hungry.

❒ I couldn't make enough milk to satisfy him/her.

❒ My doctor told me I should stop because (s)he had jaundice.

❒ My doctor told me I should stop because (s)he was not growing.

❒ I had to go back to work or school.

❒ Other _____

33. Did you give your child formula regularly in addition to breast milk? Check one.

Yes ❒ No ❒

If No, skip to question #36.

34. If Yes, when did you first start giving him/her formula? Check one.

❒ 0 to 3 months

❒ 4 to 6 months

❒ 7 to 12 months

35. Why did you start giving him/her formula? Check as many as you like.

❒ Wasn't growing fast enough.

❒ Always seemed hungry.

❒ I couldn't make enough milk to satisfy him/her.

❒ My doctor told me I should because (s)he had jaundice.

❒ My doctor told me I should because (s)he was too small.

❒ I had to go back to work or school.

❒ **I wanted other people to be able to feed him/her** ❒ **Other _____**

36. How old was your child when (s)he **started** eating the following foods?

Check one box for each food item. Leave blank if (s)he never ate the food regularly during the first year.

	Baby's Age		
	0-3 Months	**4-6 Months**	**7-12 Months**
Infant Cereal from a bottle At least once a day?			
Infant Cereal from a spoon At least once a day?			
Fruit Juice (from bottle or cup) At least once a day?			
Baby food At least once a day?			
Chopped/ Mashed table food At least once a day?			
Regular table food (same as rest of family) At least once a day?			
Cow's milk (from bottle or cup) At least once a day?			
Kool Aid®, Gatorade®, or Soda Pop At least once a day?			

37. Did a doctor or nurse ever tell you that your child had reflux?

Yes **No**

38. Did you ever change to a different formula because a doctor or nurse told you that your child had reflux?

Yes **No**

39. Did you ever add cereal to your child's bottle because a doctor or nurse told you that your child had reflux?

Yes **No**

40. Did your child give you any of these signs to show (s)he had enough to eat?

Yes	**No**	Falling asleep.	**Yes**	**No**	Slowing down in eating or sucking
Yes	**No**	Spitting the nipple out	**Yes**	**No**	Gagging or spitting up
Yes	**No**	Talking and cooing during feeding	**Yes**	**No**	Crying or getting angry
Yes	**No**	Pushing the bottle or nipple away	**Yes**	**No**	Getting interested in other things

41. Who was your **main** source of information about feeding your child? Check only one.

❒ **My baby's grandmother**

❒ **Other family members**

❒ **Friends**

❒ **WIC nutritionist**

❒ **Doctor**

❒ **Other health care professional**

❒ **Other (please specify)_____**

❒