



Using community-based participatory research to develop healthy retail strategies in Native American-owned convenience stores: The THRIVE study

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ABSTRACT

In rural Native American communities, access to healthy foods is limited and diet-related disparities are significant. Tribally owned and operated convenience stores, small food stores that sell ready-to-eat foods and snacks primarily high in fat and sugar, serve as the primary and, in some areas, the only food stores. The Tribal Health and Resilience in Vulnerable Environments or “THRIVE” study, implemented between 2013 and 2018, is the first healthy retail intervention study implemented in tribally owned and operated convenience stores. THRIVE aims to increase vegetable and fruit intake among Native Americans living within the Chickasaw and Choctaw Nation of Oklahoma. The study comprises three phases: 1) formative research assessing tribal community food environments and associated health outcomes; 2) intervention development to assess convenience stores and tailor healthy retail product, pricing, promotion, and placement strategies; and 3) intervention implementation and evaluation. In this paper we share the participatory research process employed by our tribal-university partnership to develop this healthy retail intervention within the unique contexts of tribal convenience stores. We summarize our methods to engage tribal leaders across diverse health, government, and commerce sectors and adapt and localize intervention strategies that test the ability of tribal nations to increase fruit and vegetable purchasing and consumption among tribal members. Study processes will assist in developing a literature base for policy and environmental strategies that intervene broadly to improve Native community food environments and eliminate diet-related disparities among Native Americans.

1. Introduction

Native Americans experience rates of obesity, diabetes, and hypertension that exceed those of the United States general population (Jernigan et al., 2010). Interventions aimed to improve food environments, including farm-to-school programs and healthy retail interventions in corner stores, are recommended to prevent and control obesity (Khan et al., 2009; Committee on Accelerating Progress in Obesity Prevention, 2012) While many Native communities may be uniquely suited to implement these types of interventions because of their status as sovereign nations, few such interventions have been implemented and tested within Native communities. Historical events have shaped tribal food environments, including the removal and restriction of

Native people to reservations, and the subsequent reliance of Native people on surplus commodity foods provided to them by the US Department of Agriculture (Echo Hawk Consulting, 2015; US Department of Agriculture, 2012). However, the characteristics of Native community food environments and associated correlates remain poorly understood.

Of the limited research that has assessed Native community food environments, most studies have documented the physical environment, including the number and types of food stores, their location, and the foods sold in the stores. Two studies examined the Navajo Nation food environment and found that most areas lacked healthy food options, with fresh fruits and vegetables in poor condition and dramatically varying prices among stores (Pareo-Tubbeh et al., 2000;

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Gittelsohn et al., 2013). A study in California found that Natives had limited access to healthy foods and relied primarily on convenience stores that sold packaged and fried foods (Blue Bird Jernigan et al., 2011). Similarly, studies examining First Nations community food environments report limited availability of healthy food, poor food quality within existing stores, geographic barriers to accessing healthy foods, such as long distances to stores and closure of winter roads, and community members' reliance on convenience stores where few or no healthy foods are available (DyckFehderau et al., 2013; Skinner et al., 2013).

Interventions to improve Native community food environments are scarce. Four interventions, all conducted by Gittelsohn and colleagues, implemented cooking demonstrations and taste tests in grocery stores in First Nations, Inuit, and Native communities in the Southwestern United States and Canada (Gittelsohn et al., 2013; Curran et al., 2005; Ho et al., 2008; Mead et al., 2010). All of the interventions increased knowledge and frequency of healthy food purchasing. One of the trials, the Healthy Navajo Stores Study found that body mass index (BMI) showed a trend toward intervention impact among participants who shopped most frequently at the stores (Gittelsohn et al., 2013). These studies cited a lack of participation by convenience stores as well as a lack of engagement with tribal leaders and policymakers as study limitations.

The THRIVE study is a five-year community-based participatory research study to implement a healthy retail intervention in tribally owned and operated convenience stores and assess its impact on vegetable and fruit intake among Natives. The study, currently underway, is the first healthy retail study to be implemented in tribally owned and operated convenience stores and results will be published in a separate article upon the study's conclusion. In this paper, we share the three-phase consecutive process employed by our tribal-university partnership to design THRIVE and lessons learned as part of this process.

2. Background

2.1. Tribal-university collaboration

This partnership is guided by a participatory research orientation comprising university researchers and tribal health, commerce, and government leaders from the Chickasaw and Choctaw Nations. Approximately 24 partners were involved (12 per Nation), meeting every month. Memoranda of agreements were established at the beginning of the partnership, between the academic institution and both Nations, which included financial agreements as well as research agreements. The tribal Institutional Review Boards (IRBs) oversaw all aspects of the partnership. The study was reviewed and approved by the University of Oklahoma Health Sciences Center, Chickasaw Nation, and Choctaw Nation of Oklahoma IRBs.

2.2. Setting

Convenience stores are defined by the Association for Convenience and Fuel Retailing as retail businesses that provide the public a convenient location to quickly purchase a wide array of consumable products (predominantly food or food and gasoline) and services (Association for Convenience and Fuel Retailing, 2017). The tribal convenience stores in Chickasaw Nation and the Choctaw Nation of Oklahoma are similar to non-tribal convenience stores in size and scope but important differences exist.

First, the stores are not independently owned but owned and operated by the Chickasaw and Choctaw Nations. Chickasaw and Choctaw Nations are among the largest of the > 550 Native American Nations and together make up more than one-quarter of the land mass in the state of Oklahoma. The Nations have a combined population of > 70,000 Native Americans. Both Nations own and operate > 20 convenience stores across the southeastern portion of the state. All

revenue generated from these stores is used for tribal operations and health and social service initiatives. Tribal citizens who shop at the stores, upon showing a Tribal Identification Card, receive discounts on all purchases.

The stores sell widely marketed commercial snack products and have “hot boxes” which contain pre-fried foods that are sold for a quick and hot meal on the go. In addition to these general products the stores also sell tribal foods such as Bedré Chocolates (Bedre Fine Chocolates, 2017), a Chickasaw Nation product, Choctaw Farms Pecans (Choctaw Nation Store, 2017), and local Native art. These items are given priority locations within the stores including end cap spaces (i.e. spaces located at the end of the aisles and highly visible to customers) as well as placed near the cash registers. Unlike non-tribal stores, most or all tribal stores have tables and chairs, casinos, and “smoke shops” where commercial tobacco products are sold without state or county taxes, resulting in significant savings for shoppers. While the average time spent at a non-tribal convenience store is less than five minutes (Association for Convenience and Fuel Retailing, 2017) the additional aspects of the tribal stores encourage patrons to spend more time within these stores.

3. Methods/design

3.1. Phase one: formative research

We assessed perceived food environments, shopping behaviors and vegetable and fruit intake among Native adults living within the Chickasaw and Choctaw Nations. The questionnaire developed by our partnership included measures used in other food environment and food-related studies. Measures from Gustafson et al. (2011) were used to assess participants' perceptions of the availability, variety, quality, and cost of fresh vegetables and fruits in their town and the extent to which cost was a barrier to purchasing these foods. Additional questions measured the frequency of food shopping at six locations: grocery store, Wal-Mart, tribal convenience stores, small markets, Dollar Stores, and farmers' markets. An adapted item based on the USDA definition of food desserts assessed whether participants traveled further than 20 miles round trip to do their grocery shopping. We used Behavioral Risk Factor Surveillance System (BRFSS) measures to assess daily consumption of vegetables and fruits and number of servings of each (Centers for Disease Control and Prevention, 2013). We used items from Boehmer et al.'s (2006) obesogenic environment measures to assess the frequency of meals eaten weekly at three types of food venues: fast food restaurants, convenience stores or gas stations, and restaurants with waiter service. The survey also included self-reported weight and height which were used to calculate BMI and items from BRFSS to assess doctor diagnosed hypertension and diabetes. Sociodemographic characteristics and participation in tribal assistance programs such as Women, Infants, and Children (WIC) and Temporary Aid for Needy Families (TANF) were also assessed.

After pilot testing our survey trained tribal collaborators recruited and screened participants at community locations selected by the partnership including tribal community centers, clinics and community events (e.g. powwows, health fairs). Native men and women, at least 18 years old, and living within the Chickasaw and Choctaw Nations were eligible. Participants provided informed consent and then completed a paper survey or an electronic survey via iPad. Participants received a \$30 gift card for participating. Survey response (91.4%) was excellent and many participants expressed that they were pleased that the Nations were interested in improving the food environments.

3.2. Phase one formative research results

Overall, sociodemographic characteristics of participants were similar across both Nations (data not presented). The majority of participants were women (75%), married or living with a partner (60%), middle aged (mean = 43.8 ± 14.9 years) and had a high school

Table 1

Perceived food environment, shopping behaviors, and vegetable and fruit intake among Native Americans in Oklahoma participating in the THRIVE study, 2013–2018 (N = 513).

	All participants (n = 513)		Nation A (n = 254)	Nation B (n = 259)
	n	%	%	%
Perceived food environment in their town				
Strongly agree/agree that it is easy to purchase fresh fruits and vegetables	501	57	66	48
Strongly agree/agree that there is a large selection of fresh fruits and vegetables	503	43	53	33
Strongly agree/agree that the fruits and vegetables in my town are of high quality	502	35	44	27
Strongly agree/agree that the cost of fruits and vegetables in my town is expensive	503	56	56	57
Strongly agree/agree that the cost of fruits of vegetables in my town has kept from buying them	500	39	38	40
Food shopping behaviors				
Shop for food one or more times per week at a convenience store or gas station	495	65	65	66
Primary food shopping location ^a				
Convenience/Dollar store	490	10	5	16
Grocery store, Walmart, small market, farmers market		16	20	12
Both types of stores		74	75	72
Travel > 20 miles round trip to shop for main groceries	506	56	45	67
Eat one or more meals per week at/from a convenience store or gas station	499	49	50	49
Fruit and vegetable consumption				
Fruit (including 100% fruit juice), meeting or exceeding recommended intake (2+ servings/day)	509	44	52	36
Vegetables (including 100% pure vegetable juice), meeting or exceeding recommended intake (3+ servings/day)	511	25	31	20
Food Insecurity				
In the last 12 months, the food we bought didn't last and we didn't have money to get more	510			
Never true		44	45	42
Sometimes true		38	38	39
Often true		18	17	20

^a About 20 participants shopped monthly at all or many of the stores the survey asked about, which resulted in them primarily shopping nowhere according to our definition. In this case they were reclassified as shopping at both types of stores.

education plus some college or technical school (64%). More than half were low-income (57% with annual household income < \$40,000) and 26% received some type of food assistance. Almost half (49%) reported doctor-diagnosed high blood pressure, 24% reported doctor-diagnosed diabetes, and 55% were obese. The majority of participants did not meet recommended daily intake of vegetables (75%) and 56% did not meet recommended daily intake of fruits (Blue Bird Jernigan et al., 2017).

The participant responses to characteristics of the food environment are presented in Table 1. Few participants reported having access to a large selection (43%) of vegetables and fruits or high quality (35%) vegetables and fruits where they lived and many (56%) reported vegetables and fruits at their nearest store were too expensive. More than half (56%) reported having to travel > 20 miles round trip (i.e., USDA's indicator of food deserts (US Department of Agriculture, 2011)) to get their groceries. Sixty-five percent reported shopping for food at a convenience store one or more times a week and about half (49%) ate at least one meal per week at a convenience store or gas station. Study findings supported partners' interest in developing healthy retail interventions for the tribal stores.

3.3. Phase 2: intervention development

Our partnership used a two-step process to adapt and localize four healthy retail strategies recommended by the Institute of Medicine and Centers for Disease Control and Prevention: 1) increasing availability, variety, and convenience of healthy foods; 2) placement of point of purchase information; 3) promoting, advertising and marketing healthy foods; and 4) reducing healthy foods prices (Khan et al., 2009; Committee on Accelerating Progress in Obesity Prevention, 2012). The first step, food systems mapping, was guided by a conceptual model developed by Rutten et al. (2011) that specifies different food system sectors and their relationships with health outcomes. In this step we assessed the tribal convenience store environments and focused on identifying healthy products to include in the intervention. During the second step, the strategy-tailoring process, we conducted focus groups

with Native convenience store shoppers to better understand shopper preferences, values, and perspectives. Findings from both of these steps allowed us to finalize the intervention.

3.4. Step one: mapping the tribal convenience store food system

Our tribal-university partnership created an adapted version of Glanz et al.'s (2007) Nutrition Environment Measures Survey (NEMS) and used the revised tool, NEMS-Tribal Convenience Stores ("NEMS-TCS"), to systematically review and analyze the nutrition profile of products sold in the tribal stores as well as the placement, pricing, and promotion of those products. Foods included in NEMS-TCS were selected from existing NEMS tools with an emphasis on vegetables and fruits, healthy beverages, and ready-to-eat items, including salads, sandwiches, and "hot box" grab-and-go foods such as French fries and chicken nuggets. We categorized healthier snack options as snacks containing ≤ 200 cal with 35% or fewer calories from fat (except nuts and seeds) and healthier meal options as meals containing ≤ 500 cal with 30% or fewer calories from fat. We also added a domain on tribally sourced and labeled foods.

After piloting and adaptation, trained tribal partners used NEMS-TCS to assess the convenience store environments of both Nations (N = 18 stores, 11 in one Nation and 7 in the other). Using NEMS criteria we calculated scores for each store based on the availability, pricing, quality, and placement of healthier food options establishing a baseline rating of the tribal store environments prior to implementing the intervention. Because few healthy options were sold in the stores, we also reviewed the nutritional profiles of all of the foods available from all of the store vendors to identify foods potentially available to include in the intervention. We generated a final list of healthier options to present to community members for product selection as part of the strategy tailoring process.

3.5. Step 2: strategy tailoring

We conducted focus groups with Native shoppers to effectively

tailor the intervention to consumer preferences and values (N = 12 groups with a total of 83 individuals). Tribal staff recruited focus group participants by posting signs at the tribal stores and advertisements in tribal newspapers. Native adults (≥ 18 years old) who shopped at one of the tribal stores at least three times per week for food were eligible to participate. Different groups were conducted in each of the Nations. Focus groups were led by university and tribal staff and ranged in size from four to 12 participants.

The focus group interview guide was co-developed by university and tribal partners, was informed by the social marketing mix (e.g. product, price, place, and promotion) (Luca and Suggs, 2010), and included discussion topics and hands-on activities. Questions aimed to identify shopping behaviors, perceptions of tribal stores, food and pricing preferences, and perceptions of promotional materials and messages. During each group participants taste-tested the potential intervention foods (e.g. hummus, sandwiches, wraps, salads) and used Turning Point polling software to “vote” for the foods they preferred. They also indicated whether they would buy the tasted foods or a comparison item (i.e. a popular convenience store food) at four different price points: 1) at the tasted items true retail price, 2) with tasted items at the same price as comparison items; 3) with tasted item at a 30% discount; and 4) with tasted items at a 50% discount. Participants used the polling software to evaluate logos, promotional signage, and marketing language under consideration (i.e., “fresh” vs. healthier).

The focus groups were videotaped and transcribed. One university staff member, also a tribal citizen, reviewed and coded the transcripts and assigned variable names based on content. An additional university staff member and two tribal staff independently identified themes associated with text passages, assigned them as variables, and summarized comments within each variable by Nation. Differences in summarization were reviewed and resolved. The analysis was conducted using NVIVO qualitative software (version 9).

3.6. Phase two intervention development results

Findings from phases one and two informed the final intervention product, placement, promotion, and pricing strategies. In order to ensure there would be a sufficient variety of healthier snacks and meals to choose from, as recommended by NEMS guidelines, both Nations aimed to provide a minimum of 10 healthy snack options and 5 healthy meal options that contained fresh vegetables and fruits as a primary focus, with other healthy foods (e.g. low-fat dairy and baked chips) and beverages as secondary foci (Table 2.). The foods were similar across both Nations, however, differences in vendors and other factors yielded distinct interventions. Specifically, Nation A purchased their healthier choices directly from the food distributor. Alternatively, Nation B faced so many procurement barriers to supplying their prioritized foods – fresh wraps, salads, sandwiches, and fruit cups – that they ultimately changed vendor contracts, modified their food preparation processes, and expanded their preparation kitchens so that they could prepare these fresh items “in house” rather than ordering pre-packaged items from vendors.

The final placement, promotion, and pricing strategies are shown in Table 3. Both Nations purchased open-air coolers, which were placed in prominent locations and stocked with healthier options, built display baskets for fresh fruit to be placed in view of store entrances, and were granted permission to use prominent end caps space to stock and display with healthy snacks. Focus group participants wanted to see the tribal store logos on the intervention options and preferred the logos and advertisements that contained the messages of “fresh” and “value” over messages promoting the healthfulness of an item. Participants also prioritized promotional messages and signage in the Native language. Finally, most participants said that they would be willing to purchase the healthier items over the less healthy items ordinarily purchased if the healthier items were priced 30% off retail price.

Table 2
Healthier products included in the THRIVE intervention, 2013–2018^a.

Product	Nation A	Nation B
Snacks		
Fruit	Apples Oranges Bananas Fruit cup quick packs (5 varieties)*	Apples (2 varieties)* Oranges Bananas Fruit cup quick packs (10 varieties)* Apples with dipping sauce (2 varieties)*
Vegetables	Vegetable quick packs (5 varieties) Low fat cheese sticks Yogurt (3 varieties)	Vegetable quick packs (1 variety)* Dill pickles Pickled jalapenos Low fat cheese sticks Yogurt (3 varieties)* Boiled egg quick pack* Quail eggs (pickled) Reduced fat milk (2 varieties)* Almond milk (2 varieties)*
Nutrition bars	11 varieties*	11 varieties*
Nuts/seeds	11 varieties	26 varieties*
Jerky (beef, turkey, and chicken)	3 varieties	16 varieties*
Canned meats	Tuna* Chicken*	Tuna* Chicken*
Beans		Hummus with pretzels (2 varieties)*
Grains	Cereal (2 varieties) Oatmeal (3 varieties)*	Cereal (7 varieties)*
Baked chips/pretzels/ chip alternatives		Kettle chips (5 varieties)* Pretzel chips* Mini pretzels* Popped corn (packaged)* Snap peas (packaged)* Tuna kit (with crackers)*
Meals	Tuna kit (lunch to go with crackers) Salads (3 varieties)	Chicken salad kit (with crackers)* Salads (4 varieties)* Sandwich (3 varieties)* Wraps (4 varieties)*
Beverages	Water V8 (2 varieties)	Water V8 (9 varieties)* Flavored vitamin water (low sugar)* Lemonade (light)

^a Guided by NEMS criteria: ≤ 500 cal and 30% or fewer calories from fat for meals; ≤ 200 cal and 35% or fewer calories from fat for snacks (excluding nuts/seeds).

* New foods not offered at stores prior to the intervention.

3.7. Phase 3: intervention implementation

The THRIVE intervention is now being implemented in a total of eight stores. Using a cluster randomized controlled trial design, two stores were randomized to receive intervention and two other stores allocated to serve as comparison stores, which will not receive the intervention but will benefit from successful elements after the trial's completion. The primary outcome is vegetable and fruit intake. Secondary outcomes such as changes to the store nutrition environments and food purchasing behaviors are also being assessed at both store-level and individual-level changes associated with the intervention. A total of 1640 Native adults are participating in the trial. Process evaluation measures are being collected in both intervention and comparison stores and the tribal commerce divisions of both Nations are providing sales data for all stores. Study methods and outcomes will be described in more detail in subsequent manuscripts.

Table 3
Healthy retail strategies and their implementation in tribal convenience stores in Oklahoma as part of the THRIVE study, 2013–2018^{a,b}.

Strategy	Implementation
Product	<ul style="list-style-type: none"> ● Increased availability, variety, and convenience (i.e., at least 10 new snack choices and 5 new meal choices) ● Packaged vegetable and fruit “quick packs” ● Tribe B expanded kitchen to prepare and serve these items in house
Placement	<ul style="list-style-type: none"> ● Large open air coolers were purchased and placed at store front entrances ● Fried food hot boxes removed and placed behind registers ● Endcap spaces “rented” and stocked with healthy foods
Promotion	<ul style="list-style-type: none"> ● Foods, shelves and coolers labeled ● Promotional signage (e.g., “fresh food destination,” “good and good for you,” etc.) placed above coolers
Pricing	<ul style="list-style-type: none"> ● Combination meal, snack, and bottled water offered at discount prices ● All meals and snacks priced at or below competing foods

^a Guided by NEMS criteria: ≤ 500 cal and 30% or fewer calories from fat for meals; ≤ 200 cal and 35% or fewer calories from fat for snacks (excluding nuts/seeds).

^b Based upon Khan LK, Sobush K, Keener D, et al. *Recommended community strategies and measurements to prevent obesity in the United States*. US Department of Health & Human Services, Centers for Disease Control and Prevention; 2009.

4. Discussion

The THRIVE study is one of few studies that is intervening at the environmental level to address healthy food access within Native communities and the first healthy retail intervention to be implemented within tribally-owned and operated stores. The study is also the first to report an association between food insecurity and chronic disease within Native populations (Blue Bird Jernigan et al., 2017). The participatory research process used to tailor the intervention to the unique contexts of tribal food environments is addressing a number of barriers to healthy eating in Native communities cited by previous research including geographic isolation (Pareo-Tubbeh et al., 2000; Gittelsohn et al., 2013; Blue Bird Jernigan et al., 2011) and reliance on convenience stores that sell poor quality foods (Blue Bird Jernigan et al., 2011; Skinner et al., 2013). Finally, THRIVE is one of few studies within Native communities to intervene across the health, government (policy), and economic sectors to address structural factors influencing Native health outcomes, including tribal procurement, sales, promotion, and pricing of healthier foods, and the engagement of tribal policymakers from the onset to plan for sustainability should the interventions prove effective.

Though study data are still being collected and analyzed, key policy changes have already occurred as a result of the study. First, the process of identifying and prioritizing healthy options for the intervention uncovered key barriers in the procurement processes in both Nations. In lieu of losing tribal contracts, the three primary food distributors supplying the stores expanded healthier options by changing vendors, including the incorporation of a number of local vendors, in order to supply these options. This change not only impacted the types of foods available to the stores but also all tribal programs including elder and childcare programs and tribal hotels and casinos. The change in vendors allowed for more local, frequent deliveries of foods resulting in even fresher foods.

Additionally, in order to establish a baseline measure of purchases for the new intervention foods, the Nations priced all of the healthy items at the suggested retail prices for the first 30 days of the intervention with the plan to lower the price of the items to 30% off suggested retail prices after 30 days. An exception to this plan was the combination meals, which were discounted from the start of the THRIVE intervention. However, after the first 30 days no store in either Nation had to reduce the prices of the healthy intervention foods to

below the suggested retail price as sales data at the 30-day mark showed a steady rate of sales with several of the healthy foods selling out during the course of each week. Though data are still being collected and analyzed, this trend has continued to date and neither Nation has needed to reduce intervention food prices to encourage sales.

Finally, the study fostered dialogue and collaboration, for the first time, between health, commerce, and government sectors within both Nations, building opportunities for greater alignment of tribal economic development and health. Within both Nations the health sectors have already been invited to participate in various commerce and government-led initiatives including the planning for a new grocery store, consultation on the foods stocked in new convenience stores, and a smart phone app to promote culture, language, and (now) health behaviors.

While the THRIVE study may be a useful model for other Native communities wishing to improve their food environments this study has limitations. The study development and implementation processes described are specific to the contexts of the Chickasaw and Choctaw Nations, both of which are not representative of all Native, Indigenous, or First Nations communities. Additionally, the extensive nature of this work in terms of both cost and staff time may be prohibitive to other communities looking to replicate this work within their own settings. Nonetheless, the study is building an evidence base upon which to intervene with Native communities at environmental and policy levels and may provide important information to the > 180 Native communities that own nearly 300 convenience stores across 25 states (Robinson, 2014).

The THRIVE study is successfully implementing an environmental intervention, using a rigorous cluster randomized controlled trial design, and driven by community goals and methods. Study processes and findings are shedding light on the correlates of obesity and chronic disease with food environments in Native communities. The study is offering strategies to engage diverse tribal stakeholders in participatory research and policy work, and the design of multilevel efforts to prevent and control obesity and improve Native community food environments.

Conflict of interest

None of the authors report any conflicts of interest.

Ethics approval and consent to participate

The study was reviewed and approved by the Institutional Review Boards of the University of Oklahoma, Chickasaw Nation, and Choctaw Nation of Oklahoma.

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Authors contributions

Drs. Jernigan, Williams, Wetherill, and Salvatore led the study concept and design and all authors participated in the design and implementation of the study; Dr. Williams, Wetherill, Salvatore, and Noonan led the data analysis and all authors participated in the interpretation of data; Dr. Jernigan led the drafting of the manuscript, and all authors participated in additional drafting and revisions of manuscript. All authors approve of the final version. This work has not been published or presented elsewhere.

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