

Barriers to Achieving Longevity through Diet and Exercise in Rural Communities

Original Research

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Abstract

Introduction: Rural Americans consistently fall short of diet and exercise guidelines. Meeting RDA's and physical activity guidelines can improve health and increase longevity. The purpose of this study was to determine barriers to healthy eating and physical activity in a rural community.

Methods: A cross-sectional survey was administered to a rural community in Spring of 2021. Quantitative data were analyzed using Kendall's tau. Qualitative data were analyzed using thematic analysis.

Results: Quantitative results revealed a negative association between age and healthy eating ($T_b=-.22, p=.001$), income and healthy eating ($T_b=-.17, p=.001$), and a positive association between age and consumption of nuts and seeds ($T_b=.20, p=.001$). Barriers to healthy eating included limited access, diet preferences or restrictions, inconvenience, and safety concerns associated with grocery shopping. Physical activity barriers included lack of time and motivation.

Conclusions: While some variables related to healthy eating and physical activity are non-modifiable (e.g., income, age, sex), others are. Health practitioners have an ethical obligation to mitigate many of these barriers to ensure healthier communities, especially in rural settings. Education, advocacy, policy, and systems changes should target all demographics, irrespective of age, gender, or socioeconomic status.

Key Words: Nutrition, movement, healthy lifestyle factors.

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Introduction

The majority of Americans do not meet recommended dietary allowances (RDA's) or physical activity guidelines.¹⁻³ According to Krebs-Smith et. al.⁴, nearly the entire U.S. population consumes a diet that is not on par with recommendations. More specifically, 88% of Americans do not meet the recommendations for vegetable intake, 85% do not meet the recommendations for fruit intake, 92% do not meet

the recommendations for dairy intake, and 99% do not meet the recommendations for intake of whole grains.⁵ While data on the percentage of rural Americans meeting dietary guidelines is sparse, a recent study of one rural community estimates that 91.3% do not meet fruit intake recommendations while 93.8% do not meet vegetable intake recommendations.⁶ Worldwide, vegetable consumption is 40% below the required 3 servings per day while fruit consumption is 60% below the required 2 servings per day.⁷ To give some context, research indicates that Americans

eat poor quality carbohydrates and consume excessive amounts of saturated fats.⁸ Likewise, Americans consume an excess of calories averaging 3,519 kcal per day compared to global average consumption of 2,940 kcal per day.⁹ Both estimates are significantly above the standard recommendation of 2,000 kcal per day.¹⁰ Equally discouraging, Americans consume approximately 3,400 mg of sodium per day, well above the recommended 2,300 mg per day.¹¹

In addition to dietary intake, physical activity guidelines are unmet by a majority of the population. According to a 2020 study by the Centers for Disease Control and Prevention,¹² 46.3% of Americans do not meet aerobic or muscle strengthening physical activity guidelines. Furthermore, the percentage of adults not meeting these guidelines in rural areas is 80.4%.¹³ Both figures are significantly higher than the global percentage with 28% of adults that do not participate in the recommended 150 minutes of moderate intensity exercise each week necessary to sustain health benefits.¹⁴⁻¹⁶ Adults who have low physical activity have a 20-30% increased risk of death compared with those who are sufficiently active.¹⁶ In addition to 150 minutes of moderate intensity activity each week, 2 days should be devoted to muscle strengthening activities.¹⁷ To maintain health, physical activity should be incorporated into daily life.

Poor dietary habits and limited physical activity are even more prevalent in rural regions of the United States.¹⁸ These unhealthy habits can lead to development of chronic disease and poor quality of life. More specifically, maintaining a balanced diet and incorporating regular physical activity into the daily routine have numerous health benefits, including: psychological benefits (e.g., reduced anxiety, improved cognition, better mood, and enhanced sleep), boosted muscle function, strong bones, healthy hair, skin, and nails, greater immunity, reduced risk of comorbidities (e.g., heart disease, type 2 diabetes, cancer, metabolic syndrome, infectious disease), weight maintenance, and most important to this study, longevity.^{19,20}

In order to address poor diet and limited physical activity among rural communities, objectives of this 4-part study include: 1) administration of a survey to identify barriers to healthy lifestyles, 2) resource website development,²¹ 3) interviews with elderly people in the community about lifestyles and habits, and 4) education on findings in elementary schools. At this point, the resource website has been developed and published,²¹ the survey has been administered, and the results have been analyzed. A portion of the survey results are discussed here. The survey had 4 main components related to the Power 9 identified by Buettner and colleagues²² at National Geographic. The Power 9 are lifestyle factors that centenarians have in common.²² The survey that was administered in 2021 to residents of a rural community in a southeastern state focused on 4 of the Power 9: nutrition, physical activity, rest, and connection. Nutrition and physical activity findings are discussed below while findings related to rest and connection are documented elsewhere. In sum, the goal of the survey was to determine barriers to engaging in healthy eating and physical activity that contribute to living a healthy lifestyle.

Literature Review

Throughout the literature, numerous barriers are identified related to healthy eating and engaging in regular physical activity. Barriers to each lifestyle factor are outlined below. While some of these barriers are modifiable, others are non-modifiable, indicating a need for each to be addressed, whether through patient education, advocacy, or policy change at the systems level.

Barriers to Healthy Eating in Rural Communities

Seguin and colleagues²³ qualitatively assessed barriers to healthy eating for individuals living in rural areas. Barriers included convenience of fast-food options, busy schedule with limited time to cook, expense of healthy food, and the temptation to prepare and eat unhealthy foods. More specifically, parents in rural areas indicated that after work, evenings were spent driving to one sporting event or another. Often, the only opportunity to eat and catch-up was while running through the drive-thru and eating on the go.²³⁻²⁵ In another study, participants perceived healthy food to cost more. To give an example, farmers' markets had limited capacity to accept SNAP benefits. Participants also reported being in the habit of cooking for individuals that labored all day, even if that was no longer the case. Habits

are hard to break. Likewise, many community events offer unhealthy incentives such as church potlucks with fried chicken, mashed potatoes, gravy, and cookies. Minimal effort is made to offer healthier options.^{23,26} Additional barriers identified throughout the literature include: limited access to healthy foods due to prevalence of food deserts in rural areas, inequitable access to transportation to shop for groceries, limited knowledge of available resources (e.g., SNAP benefits), and how to eat healthfully (ie. reading nutrition facts labels).²⁷ Minimal support from family members when adhering to a healthy diet,²⁷ lack of nutrition education, unhealthy food preparation habits, and engrained unhealthy food preferences were also identified as barriers.²⁴ Arcury and colleagues²⁴ further noted that many of the retail outlets available in rural communities are convenience stores with limited fresh produce.

Barriers to Engaging in Regular Physical Activity in Rural Communities

In their qualitative exploration, Seguin and researchers²³ identified time constraints, digital environment, and geographic isolation as barriers to being active. As it pertains to time constraints, participants reported that exercise competed with an already hectic schedule. If physical activity was prioritized, it came at the expense of less time to sleep. With regards to the digital environment, participants indicated that society has become so used to instant gratification for entertainment, whether it be the smartphone, TV, tablet, or computer, that they no longer turn towards activities that require movement.^{23,28} People are more likely to interact with technology than to seek entertainment elsewhere, including outside or at the gym. In regards to isolation, rural environments do not have safe places for individuals to engage in physical activity. Busy highways and limited parks make walking or jogging dangerous.^{23,28} Likewise, other researchers have found that exercise equipment in rural areas tends to be poorly maintained.²⁹ Other researchers note that rural communities may be averse to health education on physical activity from healthcare providers. Tai-Seale and Coleman²⁸ suggest that cultural patterns prefer advice from friends and referent others as opposed to provider recommendations for engaging in both diet and physical activity.

In 2012, Dan Buettner and National Geographic²² partnered to examine regions of the world where individuals lived long, healthy lives. Buettner and colleagues identified 9 lifestyle factors that individuals in these regions exhibited. Two of these lifestyle factors were related to diet and physical activity. The purpose of the present study was to identify barriers to engaging in each of these lifestyle factors for residents of a rural community. Results presented here are a snapshot of the barriers identified in the larger survey, focusing specifically on diet and physical activity. More specifically, the hypotheses listed below reflect non-modifiable barriers to engaging in healthy lifestyle behaviors such as healthy eating and physical activity.

H1: Younger age is associated with physical activity and healthy eating in rural communities.

H2: Female gender is associated with physical activity and healthy eating in rural communities.

H3: Higher income is associated with physical activity and healthy eating in rural communities.

Scientific Methods

This article focuses on the physical activity and nutrition components of the broader study. Upon receiving approval from the Institutional Review Board (IRB) of the authors' institution, questions were populated in a Google Form. The survey was distributed over a period of 2 months in Spring 2021. Participants were recruited through IRB-approved marketing messages via Facebook, Instagram, and email. Participants read an overview of the project and provided informed consent electronically prior to responding. Participants were eligible to participate if they were 18 years or older and a resident of Calloway County, Kentucky. Participants were deemed ineligible to participate if they were under the age of 18 and not a resident of Calloway County, Kentucky. Health status was not a criterion for inclusion or exclusion. Once the window closed, data was downloaded and analyzed by the research team.

Participants

Two hundred and twenty-one participants responded to the survey. Of those participants, 185 met inclusion criteria and were included in the analysis. The mean age of participants was 43 years old (range 19 to 75 years of age). The majority of participants were white (96%), married (66.2%), and female (82.7%). During the time of data collection, February-April of 2021, half of the sample was employed full-time (40 hours or more per week). Table 1: Participant Characteristics summarizes participant demographics.

Table 1: Participant Characteristics (n=185)

Individual-level variables	n	Percent
Gender		
Female	153	82.7
Male	30	1.2
Non-Binary	2	1.1
Race		
White	178	96.2
Asian	4	2.2
Multi-racial/other	3	1.6
Marital Status		
Married	123	66.5
Never married	40	21.6
Divorced/separated	19	10.3
Widowed	3	1.6
Employment Status		
Full-time	95	50
Part-time	78	42.2
Retired	8	4.3
Unemployed, not searching	4	2.2
Unemployed, searching	1	0.5
Annual Household Income		
> \$100,000	65	35.1
\$40,000-59,000	39	21.1
\$80,000-99,000	38	20.6
\$60,000-79,000	26	14
\$0-39,000	17	9.2

Association analyses of demographic indicators showed that age was positively associated with marital status ($T_b=.24$, $p<.001$) and income ($T_b=.12$, $p<.05$). Females were more likely to hold a part-time job compared to males and non-binary participants in this sample.

Protocol

Survey questions were based on the Power 9, lifestyle factors associated with wellbeing established in prior Blue Zones research.²² For this study, diet and physical activity questions were asked in quantitative and qualitative formats. Questions were modified from recent landmark literature. The survey is exploratory in nature. Five questions asked about daily food servings across the 5 food groups (e.g., how many servings of vegetables do you eat each day?) with responses on a scale ranging from none to more than the USDA serving recommendation.¹⁰ In addition, 5 qualitative questions were asked regarding barriers to eating from each of the food groups (e.g., what barriers do you have to eating more vegetables?). Participants could select from a variety of choices while also providing reasons of their own. Choices included: vegetables are expensive, fresh vegetables spoil quickly, I don't know how to prepare vegetables, and it takes too long to prepare vegetables. Likewise, 3 questions asked about beverage consumption, including red wine, a key component of the Blue Zone-approved diet. Similarly, 2 questions asked about overall eating habits and the impact of COVID-19 on eating habits. General definitions of physical activity and exercise were provided in the survey prior to asking participants "do you regularly incorporate physical activity/exercise into your day?" Participants that answered "yes" were directed to select how physical activity/exercise was incorporated daily. Participants that answered "no" were directed to select 1 or more common barriers to physical activity/exercise (e.g., limited time, limited resources, cost, lack of knowledge). Participants could input barriers with the "other" feature. The purpose of the quantitative questions was to identify relationships and patterns and to address the hypotheses. Considering the nominal nature of the scale, (e.g., responses versus actual numerical values of 3 servings per day of vegetables per USDA guidelines),¹⁰ reliability analysis could not be meaningfully determined. These questions were followed by qualitative questions aiming to capture in-depth how participants incorporated physical activity into their daily routine.

Statistical Analysis

A mixed methods design was implemented in the analysis, where both quantitative and qualitative questions were utilized to examine participants' diet and physical activity patterns. Quantitative data were analyzed using descriptive

statistics and Kendall's tau (SPSS v. 25). Researchers used Kendall's tau as opposed to Pearson's correlation coefficient because some variables had continuous, interval, or ratio data. More specifically, some variables were ordinal and thereby grouped in order (e.g., socioeconomic status, employment status, gender, food servings). Therefore, a non-parametric test such as Kendall's tau was warranted. A $p \leq 0.05$ was considered statistically significant. A post-hoc t-test, point biserial model correlation power analysis was performed using *GPower 3.1. Input parameters included a one-tailed test, effect size of 0.3, and an alpha error probability of 0.05. A sample size of 100 was deemed acceptable to meet these parameters.^{30,31} The sample size of 185 in the present study was deemed sufficient for the statistical test utilized.

Qualitative data were analyzed using thematic analysis. The goal was to create “patterns of meaning (p. 297).”³² More specifically, 5 researchers were independently assigned to analyze responses to 2-3 open-ended questions on the survey. Each researcher read the response multiple times and came up with overarching themes. The 5 researchers then met to develop an initial codebook. Once the codebook was formed, the researchers traded responses to 2-3 open-ended questions on the survey. Each researcher followed thematic analysis procedures using the initial codebook. Next, researchers came together to refine the codebook, discussing discrepancies in overarching themes or subthemes. Afterward, a final codebook was developed. The codebook was organized by theme. Themes included: barriers to healthy eating and engaging in physical activity and the impact of COVID-19 on diet and exercise. A total of 31 themes were developed. Five themes were related to healthy eating while 3 themes were related to physical activity. Each theme and subtheme were designed to be mutually exclusive. Therefore, phrases of text were assigned to a theme if the meaning in the text fell within the definition established in the codebook.³²

Results

Barriers to Healthy Eating in Rural Communities

Regarding the first hypothesis examining the associations between age, nutrition, and physical activity, there were 2 relevant findings. There was a significant negative association between age and healthy eating practices ($T_b=-.22$, $p=.003$), while there was a significant positive association between age and servings of nuts and seeds consumed ($T_b=.20$, $p=.008$). There were no significant associations between age and fruit, vegetable, whole grain, or oil intake. Also, there were no significant associations between gender and nutrition.

Regarding the second hypothesis investigating income, nutrition, and physical activity, results showed that higher income was significantly and negatively associated with eating until satisfied ($T_b=-.18$, $p=.013$) and positively associated with eating until your plate is empty ($T_b=.21$, $p=.004$).

In the survey, participants responded to several qualitative questions related to the intake of fruits, vegetables, and whole grains. In addition, questions explored barriers to healthy eating. Participants reported limited access to fresh fruits and vegetables, diet restrictions/preferences, inconvenience of healthy foods, and safety concerns related to COVID-19 as significant barriers. Concerning fruits and vegetables, cost was a factor. So was the quality of available produce at the grocery store. For example, one participant stated that, “Kroger produce doesn’t always look the nicest.” Another participant suggested additional grocery chains were warranted to improve the selection, “we really need a Fresh Thyme or an Aldi or something like them in the community – not another new bank or Fast Pace Urgent Care.” There was consensus that there were few healthy options on restaurant menus as well. One participant expanded on this notion, “we eat vegetables at dinner, unless we order carryout.” Many attempted to eat healthfully but were fearful of contracting COVID-19 while grocery shopping. One participant articulated, “during COVID I have not felt safe shopping...ordering fresh vegetables for pickup has not worked out well at all. We have substituted with frozen and canned vegetables.” When it comes to the grains category, some participants categorized whole grains as “carbs” and therefore considered them to be “bad.” One participant argued, “I am trying to limit my caloric intake and try not to eat too many ‘bread-like’ foods.” Another advocated for a reduced carbohydrate diet, “I try to avoid eating too many grains.” When asked about barriers to eating nuts and seeds, participants reported dietary restrictions (e.g., diverticulitis, food allergies, etc.), dislike, and a low priority to incorporate nuts and seeds in their regular diet. In addition, expense was a limiting factor. Many experienced acute or chronic health conditions that limited the types of foods they could eat. One participant elaborated, “since gallbladder surgery, nuts are hard to digest.” Another mimicked this sentiment, “due to diverticulitis, I eat very little nuts and seeds.” When it came to food preference, several reported a strong dislike, as evidenced by the following statements, “[I] don’t enjoy eating them” and “[I] don’t like the texture.” As for priority, many indicated that other foods take precedence when planning meals and snacks. One participant went so far as to comment, “[nuts and seeds are] not in a handy snack location [at the grocery store].” When asked about barriers to incorporating healthful oils into their daily routine, participants responded in the following ways: limited

knowledge of which oils are healthful, healthful oils are too expensive, limited knowledge related to cooking with oils, and healthful oils are difficult to find. Table 2: Observed Barriers to Healthy Eating provides a summary of this information.

Table 2: Observed Barriers to Healthy Eating

Theme	Descriptors
Access	Lack of access to grocery stores, produce at grocery is not fresh, not many healthy drive-thru options, fresh fruit is not available
Diet restrictions/preference	Intolerance, individuals and/or family do not like fruits and vegetables, prefer other foods
Low priority	Foods such as nuts and seeds are not prioritized in the diet.
Inconvenience	Too much effort to cook, takes too much time to prepare
Safety concerns related to COVID	Distrust of produce in grocery stores, contamination

Barriers to Engaging in Regular Physical Activity in Rural Communities

In response to hypothesis 1, there were no significant associations between age and incorporating physical activity into the daily routine. Likewise, in response to hypothesis 2, there were no significant associations between gender and physical activity.

As for hypothesis 3, higher income was positively associated with some aspects of physical activity (i.e., “leaving the house for any reason including work,” $T_b=.14$, $p=.03$).

Researchers asked qualitative questions about how participants incorporated exercise into their day. The majority of participants said they planned structured exercise daily. Fewer participants indicated that a physically demanding job superseded the need to exercise. In addition, a minority of participants reported walking or biking to work. A limited number of participants engaged in organized or recreational sports. Other means of incorporating physical activity included: exercise classes, stationary bikes, tennis, yoga, working on the farm, parking far away from the destination, and taking the stairs.

Participants were also asked what prevented them from being active on a regular basis. The majority of participants suggested a lack of motivation to exercise and limited time in their schedule. Fewer participants reported the following barriers: inability to establish personal goals and stay on track, exercise was not enjoyable, family obligations competing for time, limited resources like equipment or access to a park or gym, injury or illness, exercise was not convenient, intimidation of others at the gym, lack of confidence in ability to safely engage in physical activity, cost, and lack of knowledge how to initiate an exercise program. Table 3: Observed Barriers to Engaging in Regular Physical Activity provides more information.

Table 3: Observed Barriers to Engaging in Regular Physical Activity

Theme	Descriptors
Limited access	Facilities required to engage in safe physical activity were unavailable in the community (e.g., gym, pool) in addition to inside of the home/or resources were inconvenient for regular use.
Limited time	Family obligations and competing priorities including child-rearing.
Psychological distress	Increased stress secondary to COVID-19 pandemic, decreased motivation to engage in physical activity while isolated, development of depression after prolonged periods of isolation, inability to stick to goals

Findings suggest that increased awareness, education, and policy change are required at the community level in order to make healthy eating and engaging in regular physical activity more achievable, especially for the rural population.

Discussion

Findings from this exploratory study examining the barriers to healthy eating and engaging in regular physical activity among residents in a rural community were enlightening. This section will interpret findings in addition to comparing and contrasting barriers with existing literature.

Barriers to Healthy Eating in Rural Communities

The negative association between age and healthy eating practices suggest there could be generational differences in healthy eating knowledge, habits, preferences, and values. Findings suggest older participants were less likely to have heard about healthful eating practices. For example, in their analysis of Mexican American women, Guendelman and Abrams³³ found older generations to be at greater risk of poor dietary intake.

Findings also highlight the parallel relationship between age and consumption of heart-healthy foods such as nuts and seeds. Contrary to the negative association between age and healthy eating in general, it appears that older participants were more likely to eat additional servings of nuts and seeds compared to younger participants. This may be related to salient concerns for heart health and regular consumption of supplements like fish oil.³⁴ Younger participants may avoid nuts and seeds more than older participants due to costs and allergies. This calls for enhanced education and awareness on the benefits of nuts and seeds as staples in the American diet.

Age and intake of fruits, vegetables, whole grains, and oils were unrelated. Likewise, gender and nutrition were unrelated. Generally, nationally, globally, and especially among rural populations, intake in each of these categories is subpar.¹⁻⁷ While there may be age- and gender-specific barriers to regular consumption from each of these categories, this is beyond the scope of this study. Nutrition education should target all age and gender groups as each could benefit from increased consumption of fruits, vegetables, whole grains, and heart-healthy oils (e.g., olive oil, avocado oil, fish oil, etc.).

When it comes to barriers to healthy eating, participants indicated cost was a factor, especially for purchasing fresh fruits and vegetables. Cost is consistently identified as a major barrier to eating fruits and vegetables in the literature.^{23,25,26} Along that same thread and unique to this study, participants cited poor produce quality at the grocery store as a limiting factor. Additionally, there is consensus in the literature around limited availability of healthy menu options when dining out.^{23,25,26,35} Related to COVID, participants expressed fear of exposure during in-person grocery store trips. This further limited their capacity to secure fresh, safe, healthy food sources. Many participants in this study reported acute or chronic health conditions that limited the types of foods they could eat. Similarly, Niles et al.³⁶ found that participants had concerns about the safety of purchasing foods from a grocery store or receiving them from a delivery driver during the peak of the COVID-19 pandemic.

Barriers to Engaging in Regular Physical Activity in Rural Communities

In contrast to healthy eating, there were no significant associations between age and gender and incorporating physical activity in this study. This may suggest that barriers to engaging in regular physical activity are independent of lifecycle stage and gender.

Contrary to some current literature,³⁷ this study suggests that higher income is directly related to physical activity such that those with more financial resources are more likely to engage in exercise. Higher income is generally associated with higher education.³⁸ Therefore, those with higher education have likely been exposed to the benefits of an active lifestyle and a well-balanced diet. To ensure equity in promoting an active lifestyle, educational materials should be made more accessible to all, regardless of income. Also, an increase in awareness and promotion of existing programs (e.g., SNAP, EFNEP) in the local community would be beneficial. Numerous studies confirm these results.³⁹⁻⁴¹

The majority of participants in this study said they planned structured exercise into their day. This is in contrast to existing literature establishing that most adults do not meet physical activity guidelines.^{13,14} For those that did not report engaging in regular physical activity, there were several barriers identified, some of which are consistent with existing findings. For example, several researchers cited a lack of motivation to exercise and limited time in their schedule as

roadblocks to engaging in exercise.^{23,28,42} Likewise, Seguin et al.²³ and Tai-Seale and Coleman²⁸ found family obligations competed for participants' time and thus impacted their opportunity to engage in regular exercise. These same researchers also identified limited resources like equipment or access to a park or gym to be confounding factors in their ability to engage in physical activity.²³ Moreno and colleagues⁴² found participants to be self-conscious when entering a public gym, which is similar to the perceived intimidation at the gym that participants expressed in the present study. The present study also found a lack of confidence in ability to safely engage in physical activity as an additional barrier. Other researchers have identified safety concerns while using equipment as a barrier. This may go hand-in-hand with a knowledge deficit that was discussed by some participants in regards to how to initiate an exercise program safely.⁴³ Unique to this study is the inability to establish personal goals and stay on track with an exercise regimen.

Personal trainers, health coaches, dietitians, nurses, professional counselors, psychologists, and other healthcare professionals have an opportunity and an ethical responsibility to get residents excited about healthy lifestyle behaviors. It appears that a community-based approach is warranted whereby multiple health disciplines coordinate to support healthy living. Other avenues to inform and engage residents include the community radio and other media outlets as well as community and religious organizations. Based on lessons from the Blue Zones,²² good health and longevity is a communal, daily effort. Therefore, utilizing a community-based approach with a multidisciplinary team of healthcare providers and advocates will provide multiple benefits to overall wellbeing and longevity in the rural community through nutrition and exercise.

In the future, researchers should survey participants in other regions of Kentucky and other states with similar demographics. Additionally, power analysis should be performed a priori to ensure adequate sample size and increase the robustness and significance of the findings. Secondly, reusing the scales and adding established ones would enable researchers to effectively examine and report psychometric properties. Considering that many of the items were nominal in nature (e.g., food servings), reliability tests could not be determined. Some questions on the survey could be altered in future studies. For example, for the questions about income, detail should be provided about the number of people in the household to accurately determine income brackets and assess poverty level. The question about residency in Calloway County did not address length of time in this location; therefore, college students who were only temporary residents of Calloway County may have responded and altered the results. In the question about incorporating physical activity into daily routine, the question should ask further about duration of the activity to determine how much physical activity people are getting each day. Thirdly, there was a very small sample of males, thus, 1 group was underpowered to statistically determine any significant differences. Future studies should increase the sample size of males and other gender and ethnic groups to get a more representative sample. Additionally, it is a goal to gain a more comprehensive look at the local community as well. This survey was administered during the second year of the COVID-19 pandemic, so methods of collecting data were limited. In-person surveys could be conducted and the researchers could visit local organizations and meetings in order to increase participation. Due to the fact that this survey was administered during a pandemic, answers could have been affected. For example, many people responded that the pandemic was a barrier to their healthy eating and activity levels. Now that the peak of the pandemic has passed, results may no longer be generalizable or valid. Findings should be interpreted with caution. A future goal of this research is to administer this survey during a time when the pandemic is less at the forefront.

Conclusions

Results support the notion that engaging in healthy eating practices and regular physical activity is difficult, especially for individuals living in rural communities. Common barriers to healthy eating across this study and others include: ingrained dietary preferences, specialized diet requirements secondary to acute or chronic conditions, and low motivation to incorporate healthy choices. As for barriers to engaging in regular physical activity, time and the perceived psychological distress associated with going to a gym proved to be major setbacks. One barrier was common across both lifestyle habits: limited access. This pertains to inaccessible fresh produce and healthy meal options while dining out and unavailable safe exercise equipment to utilize in the home or broader community. Additionally, motivation and difficulty with goal-setting need to be explored in rural communities, with emphasis on how to improve motivation to eat healthfully, be physically active, and set attainable goals. Findings highlight barriers that community members, stakeholders, healthcare providers, and researchers should work to overcome. Suggested ways to overcome some of these barriers include starting early with educational sessions in elementary, middle, and high schools concerning fruit, vegetable, nut, and healthful oil intake, the importance of moving frequently, and benefits of healthy eating and frequent movement. Subsequently, health campaigns sponsored by local health departments, hospitals, and

clinics could help to raise awareness on the benefits of meeting diet and physical activity guidelines. Another creative avenue suggested by Kegler et al.²⁶ involves utilizing churches to provide support for healthy eating and physical activity in rural communities. Diet and exercise have a direct relationship with health, wellbeing, and longevity.^{15,18-21} It is time to advocate for rural communities so they too can reap the benefits of diet and exercise.

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