Selecting Valid Questionnaires for a Longitudinal Study of African-American College Student Health

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Selecting valid questionnaires for a longitudinal study of
African-American college student health

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Abstract

Purpose: To create a modular public health questionnaire that can be used to conduct longitudinal academic research in the areas of sleep habits, dietary habits, cardiovascular disease risk, and physical activity and sedentary behavior in an African American collegiate population.

Methods: A literature search for questionnaires used in collegiate studies was conducted separately for each category via PubMed. Valid questionnaires were identified and critically reviewed.

Results: Questionnaires recommended for use were the Munich Chronotype Questionnaire, Rate Your Plate Questionnaire, and the International Physical Activity Questionnaire Short Form. For the category of cardiovascular disease risk, no calculators provide a result for individuals under age of 20. It is recommended that for this category, the data required for risk calculation be collected and analyzed as separate variables, and a brief family history of premature cardiovascular disease be collected as well.

Conclusion: We chose categories that are behavioral, and therefore modifiable, and are areas of concern for either college students or African Americans. The data collected using this tool will be used to further the knowledge of African American collegiate health as well as help to shape the behavioral health interventions for this population.

Keywords: health disparities, cardiovascular disease, diet, physical activity, sleep habits, chronotype, social jet lag
Selecting valid questionnaires to incorporate into a longitudinal study of African-American college student health

Purpose

The purpose of this culminating experience project was to create a public health screening tool that can be used to conduct health research in the areas of sleep habits, dietary habits, cardiovascular disease risk, and physical activity and sedentary behavior in an African American collegiate population.

Public Health Significance

Many racial health disparities exist in this country and a primary goal of public health, as a whole, is to decrease these disparities (U.S. Department of Health and Human Services [DHHS], 2014). Public health professionals have worked tirelessly in areas of low income and those with residents of racial minorities in an attempt to decrease the health disparities between these populations and the healthier people within higher socioeconomic classes. One opportunity that public health has yet to take advantage of is the Historically Black College/University (HBCU). At these universities there is a high density of resident African-American students in an environment that would provide public health with a convenient way to access large numbers of young black Americans who are at higher lifetime risk of morbidity and mortality from cardiovascular disease (CVD), diabetes, and other lifestyle-associated diseases (Long, Gracely, Newschaffer, & Liu, 2013). These young African Americans are taking the first steps to establish themselves as independent adults. Providing evidence-based health promotion recommendations and education for HBCU students could help them establish healthier lifestyles during an important stage of their adult lives and have lasting benefit.
The questionnaire created through this Culminating Experience will provide researchers with a tool that is not only based on validated research tools for the conducting of scholarly research, but also a way to determine how to focus future educational efforts aimed at decreasing health disparities. Because the primary goal of a longitudinal study of African American college student health is to improve individual wellness, the study would include individual wellness counseling based on the results from the questionnaire.

Background
Healthy People 2020 defines a health disparity as:

… a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion (DHHS, 2014b).

The differences in health status between African Americans and Caucasians are attributed to more than just race; socioeconomic, cultural, and geographic factors often play a role as well (Wilkinson & Marmot, 2003). A common example of this is the lack of access to healthy food supplies in areas of high-density racial minorities (Ploeg et al., 2009). All of these factors contribute to the higher rate of morbidity and mortality in African Americans compared to Caucasians, especially for diseases and risk factors that are considered behavioral (e.g. cardiovascular disease, type 2 diabetes). According to the Centers for Disease Control and Prevention’s (CDC) National Vital Statistics Report (2013b), life expectancy at birth is four years shorter for black individuals than white individuals, 74.7 years versus 78.8 years,
respectively. According to the most recent National Health Interview Survey (Centers for Disease Control and Prevention [CDC]/National Center for Health Statistics [NCHS], 2013a), 11.8% (95% CI 10.55-13.11) of black adults 18 years or older have been diagnosed with diabetes while only 7.4% (95% CI 6.88-7.89) of white adults have been diagnosed with the disease. And obesity rates between white and black adult are also significantly different: 33.9% of adult black males are classified as obese while only 27.7% of white males are obese. And the difference is even greater among females, with 38% of black women classified as obese and only 24.7% of white women in the same category (CDC/NCHS, 2013b). One of the four overarching goals of Healthy People 2020 is to “achieve health equity, eliminate disparities, and improve the health of all groups” (DHHS, 2014a). Health disparities are complex issues that are affected by many factors at the same time, and in order to decrease these disparities, all of those areas must be addressed. This work focuses on behavioral determinants of health, their effect on the health status of an individual, and the most effective ways to assess and improve these determinants. Because lifestyle-associated chronic diseases develop over time, the prevention of these diseases is predicated on the earliest possible detection of risk factors in individuals without the disease. Therefore, a fruitful environment to detect these risk factors is HBCUs. Despite the increased risk of African Americans, there has been limited research done in this environment (Bronner & Gary, 2014), and lack of infrastructure and poor financial resources have limited success in behavioral change (Howard, Boyd, Kalsbeek, & Godley, 2010). The conducting of academic research at the college level could not only provide public health and health care providers with more information for this high risk population, with the proper screening tools, it could also serve as the first line of detection for chronic disease risk. Therefore, it could be the first place
for interventions to prevent these life changing diseases, decreasing morbidity and mortality associated with these diseases and racial health disparities.

There are many behaviors that affect human health. Commonly studied behaviors include diet and physical activity, as well as cardiovascular disease risk and sleep habits. While there are many behavioral determinants of health, these four categories have been selected for the creation of this survey because of their behavioral nature and therefore the ability for individuals to make changes in these habits. Getting the appropriate amount of sleep is important for many reasons. First, inadequate sleep results in excess daytime drowsiness, which in college students not only affects their health but also their academic performance (Haraszti, Ella, Gyöngyösi, Roenneberg, & Káldi, 2014; Wald, Muennig, O’Connell, & Garber, 2014). Also, sleep patterns have been implicated in the expression of individual stress (Dinges et al., 1997), hormonal obesogenicity (Al-Hazzaa, 2014; Park, You, & Chang, 2013), and in mental health issues that plague individuals with chronic illness (Liu et al., 2013). Cardiovascular disease is more common in populations older than college students. However, early detection of the risk factors of these diseases is paramount in their prevention (Strong, Malcom, Oalmann, & Wissler, 1997), so the ability to assess these risk factors in seemingly healthy college students could be the first step in preventing these chronic diseases. Physical activity and sedentary behavior are closely related and often studied together. Physical activity has been shown to decrease risk factors for many diseases, including CVDs (CDC, 2011; Ekelund et al., 2012), and sedentary behavior, like watching TV or in the case of college students reading a textbook or working on a computer, is associated with lower amounts of physical activity (Buman et al., 2014). According to the National Health Interview Survey (CDC/NCHS, 2013a), only 20.8% of adults met the federally recommended amount of physical activity in 2011. Lastly, diet is the
other half of the “calories in versus calories out” equation that determines a person’s weight gain or loss. But not only is the number of calories important, their quality affects a person’s health as well (Kant, Schatzkin, Graubard, & Schairer, 2000). Healthy People 2020 includes goals to increase the contribution of both fruits and vegetables to diets, and increasing vegetable consumption is considered to be a leading health indicator. And in all categories, there is a general lack of information specific to African-American college students. It is important to study this population so that interventions for these high-risk individuals are based on data specific to that population. It is also important to involve them in their own health, especially at this impressionable time in their lives.

Methods

A literature review was performed to find validated screening surveys for evaluation in each of four categories: sleep habits, cardiovascular disease risk, physical activity and sedentary behavior, and dietary habits. Surveys were subjectively evaluated based on their ability to measure the desired variable, length of time needed to complete the survey, and ease of use for the study participant and the researcher. Table 1 shows the criteria used to evaluate the surveys and the positive characteristics within each criterion.

Table 1

Criteria for Evaluation

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Positive characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to measure variable</td>
<td>• Evidence-based</td>
</tr>
<tr>
<td></td>
<td>• Known association with health behavior</td>
</tr>
<tr>
<td>Time needed to complete</td>
<td>• As short as possible while maintaining the ability to measure the desired variable</td>
</tr>
<tr>
<td>Ease of use</td>
<td>• Minimal literacy/numeracy needed by participant</td>
</tr>
<tr>
<td></td>
<td>• Result given as single number</td>
</tr>
<tr>
<td></td>
<td>• Result categorized</td>
</tr>
</tbody>
</table>
Each category was evaluated separately. The goal of this project is to create a tool that can be used for future studies done at HBCUs in the United States, so each survey selected was combined to make a single research tool to be used for these studies.

The first category evaluated was sleep habits. The search terms college OR university AND sleep AND habits AND academic performance were used in PubMed. The search returned 31 articles when limited to the last ten years. Of these, 17 were found to be relevant to this project. Among these articles, five different questionnaires were identified: the Epworth Sleepiness Scale (Johns, 1991), Athens Insomnia Scale (Soldatos, Dikeos, & Paparrigopoulos, 2000), School Sleep Habits Survey (Wolfson & Carskadon, 1998), Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), Horne-Ostberg Morningness-Eveningness Questionnaire (Horne & Ostberg, 1976), and the Munich Chronotype Questionnaire (Roenneberg, Wirz-Justice, & Merrow, 2003).

Questionnaires for evaluating diet were identified using three PubMed searches. The key words questionnaire AND college were used in all searches, and all searches were limited to publish dates within the last five years. The first search also included the term diet, the second included the term food, and the third included the terms eating habits. The first search identified two tools, the Food Frequency Questionnaire (FFQ) (Block et al., 1986; Willett et al., 1985) and the Healthy Eating Index (HEI) (Guenther et al., 2013). The second search also found many articles based on FFQ data, but no more tools were identified through this search. The third search identified one additional tool, the Rate Your Plate (RYP) survey (Gans, Hixson, Eaton, & Lasater, 2000).

The calculation of cardiovascular disease risk is something that has been studied for many decades, and numerous CVD risk calculators have been created based on populations all
across the world (National Vascular Disease Prevention Alliance, 2012; Partners HealthCare System, n.d.; Payne, 2010). For that reason, it was necessary to create more stringent inclusion criteria for this category. Since CVD risk calculators are derived from data from longitudinal epidemiological studies, it was decided that our CVD risk calculator should be one created from data collected in the United States, since that would be most representative of the population being studied. While none of the risk calculators are specific to African Americans, calculators created from American data are the most representative alternative. The other criterion was that the tool must calculate overall cardiovascular disease risk, not only coronary heart disease (CHD) risk (Wilson et al., 1998). With these requirements, a search of PubMed was conducted to identify CVD risk calculators using the search terms cardiovascular disease risk calculators. From this, three American CVD risk calculators were identified: the Reynolds Risk Score (Ridker, Buring, Rifai, & Cook, 2007; Ridker, Paynter, Rifai, Gaziano, & Cook, 2008), Framingham Heart Study CVD Risk Calculator (Wilson, Castelli, & Kannel, 1987), and American Heart Association CVD Risk calculator (Muntner et al., 2014).

A PubMed search using the key words physical AND activity AND questionnaire AND college and limited to results within the last five years was conducted. The results of this search indicated that the International Physical Activity Questionnaire (Craig et al., 2003) was used in almost all of the literature. A Google search was then conducted to identify more tools. As with the cardiovascular disease risk calculators, there were numerous tools for collecting physical activity data found via this search. This again made the creation of more exclusion criteria necessary. The study in which this tool is to be used will only include a single encounter with the participant, there will not be the opportunity to give them any type of physical activity log and then collect it later. Therefore, no tools that included logging physical activity for any
amount of time were included. Any questionnaires that do not include a self-administered version were also excluded.

The PubMed search identified five tools: the International Physical Activity Questionnaire (Craig et al., 2003), CHAMPS Physical Activity Questionnaire (Giles & Marshall, 2009), 7-day Physical Activity Recall Questionnaire (Sallis et al., 1985), College Alumnus Physical Activity Questionnaire (Paffenbarger, Wing, & Hyde, 1978), and the Yale Physical Activity Survey (Dipietro, Caspersen, Ostfeld, & Nadel, 1993). Of these five, the 7-day Physical Activity Recall Questionnaire and Yale Physical Activity Survey were excluded because neither have a self-administered version. The Google search of the same key words produced four additional results not found in the PubMed search: the Aerobic Center Longitudinal Study Physical Activity Questionnaire (Kohl, Blair, Paffenbarger, Macera, & Kronenfeld, 1988), CARDIA Physical Activity History Questionnaire (Jacobs, Ainsworth, Hartman, & Leon, 1993), Framingham Physical Activity Index (Dannenberg, Keller, Wilson, & Castelli, 1989), and Minnesota Leisure-Time Physical Activity Questionnaire (Wilbur, Holm, & Dan, 1993). Both the Framingham Physical Activity Index and the Minnesota Leisure-time Physical Activity Questionnaires are interviewer-administered and were therefore excluded. The six tools included in the evaluation were therefore International Physical Activity Questionnaire, CHAMPS Physical Activity Questionnaire, 7-day Physical Activity Recall Questionnaire, College Alumnus Physical Activity Questionnaire, Aerobic Center Longitudinal Study Physical Activity Questionnaire, and CARDIA Physical Activity History Questionnaire.
Literature Review

Sleep

Sleep is an area of particular interest in the collegiate population because of the tendency for college students to have such poor sleep habits. The need to study and wake up early for class, coupled with a tendency towards evening preference means the sleeping habits of college students often fall short the recommended 9 to 10 hours of sleep for teens and 7 to 8 hours for all other adults (Wald et al., 2014; CDC, 2014). Another prominent problem is discrepancies between weekday sleep times when students wake up earlier due to their class schedule, versus weekends, when students tend to sleep later to make up for weekday sleep debt accumulated Monday through Friday and stay out late on weekend nights. It is important to assess the sleep habits of college students and develop ways to improve these habits so that students can be more successful academically, healthier physically, and set up for post-collegiate success.

Epworth Sleepiness Scale.

The Epworth Sleepiness Scale (ESS) was created for use in clinical settings to identify patients with potential sleep disorder (e.g., obstructive sleep apnea, narcolepsy) for further testing (Johns, 1991). The ESS measures daytime sleepiness by asking the participant to rate on a four-point scale (0-3) their likelihood of dozing in eight situations (Johns, 1991). The eight situations differ in somnificity (sleep inducing potential). The score is the sum of the ratings for each of the eight situations and ranges from zero to twenty-four. A score of ten or above is considered to be clinically significant daytime sleepiness, requiring further tests. The score for each of the eight situations is considered that situation’s specific sleep propensity for that individual, and the total score is considered a participant’s average sleep propensity (Johns, n.d.).
The ESS measures only daytime sleepiness, and gives no specific data about sleep quality, quantity, or habits. While excess daytime sleepiness is associated with poor sleep quality and quantity, the ESS is a proxy that measures neither. When used for research purposes, the ESS is often paired with another survey that provides the researcher with specific information about the participant’s sleep habits (e.g. Pittsburgh Sleep Quality Index). The ESS is used solely to place individuals into dichotomous categories of excess daytime sleepiness or no excess daytime sleepiness, usually for the purposes of assessing correlation between daytime sleepiness and an outcome variable of interest. Content validity was tested using self-reported problem sleepiness and mean sleep latency as criterion. The ESS score was found to be significantly correlated with problem sleepiness, but not mean sleep latency, although it is suggested that daytime sleepiness and sleep latency could be two independently related, complimentary components of sleep. ESS scores were also found to be reliable in test-retest evaluation (r=0.82) (Johns, 1991). This survey is easy to use for both the participant and researcher because it is only eight questions long and requires only basic addition to calculate the score. Completion time is estimated as less than five minutes (Johns, n.d.). It can easily be used in either digital form for computer surveys or in a paper form. However, the ESS does not provide specific sleep habit data like average sleep duration, sleep latency, or sleep midpoint. The ESS is meant to be a fast tool for assessing the possibility of clinical sleep disorders, and while its greatest advantage is its speed and ease, that is also its greatest disadvantage, since very little data is collected.

**Athens Insomnia Scale.**

The Athens Insomnia Scale (AIS) was created specifically based on International Statistical Classification of Diseases and Related Health Problems’ Classification of Mental and Behavioural Disorders (ICD-10) criteria for insomnia (Soldatos et al., 2000). This means that its
utility for research purposes was not the focus, which is evident in the information that it provides. The AIS measures only the likelihood of a person having insomnia.

The AIS has two versions, the full eight-item version (AIS-8, score range 0-24) and the shorter five-item version (AIS-5, score range 0-15). Both surveys ask the participant five questions about sleep characteristics over at least the past 30 days (Gomez-Benito, Ruiz, & Guilera, 2010), like sleep duration and night awakenings. The AIS-8 asks three additional questions about daytime symptoms of poor sleep, like daytime sleepiness and daytime functioning (Soldatos et al., 2000). Like the ESS, the AIS asks participants to rate their responses on a scale of 0-3 with a score of ten or above being clinically significant (for the AIS-8). Content validity was only tested against the Sleep Problems Scale (correlation coefficient 0.9 for AIS-8 and 0.85 for AIS-5). The AIS is also subjective in the way it asks questions. For example, question two asks the participant to rate how much of a problem awakening during the night is for them, with 0 meaning “no problem” and four meaning “serious problem or did not sleep at all,” rather than a more objective measure like the number of times the individual wakes up during an average night. This adds subjectivity, since two people who awaken the same number of times during the night can rate whether or not they think that is a problem differently.

The AIS also provides no data specific to sleep habits; instead it only indicates if a patient requires further testing. While it is also short and easy to use for both participant and researcher, it too takes less than five minutes to complete (Soldatos et al., 2000); it also provides no data specific to the individual’s sleep.

**School Sleeps Habits Survey.**

The School Sleep Habits Survey (SSHS) was created in 1994 by researchers at the Bradley Hospital/Brown University Sleep Research Lab (Wolfson & Carskadon, 1998)
specifically to study the sleep habits of high school students. While the SSHS provides large amounts of information, many characteristics of the survey make it difficult to use for a college sample. The first issue is the length of the survey. The SSHS contains 63 items, many that have multiple parts, and takes approximately 20 minutes to complete (Wolfson & Carskadon, 1998). Second is that the survey is made specifically for fourth through twelfth grade students, not collegiate students, and would need to be modified for a college study group to remove options like ‘my parents have set my bedtime’. The SSHS has multiple sections, including sleep behavior, depressive mood symptoms, and chronotype, each of which is analyzed separately. Each section is a previously validated assessment instrument of the variable being measured.

This survey measures both subjectively and objectively, depending on the section. For example, the sleep habit section asks participants what time they go to bed and wake up (objective), but the chronotype section asks them when they would prefer to do certain activities (subjective). Nonetheless, this survey has numerous advantages. First and foremost, with 63 items it gathers a large amount of information about actual sleep and wake habits, sleep quality, depression, parent demographics, academic performance, and substance use (Wolfson & Carskadon, 1998). It can be administered either in a digital or paper version. This survey is more difficult for participants due to its length and for researchers because of the necessary adaptation for use in a college population.

**Pittsburgh Sleep Quality Index.**

The Pittsburgh Sleep Quality Index (PSQI) is a commonly used tool for measuring sleep quality (Buysse et al., 1989). It contains 10 items combined to create seven component scores; subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction (Buysse et al., 1989). Each
section is scored separately and summed to create the total score (range 0-21). The PSQI asks
the participant to respond based on their actual behavior within the last month. Also, while it
was created to specifically measure sleep quality, it asks participants when they go to sleep and
when they wake up, so sleep duration can be calculated. The survey takes less than five minutes
to finish, and a simple key is provided to score the survey (Buysse et al., 1989). With the key
provided by the authors, scoring is not difficult either. The PSQI measures sleep quality and also
provides limited data on sleep duration.

**Horne-Ostberg Morningness-Eveningness Questionnaire.**

The Horne-Ostberg Morningness-Eveningness Questionnaire (MEQ) has been used to
determine a person’s time of peak alertness (chronotype) since 1976 (Horne & Ostberg, 1976).
It is composed of 19 items with four to six options, each corresponding with a point value that is
summed to calculate the individual’s total score (range 16-86). Based on this score, the
individual is placed into one of five chronotype categories; definite morning, moderate morning,
intermediate, moderate evening, and definite evening person (Horne & Ostberg, 1976). This
questionnaire is also subjective. The MEQ asks participants to respond to a hypothetical
situation (if they had no commitments), rather than actual behavior. The MEQ was designed this
way to determine the participant’s biological preference without the outside influence of social
or work-related schedules. However, this means that it provides only a biological morningness
or eveningness preference, rather than data for sleep duration, quality, or differences between
weekdays and weekends. The MEQ was originally validated in a student population using peak
oral temperature to determine cut-off points for each chronotype. Later examination by Taillard,
Philip, Chastang, and Bioulac (2004) found that the original cut-off points were not valid in an
older, working population, and suggested new cut-off scores for each chronotype in non-student
populations. For use in a study of African-American college students, to original cut-off scores suggested by Horne and Ostberg (1976) will be used.

**Munich Chronotype Questionnaire.**

The Munich Chronotype Questionnaire (Roenneberg et al., 2003) measures what its creators termed “social jet lag,” which sets it apart from any other questionnaire available. The authors explain that through industrialization and the “normal” business hours of 9:00am to 5:00pm, humans have forced themselves into a morning preference, though not all humans are suited for that schedule. Because of this, genetic evening types who tend to go to bed later build considerable sleep debt throughout the week, and believe they can “make up” for this by sleeping later on free days. This difference between sleep midpoints during the week versus the weekend spurred researchers to create a questionnaire to measure this difference. The questionnaire asks participants objective questions about when they actually go to sleep and when they wake. It also asks about alarm clock use, sun exposure, medication use, and tobacco and alcohol use. The questionnaire places individuals into one of seven chronotype categories and also provides the degree of social jet lag that the person experiences (Roenneberg et al., 2003). The questionnaire is short and computer-based, making it easy to take, however, the complicated algorithms used to calculate sleep debt and social jet lag require analysis by the team that created the questionnaire in order to obtain data for these variables, which does involve a fee. This is part of the agreement when obtaining permission to use the instrument. This questionnaire is unique in its ability to assess social jet lag, a variable that is becoming of interest among sleep physicians and researchers (de Souza & Hidalgo, 2014; Foster et al., 2013, Haraszti et al., 2014).
Selection and reasoning.

Research has repeatedly shown that maintaining a consistent pattern of sleep (going to bed and waking up at about the same time every day) has greater effect on indicators like daytime sleepiness and academic performance than sleep duration (Genzel et al., 2013; Haraszti et al., 2014). Our goal is to be able to confirm these findings in African-American undergraduate students by evaluating both average sleep midpoint and sleep duration. The Epworth Sleepiness Scale is a clinical instrument that measures only daytime sleepiness. It collects no data on either sleep duration or weekday versus weekend sleep habits. The Athens Insomnia Scale is similar to the ESS in that it is primarily a clinical instrument, but it instead measures the likelihood of having insomnia. It also collects no data on sleep duration or weekday versus weekend habits. The School Sleep habits Survey collects large amounts of data, however, some of that data (depressive mood scale) is outside of the scope of our research. It would also require significant question modification to be used in a collegiate population and is too long for our use (completion time 15-20 minutes). The Pittsburgh Sleep Quality Index has the ability to measure sleep duration, and includes the ability to measure sleep quality. However, it cannot measure any difference between weekday and weekend sleep habits. The Horne-Ostberg Morningness-Eveningness Questionnaire measures only biological time preference, or chronotype. It does not measure any sleep behavior. The Munich Chronotype Questionnaire measures many things, including chronotype, sleep duration (both during the week and on the weekend), sleep latency, and social jet lag. Because it is the only questionnaire that can measure both sleep duration and differences in sleep patterns between weekdays and weekend days, it is recommended that the Munich Chronotype Questionnaire be used for the research. Table 2 summarizes the sleep questionnaires and why they were selected, or not.
Table 2

**Summary of Sleep Questionnaires**

<table>
<thead>
<tr>
<th>Name</th>
<th>Selected (yes/no)</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epworth Sleepiness Scale</td>
<td>No</td>
<td>• Only measures daytime sleepiness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Created to be a clinical tool</td>
</tr>
<tr>
<td>Athens Insomnia Scale</td>
<td>No</td>
<td>• Only measures likelihood of having insomnia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Created to be a clinical tool</td>
</tr>
<tr>
<td>School Sleep Habits Survey</td>
<td>No</td>
<td>• Length (completion time ~15-20 mins.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Needs significant modification</td>
</tr>
<tr>
<td>Pittsburgh Sleep Quality Index</td>
<td>No</td>
<td>• Does not measure difference in sleep between week days and weekend days</td>
</tr>
<tr>
<td>Horne-Ostberg Morningness Eveningness Questionnaire</td>
<td>No</td>
<td>• Only measures chronotype</td>
</tr>
<tr>
<td>Munich Chronotype Questionnaire</td>
<td>Yes</td>
<td>• Provides data for both sleep duration and social jet lag</td>
</tr>
</tbody>
</table>

**Diet**

**Food Frequency Questionnaire.**

There were only three potential diet assessment tools identified through the literature search. This is because a majority of researchers use a version of the Food Frequency Questionnaire (FFQ) (Block et al., 1986; Willett et al., 1985). There are many forms of the FFQ; the Block FFQ and Harvard FFQ are examples of commonly used FFQs and some are even computer-based graphical versions (Kristal et al., 2013). Each assesses dietary habits by asking with what frequency various food items are eaten. The length of the FFQ varies greatly depending on the goal of the researcher. Most range from at least 20 food items (Dunn et al., 2011; Nucci et al., 2013) to over one hundred (Pandey, Bhatia, Boddula, Singh, & Bhatia, 2005; Nath & Huffman, 2005). The shorter versions are used to evaluate intake of specific nutrients, such as studying taurine intake in college students (Park et al., 2013). The longer versions seek
to obtain a more complete picture of a participant’s food intake. Some versions are also semi-quantitative. That is, they ask participants to indicate the usual portion size of the food items that they have eaten in order to calculate an estimate of intake of both calories and nutrients. Two very well-known versions of the FFQ are the Block and Harvard FFQs. Both of these versions are semi-quantitative and are designed to gather detailed information on the overall diet of the individual. In order to do this, both contain well over 100 food items (Block et al., 1986; Willet et al., 1985). This length is the most negative feature of the food frequency questionnaire. Responding to all the items, each with multiple parts can take over 30 minutes. There is also evidence that suggests that correct reporting on FFQs could be highly biased. Multiple studies have found underreporting of total energy intake, likely due to participants underreporting the frequency with which they ate or serving size of food items that they know to be high in calories or “unhealthy,” and overreporting of foods that are eaten highly infrequently and foods known to be healthy choices (Bingham et al., 2003; Lietz, Barton, Longbottom, & Anderson 2002; Subar et al., 2003). FFQ’s have been found to be effective at ranking groups of study participants, but when determining absolute intake in individuals, it is less accurate (Lietz et al., 2002).

**Healthy Eating Index.**

Another tool for assessing dietary habits is the Healthy Eating Index (HEI-2010) (U.S. Department of Agriculture, 1995). The latest update to the HEI occurred in 2010. The HEI is a measure of diet quality that rates a participant’s conformance to federal dietary guidelines in the United States. It is a scoring metric that can be used to assess any defined group of foods. It contains nine adequacy categories in which it rates whether the individual has eaten enough of foods considered to be healthy, and three moderation categories in which it rates how well they have limited intake of foods that are considered to be unhealthy (Guenther et al., 2013). The
maximum score for the metric is 100. The HEI is not a questionnaire, it is simply a metric used to evaluate the quality of a group of foods. In order to use this index, a group of foods must be known, either by using a food diary or a food recall interview.

**Rate Your Plate Questionnaire.**

The final tool identified by the literature search is a recent instrument called the Rate Your Plate (RYP) questionnaire (Vargas & Zelis, 2014). The RYP questionnaire is a simplified 27-item version of the FFQ and focuses on food items that contribute the most fat, saturated fat, and cholesterol to the American diet (Gans et al., 2000). Each item has three response options (score 1-3), with three being the healthiest option of the group. The sum of the item scores determines the participant’s total score (range 25-75), which is then used to place them in one of three categories. The first category (score 60-75) includes individuals making the healthiest choices. The next category (score 40-59) includes individuals that could make some changes to their diet in order to improve their health. The final category (score 25-39) includes individuals who would need to make significant changes to their diet in order to have healthy eating habits (Vargas & Zelis, 2014). This tool also includes a goal setting section that is intended to help the participant improve their diet in the future.

**Selection and reasoning.**

Our goal for the diet portion of the questionnaire is to categorize participants based on (excess) calorie intake. While additional information on fruit and vegetable intake is of interest, it is not the primary focus of our study. The FFQ is a common way to assess eating habits. It was used by far the most of the three instruments in the articles retrieved by the literature search. The full 100 plus item versions collect large amounts of data and would be able to both categorize participants based on excess calorie intake and provide data on fruit and vegetable
intake. If we were only collecting data on participant’s diet, this length would be acceptable. However, since we are combining this questionnaire with others to create an overall behavioral health profile, this FFQ is too long for our purposes. The HEI-2010 uses the most recent federal guidelines as its benchmark, and can be used to determine if participants meet federal guidelines for fruit and vegetable intake. It can categorize participants based on overall diet quality, but not excess calorie intake. More importantly, the HEI requires a specific food intake inventory, which would require use of either a food diary or recall interview to determine exactly what the participant ate over a specific period of time. Since our study includes only one encounter with the participants, all of the instruments chosen for our study must be retrospective, self-administered questionnaires. This means the HEI-2010, despite its advantages, cannot be used.

The Rate Your Plate questionnaire does not provide as much detail as either the HEI-2010 or the Block or Harvard versions of the FFQ. It does not determine if the person has met the federal standard for a healthy diet, nor does it document the participant’s intake of fruits and vegetables. However, it compromises detail for length by focusing on foods that contribute the most excess fat and calories to the American diet (Gans et al., 2000). It also gives results as a total score and puts that score into a category, so the results can be analyzed using either the continuous variable of the participant’s item total or the categorical variable of their score category. Because of its retrospective nature, shorter length, and focus on excess calorie intake, the Rate Your Plate questionnaire is recommended as the diet assessment instrument for our study’s modular questionnaire. Table 3 summarizes the reasons for selecting, or not selecting, diet questionnaires.
Table 3

Summary of Diet Questionnaires

<table>
<thead>
<tr>
<th>Name</th>
<th>Selected (yes/no)</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Frequency Questionnaire</td>
<td>No</td>
<td>• Length (over 100 items)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time to complete greater than 20 min.</td>
</tr>
<tr>
<td>Healthy Eating Index</td>
<td>No</td>
<td>• Requires either food diary or recall interview</td>
</tr>
<tr>
<td>Rate Your Plate Questionnaire</td>
<td>Yes</td>
<td>• Appropriate length (25 items)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Focus on foods that contribute most calories &amp; fat to American diet</td>
</tr>
</tbody>
</table>

Cardiovascular Disease

Cardiovascular disease risk calculators are very different from the other questionnaires being used because they require data from laboratory blood tests. All three of the identified calculators require cholesterol and blood pressure data, and the Reynolds Risk Score also requires a high sensitivity C-reactive protein test value as well. While objective data is usually less biased than self-report questionnaires, it also requires more resources, since it will be necessary to have staff with the training needed to use the instruments required to obtain these values. It has also been found that different risk calculators can give significantly different results based on the same input variables (e.g. for the same person), so using the same risk calculator is important, since comparison of risk estimates across multiple calculators is not reliable (Allan et al., 2013). While this is especially important for physicians using these calculators as tools for a patient’s clinical assessment, it is also important in public health research and wellness counseling.

The risk calculators were created using data from large epidemiological studies of American adults. College students were not included in these epidemiological studies. Because
of this, many calculators do not give results for individuals below a certain age (often age 20).
Because most college students in our study will be under the age of 20, this is a serious obstacle
for our research. These problems, and their possible solutions, are discussed below.

**Framingham Risk Calculator.**

In the literature search, by far the most commonly used risk calculator is the Framingham
Risk Calculator. Even the National Institutes of Health (NIH) use this calculator (DHHS,
National Institutes of Health, National Heart, Blood, and Lung Institute, 2013). The equation
used to assess risk for this calculator was derived from data collected from the Framingham
Heart Study (Wilson et al., 1987). The Framingham Heart Study is now in its third generation:
as it has grown and added data, the calculator has been modified to reflect the latest findings. In
its current form, the calculator requires seven pieces of data: age, gender, total cholesterol, HDL
cholesterol, systolic blood pressure, whether or not the individual smokes, and whether or not the
individual takes medication for high blood pressure. This calculator is not meant for use by
anyone with type II diabetes. The result from this calculator is given as the percentage chance of
having a heart attack in the next ten years. The minimum age for this calculator is 20 years of
age. Because this calculator gives only ten-year heart attack risk and will not provide results for
any individual under 20, it cannot be used for our study.

**Reynolds Risk Score.**

The Reynolds Risk Score is a newer calculator that was created to incorporate a partial
family history and C-reactive protein value into a CVD risk calculator. Ridker, Paynter, Rifai,
Gaziano, and Cook (2008) stated that C-reactive protein and family history are independently
associated with future cardiac events, but that no cardiovascular risk prediction algorithm
incorporating these indicators existed. To create the calculator they followed two cohorts
(24,558 women and 10,724 men) for ten years. The participants were all 45 years or older, so this calculator can only be used for individuals between the ages of 45 and 80 (Ridker et al., 2007). If the person is under the age of 45, the calculator will give the risk results for a 45-year-old individual with all of the same values. This calculator is also not meant for use by people with type II diabetes. Unlike the Framingham Risk Score, the results are given as the individual’s percentage chance of having a “heart attack, stroke, or other major heart disease in the next 10 years,” (Partners HealthCare System, n.d., Calculator) not just a heart attack. While C-reactive protein and family history are additions to traditional CVD risk calculators that will likely lead to more accurate results, we do not yet have a way or the funds to obtain the C-reactive protein value for our study participants. Further, because all of the participants will be under the age of 45, this calculator cannot be used.

**American Heart Association Heart Disease Risk Calculator.**

The final risk calculator found comes from the American College of Cardiology/American Heart Association (AHA). It also uses data from the Framingham Heart Study to create the prediction algorithm. Unlike the other two calculators, individuals with type II diabetes can use this calculator because one of the variables included in the algorithm is the individual’s type II diabetes status. This calculator gives two results, both stated as percentage chances of having an atherosclerotic cardiovascular disease (ASCVD) event. The first result reflects risk within the next ten years. However, this is only available for people between the ages of 40 and 79, because this calculator was validated in a population of that age distribution (Muntner et al., 2014). The other value is lifetime ASCVD risk. This is calculated for anyone between 20 and 79. Once again, there will be many participants in our research under the age of 20 years, so this calculator does not suit our purposes.
Selection and reasoning.

None of the cardiovascular disease risk calculators identified in this review will be effective tools for our research because none provide a result for participants under the age of 20. Although we will therefore not have a single overall percentage risk based on the combined risk factors of an individual, it is still important to collect the data for these risk factors. Instead of a single CVD risk calculator, it is recommended that a combination of the objective values included in the CVD calculators, like systolic blood pressure and cholesterol, and family history be collected for analysis of each variable independently. The collection of family history data should be based on the work of Hall, Saukko, Evans, Qureshi, and Humphries (2007) and include both first and second-degree relatives. In this protocol, participants are asked if any of are defined as any myocardial infarction, angina pectoris, percutaneous coronary intervention or coronary artery bypass surgery occurring in male relatives before age 55 and female relatives before age 65. Participants are then put into three risk categories. Individuals are defined as having ‘strongly elevated risk’ if two first-degree relatives have experienced premature CVD. Individuals are defined as having a ‘moderately elevated risk’ if either one first-degree relative or two second-degree relatives experienced premature CVD. Individuals are defined as having ‘average risk’ if either one second-degree relative or fewer experienced premature CVD. Table 4 summarizes the cardiovascular disease risk calculators and the reasons that they were not chosen.
Table 4

Summary of CVD Risk Tools

<table>
<thead>
<tr>
<th>Name</th>
<th>Selected (yes/no)</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framingham Risk Score</td>
<td>No</td>
<td>No results if under the age of 20</td>
</tr>
<tr>
<td>Reynolds Risk Score</td>
<td>No</td>
<td>No results if under the age of 45</td>
</tr>
<tr>
<td>AHA Heart Disease Risk Calculator</td>
<td>No</td>
<td>Only lifetime risk if under the age of 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No results if under the age of 20</td>
</tr>
</tbody>
</table>

Note. Variables used for these calculators will be used along with short family history questionnaire.

Physical Activity

Evaluating participants’ physical activity is difficult for a number of reasons. Physical activity often varies depending on the time of year and the same type of physical activity can be done at different levels of intensity. For example, running for one hour at nine miles per hour is not metabolically equivalent to running for the same amount of time at only five miles per hour, even though both people in the example ran for one hour. Most physical activity questionnaires estimate a number of metabolic equivalents of task, or METs. METs are used to measure the energy required to do a given activity. Metabolic equivalents are like an index value of intensity for physical activity, ranging from 0.9 METs for sleeping up to an estimated 23 METs for running at a 4:17 minute per mile pace. These values are all predetermined and are published in the *Compendium of Physical Activities* (Ainsworth et al., 2000).

It is important to note that physical activity and physical fitness are not the same. A higher total number of METs completed by an individual does not necessarily lead to higher values of physical fitness, which is usually measured by maximal oxygen consumption (VO₂max). Research has repeatedly shown that only exercise of high intensity correlates with
higher VO₂max levels (Ainsworth, Leon, Richardson, Jacobs, & Paffenbarger, 1993; Jacobs et al., 1993; Kohl, Blair, Paffenbarger, Macera, & Kronenfeld, 1988). Physical activity also displays seasonal variation across all age groups (Bélanger, Gray-Donald, O'Loughlin, Paradis, & Hanley, 2009; Hjorth et al., 2013; Merchant, Dehghan, & Akhtar-Danesh, 2007). In order to accurately capture yearly patterns of physical activity, questionnaires must either be made to determine the difference in seasons or data must be obtained at multiple points throughout the year for seasonal comparison.

**College Alumnus Physical Activity Questionnaire.**

The College Alumnus Physical Activity Questionnaire (CAQ) (Paffenbarger et al., 1978) asks participants to report the number of sets of stairs climbed and city blocks walked in the past week and to describe the type, frequency, and duration of any leisure-time physical activity over the same time period in an 8-item questionnaire. It then uses an equation to convert these values into a MET value, given as the Physical Activity Index score (PAI-CAQ) (Paffenbarger et al., 1978). The CAQ attempts to evaluate energy expenditure in transportation based on the number of city blocks walked and the flights of stairs climbed. However, this can be difficult for participants to estimate when they are not walking in the city or climb stairs on an irregular basis, as shown by the underestimation of energy expenditure from walking and stair climbing in the validation study of the instrument (Ainsworth et al., 1993). The same study found little correlation between the recreational activities in the long-term (9 months) test-retest validation (Pearson product-moment correlation ranged from 0.01 for sports and recreation to 0.63 for flights of stairs climbed). The authors state that this could be due to the seasonal variation of physical activity, but it could also be due to recall bias. Also, the College Alumnus Questionnaire may not estimate energy expenditure well either. When compared to
accelerometer data (used as the standard against which the questionnaire was measured) the
 correlation coefficient was 0.29. The amount of time to complete the questionnaire can vary
depending on the number of recreational activities the participant records, but takes no more than
5-10 minutes (Paffenbarger et al., 1978).

**CHAMPS Physical Activity Questionnaire.**

The Community Healthy Activities Model Program for Seniors (CHAMPS) created a
questionnaire to measure physical activity in older adults (Stewart et al., 2001). The
questionnaire has 40 different activities, and the option for “other” activities not included among
those 40. The participant is asked to report how many times in a typical week within the past
four they have done the activity. If they have done the activity, they are asked for how many
total hours a week they usually do that activity. Each activity has a corresponding MET value
that is used to convert the reported frequencies into weekly energy expenditure (Stewart et al.,
2001). The authors distinguish between light physical activity and moderate, but no vigorous
activity category is included because the physical activity guidelines for older adults do not
include vigorous physical activity (DHHS, Office of Disease Prevention and Health Promotion
[DPHP], 2008). The questionnaire was validated, but in a population of individuals age 65-90
years (mean age 74 yrs.). The form of this questionnaire found in the literature search was a
modified version specifically for African Americans; however, it was still for older African
Americans (Resnicow et al., 2003). The CHAMPS Physical Activity Questionnaire (CHAMPS-
PAQ) takes approximately 10 minutes to complete (Stewart et al., 2001).

**Aerobics Center Longitudinal Study Physical Activity Questionnaire.**

The Aerobics Center Longitudinal Study Physical Activity Questionnaire (ACLS-PAQ)
(Kohl et al., 1988) measures leisure-time and household physical activity over the last three
months. It includes nine recreational activities, two categories of moderate to vigorous physical activity, and two household activities. Participants are asked to report weekly participation in the recreational activities, and those who report doing moderate to vigorous and household activities are asked the number of times per week they engage in those activities (Kohl et al., 1988). The reported exercise participation is then converted into energy expenditure. The purpose of this questionnaire is not to estimate total physical activity, or to determine if participants met physical activity recommendations, but rather to predict measures of physical fitness. The validation criterion used in the validation of the ACLS-PAQ was VO₂max, and the population used in the validation was 375 men with mean age of 47.1 years. The questionnaire’s validity in determining total METs per week is unknown, as is the test-retest reliability (Bandmann, 2008). The questionnaire is not long; it takes about 5 minutes to complete (Kohl et al., 1988).

**CARDIA Physical Activity History Questionnaire.**

The CARDIA Physical Activity History Questionnaire (Jacobs et al., 1993) is another questionnaire created for use a longitudinal study, in this case the Coronary Artery Risk Development in Young Adults study. The CARDIA researchers tested two different physical activity questionnaires, a 7-day Physical Activity Recall questionnaire and a Physical Activity History questionnaire that quantified physical activity over the past year. They determined that the Physical Activity History questionnaire was more valid for their study population (Sidney et al., 1991). The history questionnaire asks participants to report their participation in 13 specific activities including leisure, job, and household activities in the last year, where frequency is times participated per week (with minimum duration of 60 minutes per week). The participant is then asked how many months out of the last 12 that they participated in that activity, but not which months, so seasonal variability of physical activity is not measured. The activity-specific
participation is then converted into MET values and summed to determine the person’s level of physical activity. Activities are divided into categories of moderate and vigorous, and participation in the activities is averaged across an entire year. The researcher can then determine, on average, whether or not the person has fulfilled the recommended amount of physical activity.

The validation study for the Physical Activity History questionnaire was conducted in a population of 78 young adults from the CARDIA study group (Jacobs et al., 1993). The authors note that the validity of the questionnaire may not extend outside of the young adult population. Because that is the population we wish to study, this is not a concern. They found stronger correlations between the vigorous activity category and physical fitness, as measured by both VO₂max (correlation coefficient 0.63) and accelerometer data (correlation coefficient 0.31), which is consistent with other literature (Jacobs et al., 1993). The test-retest reliability was found to have a correlation coefficient of 0.88 and was performed with at least a one-month interval. The CARDIA Physical Activity History Questionnaire provides data on a wide variety of physical activity over an extended period of time, but it does not include sedentary behavior, which is the reason that it is not recommended for use our study.

**International Physical Activity Questionnaire short form.**

The International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003) was created and validated by a multinational research group that included 12 countries. It has two forms, a long and short, both of which self-administered and interviewer-administered forms. The long form has 27 items and can take more than 10 minutes to complete, so only the short form was evaluated for use in our study. The IPAQ short form asks participants to report their physical activity from the last week and has only four items. Physical activity is grouped into four
categories: vigorous, moderate, walking, and sedentary behavior. Definitions and examples for each category are provided. Each item asks the individual to report how many days a week they participate in each category for at least ten minutes. If the individual reports that they participated in that category, they are then asked for the duration of the activity. This frequency is then converted into MET values. The IPAQ may not provide the most accurate total MET values because it groups many physical activities into categories. The validity study for the IPAQ used accelerometer data as the criterion standard, and the correlation coefficient for total energy expenditure between the IPAQ short form and accelerometer was 0.3 (Craig et al., 2003). The test-retest reliability was found to be between 0.46 and 0.96, depending on the country, with an average of 0.8.

Selection and reasoning.

Our goal for this section of the questionnaire is to be able to determine whether or not the participant is engaging in the recommended amount of physical activity as set forth by the Office of Disease Prevention and Health Promotion (DHHS, DPHP, 2008). Also, while it is not our primary objective, we are interested in assessing sedentism in the African-American collegiate population. The recommendations state that healthy adults should engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic exercise per week, or an equivalent combination of the two, and that aerobic exercise should be performed in episodes of at least ten minutes at a time (DHHS, DPHP, 2008).

The College Alumnus Physical Activity Questionnaire can determine whether or not participants met the Physical Activity Guidelines for Americans, since it assesses activity frequency and duration for at least a week and it differentiates levels of intensity. However, its focus on stair climbing and walking may not be the appropriate measures of physical activity in
colleges. Also the possibility for significant recall bias calls into question the validity of the instrument. The CHAMPS-PAQ provides information on a wide variety of physical activities. However, many of them are meant specifically for seniors, like question #2, which asks if the individual has been to the senior center. Because it is designed specifically for older adults, it should not be used for a collegiate study population. The Aerobics Center Longitudinal Study Physical Activity Questionnaire was designed to predict physical fitness. For this reason, it focuses on higher intensity physical activity, not compliance with federal recommendations. The CARDIA Physical Activity History Questionnaire divides physical activity into categories of moderate and vigorous, and participation in the activities is averaged across an entire year, so the researcher can determine, on average, whether or not the person has fulfilled the recommended amount of physical activity. However, the CARDIA questionnaire does not collect data on sedentary behavior. The International Physical Activity Questionnaire’s grouping of physical activity may decrease the accuracy of the total MET value. However, it collects data on the time spent participating in moderate and vigorous physical activity each week, which is what we need to determine whether or not an individual has met the recommendations set by the Physical Activity Guidelines for Americans. The IPAQ short form also collects weekly sedentary time, the other variable of interest in our study. Finally, the IPAQ short form has only four items and takes less than five minutes to complete (Craig et al., 2003). Because of its simplicity and its ability to provide the data that we are most interested in, it is recommended to use the IPAQ short version. Table 5 summarizes the physical activity questionnaires and the reasons for their selection or non-selection.
Table 5

**Summary of Physical Activity Questionnaires**

<table>
<thead>
<tr>
<th>Name</th>
<th>Selected (yes/no)</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Alumnus Physical Activity Questionnaire</td>
<td>No</td>
<td>• Focus on stair climbing and walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possibility of significant recall bias</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No sedentary time</td>
</tr>
<tr>
<td>CHAMPS Physical Activity Questionnaire</td>
<td>No</td>
<td>• Created specifically for seniors</td>
</tr>
<tr>
<td>Aerobics Center Longitudinal Study Physical Activity Questionnaire</td>
<td>No</td>
<td>• Designed to predict physical fitness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No sedentary time</td>
</tr>
<tr>
<td>CARDIA Physical Activity History Questionnaire</td>
<td>No</td>
<td>• Year-long period increases recall bias</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No sedentary behavior</td>
</tr>
<tr>
<td>International Physical Activity Questionnaire</td>
<td>Yes</td>
<td>• Easily determines if individual has met federal guidelines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Includes sedentary behavior</td>
</tr>
</tbody>
</table>

**Discussion**

In order to create a general screening tool to assess behavioral health in African-American college students for longitudinal epidemiological study, we decided to use previously validated questionnaires from multiple categories of behavioral health together as a single behavioral health profile. The categories we chose to investigate are sleep habits, diet, cardiovascular disease risk, and physical activity/sedentary behavior. Table 6 shows all of the recommended questionnaires, their citations, the variables that they measure, and whether those variables are continuous or categorical.
Table 6

*Recommended Questionnaires*

<table>
<thead>
<tr>
<th>Name</th>
<th>Citation</th>
<th>Variable/s Measured (continuous/categorical/both)</th>
</tr>
</thead>
</table>
• Sleep debt (continuous)  
• Social jet lag (continuous)  
• Chronotype (categorical) |
• Time spent in moderate and vigorous activity  
• Sedentary time |

*Note.* Biometric indicators of CVD risk will also be included in the study, but not in the form of a questionnaire.

The sleep habits we chose to examine were sleep duration and differences in sleep midpoint and duration between weekdays and weekends. The questionnaire that I recommend for analyzing these variables is the Munich Chronotype Questionnaire (MCTQ) (see Table 2). The MCTQ measures sleep duration separately for both weekdays and weekends, and uses differences in sleep midpoints between weekdays and weekends to measure social jet lag. The MCTQ also provides data for variables such as sun exposure, sleep latency, smoking, and alcohol use. Limitations of the MCTQ are that it does not provide sleep quality data and does
not identify individuals who may have a sleep disorder. The MCTQ was validated in a population that included university students in Germany, but validity specific to the African-American population is unknown.

I recommend the use of the Rate Your Plate Questionnaire for evaluation of diet choices (see Table 3). The RYP questionnaire’s greatest advantage is its shorter length (25 items) than other dietary surveys. Many full food frequency questionnaires include over 100 items. The RYP questionnaire’s focus on foods that contribute the most fat and cholesterol in the American diet will allow us to identify individuals with poor eating habits in less time than a full FFQ. The limitation of the RYP questionnaire is that it does not capture the full diet of the individual, and its focus on excess fat intake means that it provides researchers with less information on other important nutrients.

Due to the young age of the individuals in our study, no cardiovascular disease risk calculator would provide results for all of our participants. While there are no tools to provide a single risk score, analysis of known CVD risk factors in this high-risk population is still important. For that reason, it is my recommendation to collect the data required for the CVD risk calculators (systolic blood pressure, total cholesterol, HDL cholesterol, smoking status, gender, age, type II diabetes status, and use of cholesterol medication) as well as information on family history of premature cardiovascular disease following the protocol of Hall et al. (2007) (see Table 4). These data can then be used as independent indicators of CVD risk to be analyzed separately.

For the category of physical activity and sedentary behavior, we want to be able to determine if the participants are meeting or exceeding the recommendations for moderate and vigorous physical activity set forth by the *Physical Activity Guidelines for Americans*. The
International Physical Activity Questionnaire short form groups physical activity into moderate and vigorous activity categories. Without any calculation we will be able to identify participants who are not meeting the physical activity recommendations (see Table 5). The IPAQ also collects the amount of time spent sedentary each week and can be used to calculate weekly MET values. Limitations of the IPAQ short form are that the broad physical activity categories leave room for interpretation, although definitions and examples for each category are provided. Also, the IPAQ short form was validated in multiple countries, but not specifically with African-American students.

All of the selected instruments have been validated, but a common limitation is that their validity in an African-American college student population is unknown. For that reason, I would recommend that validation studies be done for each questionnaire in this population. I recommend that the survey be administered at least twice every school year to appropriately study the changing behavior of the students over time.

**Conclusion**

There is no single questionnaire that can collect all of the data that we wish to investigate, so we endeavored to find a combination of questionnaires that would create a public health profile of participants. We chose health categories that are behavioral, and therefore modifiable, and are areas of concern for either college students or African Americans. Those categories were sleep habits, diet habits, cardiovascular disease risk, and physical activity/sedentary behavior. The recommended questionnaires are the Munich Chronotype Questionnaire for sleep habits, the Rate Your Plate Food Frequency Questionnaire for diet habits, and the self-administered short form of the International Physical Activity Questionnaire for physical activity. No single cardiovascular disease risk calculator was chosen because the age of many participants would be
below the minimum age for the calculators. Instead it is recommended that data for known risk factors for cardiovascular disease be collected and analyzed as separate variables. It is also recommended that validity studies be done for each questionnaire within the specific population of African-American college students as part of the results of a longitudinal study.

It is hoped that the use of these questionnaires in a longitudinal study of African-American college student health will form the basis for improved health awareness and outcomes in this at-risk population. By providing a continuing picture of health status and risk, we hope to empower these young adults to affect their health trajectory at an early age and reduce their lifetime burden of disease.
References


Appendix A: List of Competencies Met in CE

Tier 1 Public Health Competencies

<table>
<thead>
<tr>
<th>Domain #1: Analytic/Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the health status of populations and their related determinants of health and illness (e.g., factors contributing to health promotion and disease prevention, the quality, availability and use of health services)</td>
</tr>
<tr>
<td>Describe the characteristics of a population-based health problem (e.g., equity, social determinants, environment)</td>
</tr>
<tr>
<td>Use variables that measure public health conditions</td>
</tr>
<tr>
<td>Identify sources of public health data and information</td>
</tr>
<tr>
<td>Recognize the integrity and comparability of data</td>
</tr>
<tr>
<td>Describe the public health applications of quantitative and qualitative data</td>
</tr>
<tr>
<td>Use information technology to collect, store, and retrieve data</td>
</tr>
<tr>
<td>Describe how data are used to address scientific, political, ethical, and social public health issues</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain #2: Policy Development and Program Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participate in program planning processes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain #3: Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate in writing and orally, in person, and through electronic means, with linguistic and cultural proficiency</td>
</tr>
<tr>
<td>Participate in the development of demographic, statistical, programmatic and scientific presentations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain #4: Cultural Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate strategies for interacting with persons from diverse backgrounds (e.g., cultural, socioeconomic, educational, racial, gender, age, ethnic, sexual orientation, professional, religious affiliation, mental and physical capabilities)</td>
</tr>
<tr>
<td>Recognize the role of cultural, social, and behavioral factors in the accessibility, availability, acceptability and delivery of public health services</td>
</tr>
<tr>
<td>Respond to diverse needs that are the result of cultural differences</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain #5: Community Dimensions of Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
</tr>
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<table>
<thead>
<tr>
<th>Domain #6: Public Health Sciences</th>
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</thead>
<tbody>
<tr>
<td>Describe the scientific evidence related to a public health issue, concern, or, intervention</td>
</tr>
<tr>
<td>Retrieve scientific evidence from a variety of text and electronic sources</td>
</tr>
<tr>
<td>Discuss the limitations of research findings (e.g., limitations of data sources, importance of observations and interrelationships)</td>
</tr>
<tr>
<td>Partner with other public health professionals in building the scientific base of public health</td>
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<thead>
<tr>
<th>Domain #7: Financial Planning and Management</th>
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<tbody>
<tr>
<td>N/A</td>
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<thead>
<tr>
<th>Domain #8: Leadership and Systems Thinking</th>
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</thead>
<tbody>
<tr>
<td>Incorporate ethical standards of practice as the basis of all interactions with organizations, communities, and individuals</td>
</tr>
<tr>
<td>Use individual, team and organizational learning opportunities for personal and professional development</td>
</tr>
<tr>
<td>Participate in mentoring and peer review or coaching opportunities</td>
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## Health Promotion and Education Concentration Competencies

<table>
<thead>
<tr>
<th>Area 1: Assess Needs, Assets and Capacity for Health Education</th>
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</thead>
<tbody>
<tr>
<td>1.3 Analyze factors that foster or hinder the learning process</td>
</tr>
<tr>
<td>1.6 Synthesize assessment findings</td>
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<thead>
<tr>
<th>Area 2: Plan Health Education Programs</th>
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<tbody>
<tr>
<td>2.5 Assess efficacy of various strategies to ensure consistency with objectives</td>
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<thead>
<tr>
<th>Area 4: Conduct Evaluation and Research Related to Health Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Create purpose statement</td>
</tr>
<tr>
<td>4.2 Develop evaluation/research questions</td>
</tr>
<tr>
<td>4.3 Assess the merits and limitations of qualitative and quantitative data collection for research</td>
</tr>
<tr>
<td>4.4 Critique existing data collection instruments for research</td>
</tr>
<tr>
<td>4.9 Disseminate research findings through professional conference presentations</td>
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<thead>
<tr>
<th>Area 5: Manage Health Education Programs</th>
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<tbody>
<tr>
<td>5.7 Use communication strategies to obtain program support</td>
</tr>
<tr>
<td>5.11 Promote collaboration among stakeholders</td>
</tr>
<tr>
<td>5.16 Assess capacity of potential partner(s) to meet program goals</td>
</tr>
<tr>
<td>5.17 Elicit feedback from partner(s)</td>
</tr>
<tr>
<td>5.18 Evaluate feasibility of continuing partnership</td>
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<thead>
<tr>
<th>Area 6: Serve as a health education resource person</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.8 Use a variety of resources and strategies</td>
</tr>
<tr>
<td>6.10 Provide expert assistance</td>
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