

## Review Article

**Quantitative Research Question Development  
Using the Kipling Method**Marlene M Rosenkoetter<sup>1</sup>, Cynthia Chernecky<sup>2\*</sup>, Larry Purnell<sup>3</sup><sup>1</sup>Professor Emerita, Augusta University, Augusta GA<sup>2</sup>Professor, Augusta University, Augusta GA<sup>3</sup>Professor Emeritus, University of Delaware, Adjunct Professor, Excelsior College, PhD Program, University of Panama, Transcultural Nursing Scholar**\*Corresponding author**

Cynthia Chernecky, Professor, Augusta University, Augusta GA, USA, Tel: 706-721-4709.

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OPEN ACCESS**Abstract**

Developing a research proposal requires thinking through the various components that should be included in the study and identifying the independent, dependent and potentially confounding variables. The approach suggested here is not intended to replace the traditional approach to writing a research proposal, but rather to assist the novice researcher to begin to think like a researcher. The development of a quantitative research question employs concepts drawn from the Kipling Method in journalism to identify systematically the various elements that need to be considered in a research study. Namely, it focuses on identifying who, what, when, where, why, and how within the context of research question development. Essentially, the Kipling Method is information gathering and problem solving that are key to traditional quantitative research.

**Keywords:** Research questions, Proposal development, Kipling Method**Background**

In a poem at the end of *The Elephant's Child*, Kipling wrote I keep six honest serving men (They taught me all I knew); Their names are What and Why and When And How and Where and Who (The Kipling Society, n.d.; The Kipling Society, 2005) [1].

Joseph Rudyard Kipling (1865-1936), a journalist, memorialized these six elements that became an integral part of journalistic reporting [2]. They continue to be used today [3-5]. Known as the Kipling Method, and sometimes referred to as the "5Ws & an H", they have applications far beyond journalism and have been applied in business, education, industry, and health care (Bharath, Arvind, & Prashanth, (2017); Campos, (2007); Kakte, Raichurkar, Irfan, & Chandurkar, (2018); Martin, 2019); Zou et al., (2019); Schols et al., (2018) [6-11]. This Method has been used in scientific writing for many years as well as integrated into the Six Sigma approach in industry [12,13]. Malik (n.d.) suggests "...Six Sigma is a blending of the wisdom of an organization with a methodology and an extensive toolkit to improve the efficiency and effectiveness of the organization in meeting its [sic] the customer requirements" (para 3) [14]. The approach is used "...to comprehend for details, analyze inferences, and judgment to get to the fundamental facts..." (Mahalik, n.d. (para 1). McMahan (2009) used the "5Ws and an H" to explain the development of a detailed problem statement for organizational management [15,16].

**Purpose of the Paper**

Most research proposals follow a predetermined sequence (Table 1) that clearly states the problem, includes research from a literature search, describes how the study will be conducted, how the data will be analyzed, potential applications and limitations of the study. The emphasis in scholarly studies is on original, creative, and substantive inquiry that is logical while presenting defensible evidence that can contribute meaningfully to the discipline and profession [17-21].

The process presented in this paper supports this traditional approach but uses the "5Ws & an H" to develop a detailed quantitative research question by identifying many of the variables and related components that should be further elucidated in the actual study proposal. The intent is to provide the researcher with a framework to think through the various elements of a quantitative study, including the independent, dependent, and potentially confounding variables that need to be addressed. This approach emphasizes thinking like a researcher rather than simply following a preconceived format for the development of a detailed research proposal. Describing the various integrated elements is essential for a transparent and rigorous scientific study that is based on a systematic design and proposal construction.

**Table 1: Elements of the Research Process**

- Describe the Topic
- Synthesize the Literature
- State the Problem, Purpose, & Define Terms
- Select and Describe a Conceptual/Theoretical Framework
- Select the Research Design
- State the Independent & Dependent Variables & Confounding variables
- State the Research Question(s) or Hypotheses
- Develop the Sampling Plan/Method
- Submit Proposal for Approval(s)
- Complete a Pilot Study/Revisions
- Implement the Actual Study
- Analyze the Data
- State the Findings & Conclusions
- State Implications for the Discipline/Profession
- State the Limitations & Further Research

### “5Ws and an H”

When writing detailed quantitative research questions, “Who? What? Why? When? Where? and How?” can be used to identify and describe many of the elements required for the development and implementation of the actual study. Baker (2016) suggests that these six questions are the source of all questions (para. 5) and are “basic in information-gathering, analysis, problem-solving, communication, and decision making” (para. 1) [22].

### Who? What? Why? When? Where? and How?

Who will be the subjects? Who are you targeting? Who is the control group?

What is the problem? What is the purpose of the research study? What are the independent and dependent variable(s)? What type of data are you gathering (e.g., nominal, ordinal).

Why is the research important?

When will the research take place (timeline)?

Where will the research be done?

How will you do the study?

### Applying the Kipling Method: A Study Example The Problem Statement

You are faculty member supervising students in a rural health clinic in the southern US and have repeatedly observed that there are substantial numbers of low-income overweight African American women. Many also have hypertension according to intake assessments on routine visits. As you interact with the patients, you note that exercise is greatly lacking in their daily lives. Interactions with the women suggest that much of their days are consumed by low level and sedentary activities such as watching TV, preparing meals, and taking care of infants, or functionally caring for frail family members in their homes. You decide to undertake a research study using exercise to assist these women with weight loss, and concomitantly to assess any changes in blood pressure.

### Purpose of the Study

The purpose of this study is to develop an exercise program to facilitate weight loss in overweight African American women in a rural health care setting. Hypertension, as an associated problem, will be assessed to determine if exercise among overweight women can be associated with (not a cause of) a reduction in hypertension.

### Research Question Format

What is the impact of the independent variable (IV) on the dependent variable (DV)?

Research Question 1: What is the impact of a structured bicycling exercise program (IV) on weight loss (DV) among overweight African American women?

Optional Research Question: Is there a relationship between weight loss (DV) and reduction in hypertension (DV) for overweight African American women participating in a structured bicycling exercise program (IV)?

### Applying the “5Ws & an H” Literature Review

(Note that for the purpose of this paper, only selected and abbreviated citations are included. For an actual proposal, a comprehensive review of the literature should be provided.)

Essential for developing a research proposal is having a thorough understanding of the research and relevant previously published literature. Because overweight African American women are the primary target of this study, research is needed to document the problem in this population. Obesity among African American women is a major concern. The death rate from cardiovascular disease is considerably higher among African American women than for other ethnic groups [23]. “African American women have the highest rates of being overweight or obese compared to other groups in the U.S. About four out of five African American women are overweight or obese” [24].

Regular physical activity has been found to help prevent and treat diseases such as heart disease, stroke, diabetes, and breast and colon cancers. Exercise helps to prevent hypertension, overweight and obesity, and improve mental health and quality of life and negative psychosocial factors [25,26]. Physical inactivity increases the risk of diseases such a coronary heart disease, type 2 diabetes, breast and colon cancers, and shortens lifespans [27]. There is evidence that walking and biking to a place of work can help commuters lose weight [25,28]. In the US, only 0.5% of commuters do so by bicycle [29]. Yet, one study has suggested that bicycling for transportation as well as recreation can decrease cardiovascular disease [30].

Many approaches to weight loss among African Americans have been studied [31-33]. Ard, et al., (2017) found that an evidence-based behavioral weight loss program could result in clinically meaningful weight loss among overweight African American women in the southern US [34]. When embarking on a simple exercise program for weight loss, it has been found that a community-based participatory research (CBPR) program may provide a more holistic approach to health and to weight reduction [35,36]. A study of ethnic attachment and motivation for weight loss found attachment was predictive of motivation for exercise but not for weight loss. These findings suggest that the attachment to ethnic identity may be important in any motivation for change among African American women [37]. Murphy and Williams (2013) suggest that African American women are more successful with culturally tailored programs. In their study, they had an attrition rate of 87% at 18 months because of contributing factors of caregiver and work responsibilities as well as transportation problems [38]. They suggest that self-efficacy should be considered in any weight loss program. Reducing perceived barriers and including family and friends may facilitate the willingness to exercise through bicycling [39].

Increasing the physical activity of adults in the US may also reduce US health care expenditures because activity is associated with health benefits [23]. The economic burden from lack of physical activity is estimated to be over \$115 billion dollars annually [40].

Since the purpose of this paper is only to demonstrate the use of the Kipling Method to develop a quantitative research question, a limited focus will be used and only the impact of exercise on weight loss and blood pressure will be included. Research and statistics on obesity among African American women will support the basis for this study. Formulas for calculating obe-

sity and optimal weights of the subjects (Calculator.net, n.d.) and blood pressure norms of the American Heart Association (2018) will provide comparison data for the study outcomes [24,41-43].

## Applying Kipling's Who?

Who are the subjects? Who is the target or theoretical population to whom to generalize the findings? Who is the study or accessible population for is the actual sampling frame and from which the random sample will be drawn? Who is in the control group? Who will be determined to be overweight? Gathering information to document who the subjects are will be important in the data analyses [43]. Demographic data will be needed to compare responses to the exercise program and demonstrate differences in those responses. For example, are there differences by age group, educational level, body mass index (BMI) or income? A survey instrument can be used to gather this information for statistical analyses Table 2).

**Table 2: Sample Survey Instrument**

Completed by Researcher: Subject ID#: _____ Site: _____ Age: _____ Ht: _____ Weight: _____	Calculated BMI (kg/m <sup>2</sup> )*: _____ Desired BMI Range*: _____ BP: _____ Pulse: _____ Respirations: _____
Completed by Subject: Check your response to each item. How many pounds do you want to lose? <sup>(pounds)</sup> None <sup>(1)</sup> 1-9 <sup>(2)</sup> 10-19 <sup>(3)</sup> 20-29 <sup>(4)</sup> 30-39 <sup>(5)</sup> 40 or More <sup>(6)</sup>	Your race/origin <sup>(race)</sup> White (non-Hispanic) <sup>(1)</sup> Hispanic or Latino <sup>(2)</sup> African American <sup>(3)</sup> Asian <sup>(4)</sup> Hawaiian or other Pacific Islander <sup>(5)</sup> Native American/Alaskan Native <sup>(6)</sup> Multiracial <sup>(7)</sup> Prefer not to specify <sup>(8)</sup> If you are only doing African Americans, is this section necessary? Yes to rule out others.
Your age in years is: <sup>(age)</sup> Less than 20 years. <sup>(1)</sup> 20-29 years. <sup>(2)</sup> 30-39 years. <sup>(3)</sup> 40-49 years. <sup>(4)</sup> 50-59 years. <sup>(5)</sup> Over 59 years. <sup>(6)</sup>	How long have you been overweight? <sup>(weight)</sup> Never Less than 1 year <sup>(1)</sup> 1-2 years <sup>(2)</sup> 3-4 years <sup>(3)</sup> 5-6 years <sup>(4)</sup> More than 6 years <sup>(5)</sup> Don't know <sup>(6)</sup>
Your current household income before taxes, per year is: <sup>(income)</sup> Less than \$25,000 <sup>(1)</sup> \$25,000 to \$49,999 <sup>(2)</sup> \$50,000 to \$74,999 <sup>(3)</sup> \$75,000 to \$99,999 <sup>(4)</sup> \$100,000 or More <sup>(5)</sup> Prefer not to specify <sup>(6)</sup>	Who do you see when you are sick? <sup>(provider)</sup> Private Doctor (MD) <sup>(1)</sup> Health Department or Clinic Doctor <sup>(2)</sup> Nurse Practitioner <sup>(3)</sup> Other <sup>(4)</sup> Do not see a doctor <sup>(3)</sup>
Your highest level of education is: <sup>(Educ)</sup> Some elementary school <sup>(1)</sup>	Your current living arrangement is: (Check All that Apply to You) <sup>(Living)</sup> Live alone <sup>(1)</sup>
Elementary (grade) school graduate <sup>(2)</sup> Some high school <sup>(3)</sup> High school graduate <sup>(4)</sup> Some college or trade school <sup>(5)</sup> College graduate (BS, BA, etc.) <sup>(6)</sup> Graduate degree(s) <sup>(7)</sup>	Live with spouse <sup>(2)</sup> Live with family/friends (not spouse) <sup>(3)</sup> Live in retirement community <sup>(4)</sup> Live in assisted living <sup>(5)</sup> Live on the streets <sup>(6)</sup>  Do you prepare most of your own meals? (meals) Yes <sup>(1)</sup> No <sup>(2)</sup>

Your sexual preference is: <sup>(gender)</sup> Male <sup>(1)</sup> Female <sup>(2)</sup> LGBTQ <sup>(3)</sup> Prefer not to specify <sup>(4)</sup>	What type of health care coverage do you have? (Check all that apply) <sup>(ins)</sup> Medicare <sup>(1)</sup> Medicaid <sup>(2)</sup> Private Insurance <sup>(3)</sup> Military Coverage <sup>(4)</sup> None <sup>(5)</sup>
Your current work status is: <sup>(employ)</sup> Work Full-Time <sup>(1)</sup> Work Part-Time <sup>(2)</sup> Retired and do not work <sup>(3)</sup> Looking for work for pay <sup>(4)</sup> Receiving disability <sup>(5)</sup>	Do you have a pet in the house? (Check all that apply) <sup>(pets)</sup> No <sup>(1)</sup> Yes, cat(s) <sup>(2)</sup> Yes dog(s) <sup>(3)</sup> Other pets <sup>(4)</sup>
What type of transportation do you have? <sup>(transport)</sup> Drive your own car/truck <sup>(1)</sup> Ride with somebody <sup>(2)</sup> Take public transportation <sup>(3)</sup> Walk <sup>(4)</sup> Ride a bicycle <sup>(5)</sup> Ride a motorcycle <sup>(6)</sup>	What type of exercise do you regularly do? (Check all that apply) <sup>(exercise)</sup> Walking <sup>(1)</sup> Ride a bicycle <sup>(2)</sup> Running <sup>(3)</sup> Go to a gym <sup>(4)</sup> Yardwork <sup>(5)</sup> Do not exercise <sup>(6)</sup>
Do you own a car or truck? <sup>(drive)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup> Do you use public transportation for other than work? <sup>(pubtrans)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup>	Are you a diabetic? <sup>(diab)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup> Do you take insulin? <sup>(ins)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup>
Do you have a disability that makes you need help getting out of your house? <sup>(dis)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup> Are you on the County's Special Needs List? <sup>(needs)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup> What health problems do you have? List them here. _____ _____ _____	Do you use special health aides or equipment (oxygen, walker, wheelchair etc.)? <sup>(equip)</sup> Yes <sup>(1)</sup> No <sup>(2)</sup> Would you be willing to bike 3 times a week in your neighborhood? Yes <sup>(1)</sup> No <sup>(2)</sup>

\* Calculator.net (n.d.)

Who are the primary researchers? Are there research assistants for the study? Who will complete the forms and process for IRB (Institutional Review Board) approval of the study? Who will need to obtain consent so subjects can participate in the study? Who is a physical therapist or exercise physiologist who can consult on the exercise portion of the study? Will the subjects need medical consent by a physician or advanced practice nurse to participate in the exercise program? Will the subjects need consent by a family member? Who will be contacted for approval and use of any facility and exercise equipment? Who will zero out the scales before weighing subjects at each time point? Who will clean the exercise equipment to prevent infections? Who is the contact person at the university IRB (or other required body such as a medical center or PT clinic)? for questions involving informed human consent and subsequent IRB approval? Who is the health department official who will approve and provide consent for the study? Who is the responsible research/clinical mentor who can be sought for advice when things "don't go as planned"? At the end of the study, who will be responsible for writing and submitting the findings for publication and presentation at professional meetings? Note that authorship and ranking should be decided at the beginning of the study. "Individuals should only take authorship credit for work they have actually performed or to which they have substantially contributed" [45]. Who is determined to be low income? [46].

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Sample Research Question 2: What is the impact of exercise on weight loss among low income African American women ages 20-59 years? Is there a decrease in hypertensive findings at the completion of the study?

Research Limitations: (a) convenience sample, (b) limited age range, (c) rural setting only, and (d) small sample size.

Suggestions for Additional Research: (a) dietary counseling, (b) family involvement, (c) faith-based interventions.

Potentially Confounding Variables: Increased dietary intake by subjects before or following exercise, additional current exercise, family stressors, limited transportation, and dietary and exercise cultural factors.

### Applying Kipling's What?

What do you plan to do? What is the goal of the research study? What is the standard for overweight? What is the conceptual framework for the study? "Exercise" must be defined, quantifiable and measurable. What will be measured? Bicycling is one option for example, however, unless it is done in a controlled environment, it is impossible to measure the speed, distance, and duration of biking [44]. One approach is to use a stationary bicycle and measure the various parameters on the bike, with minimum goals to achieve for each subject. What are the dependent and independent variable(s) of the study? State what type of data you are gathering (eg: nominal, ordinal). What is the expected weight loss and over what period of time? This needs to be discussed with each participant, agreed upon, and documented. What incentives, if any, will be provided for participation? If hypertension is to be included, what are the standards for a participant to be considered hypertensive? What grants are available to support the study, including providing financial incentives to participants and possibly obtaining a stationary bicycle? Will there be any support for presenting the results of the study at professional conferences? What will be the target journal for publications? [47].

Options for Further Research: Will there be dietary counseling, coaching, music to listen to, or television programs to watch? What about community involvement? If so, by whom, what type, and how will the outcomes be measured? Will there be faith-based interventions? If so, what will they be?

### Literature Review (select and abbreviated citations)

"African American women are more overweight and have greater difficulty maintaining weight loss than do Caucasian women" [38]. In a physician-based intervention study of low-income, obese, African American women, monthly meetings were held "information on weight loss, ways to decrease dietary fat, ways to increase physical activity, dealing with barriers to weight loss, healthy alternatives when eating out and shopping, and ways to stay motivated during weight loss efforts". Content for the meetings in this study was provided "by a multidisciplinary research team consisting of a physician, a health psychologist, a registered dietitian, and an exercise physiologist" (p. 1414). Participants "...achieved greater weight loss than those receiving standard medical care" (p. 1412). Weight management programs that are geared specifically toward low income African American women can have significant results on health [48].

Sample Research Question 3: What is the impact of biking on a stationary bike for 30 minutes at an average speed of 12 mph on weight loss among overweight African American women?

Research Limitations: (a) lack of counseling support, (b) lack of dietary instructions, and (c) lack of cultural interventions, including cultural concepts of overweight, (d) lack of available transportation.

Suggestions for Further Research: (a) include emotional support and dietary counseling, (b) involve family members, (c) assess cultural factors, (d) assess for transportation availability, (e) follow-up regular biking activities.

Potentially Confounding Variables: Counterproductive family involvement.

### Applying Kipling's When?

When will the exercise program take place? What days and times each week and for how many weeks? Subjects need to know when they are expected to participate so they can plan for transportation, for childcare, and interruptions in their daily schedules. Days and times could impact willingness to participate. When is the exercise facility available for the project?

Sample Research Question 4: What is the impact of biking on a stationary bike for 30 minutes three days a week (M/W/F) at an average speed of 12 mph on weight loss among overweight African American women? Is there a reduction in hypertensive readings?

### Applying Kipling's Where?

Where will the exercise intervention, take place? What arrangements and contracts need to be made for participants to have scheduled and guaranteed access to stationary bicycles at a designated facility?

Where will the survey be completed by participants and where will these instruments be confidentially deposited? From where will the control group be recruited? Where will the initial study data be acquired and recorded, and by whom? Where will weight scales and assessment equipment be acquired and placed for ready access? Where will the protocol be followed for zeroing out a scale each time it is used? Where will research personnel be to conduct the study? Will multiple exercise sites be used? [49].

Sample Research Question 4: What is the impact of biking on a stationary bike for 30 minutes three days a week (M/W/F) at a local gym at an average speed of 12 mph on weight loss among overweight African American women? Is there a reduction in hypertensive readings?

### Applying Kipling's How? (How much/many?)

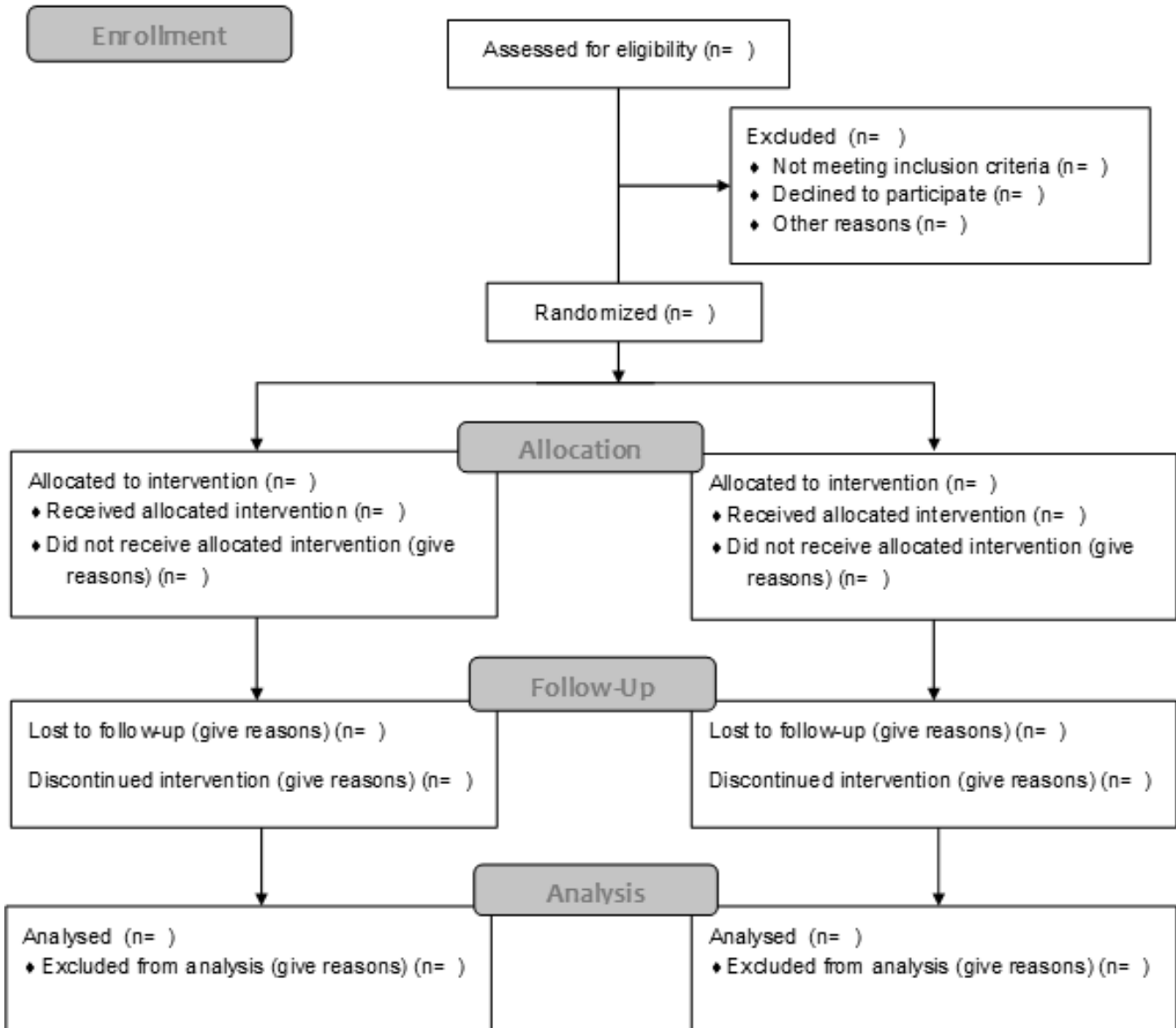
#### Literature Review (select and abbreviated citations)

Literature Review (select and abbreviated citations)  
Estimates for calories burned on a stationary bike for a weight of 155 pounds for 30 minutes is about 300- 550 calories in one hour [50]. How many participants will be recruited from the health care clinic? How many participants will be in the control group? How will comparisons between the two groups be assessed? How will participants be recruited and by whom? At the end of the study, how many participants agreed to participate, how many withdrew, or did not show for the program (insert Table 3)? How will subjects be provided informed human subject consent? How will the IRB be informed?

Table 3: Consort Diagram



### CONSORT 2010 Flow Diagram



Source: The CONSORT Flow Diagram (n.d.). Retrieved from <http://www.consort-statement.org/consort-statement/flow-diagram>

How many bicycles will be needed for the program? How long and at what speed will participants be exercising on the bicycles? How will the participants' BMI (NIH, n.d.) be calculated and entered into the data collection sheet (Insert Table 4) [51]. How will norms be provided to each participant and how will they be explained to participants concerning weight loss? If vital signs will be assessed, how will they be measured before and after exercises, and recorded? How will this information be conveyed to the participant? How will vital sign norms and hypertension risks be conveyed to participants? How much weight loss, pounds or kilograms, versus BMI will be considered significant? How will this be determined and conveyed

to participants? How will the data be analyzed? Which statistical tests will be used to analyze the data? How will the IRB be informed of the study data and conclusions? How will the findings be submitted for publication and presentation at professional conferences? [52]

Sample Research Question 5: What is the impact of biking on a stationary bike for 30 minutes three days a week (M/W/F) for 3 months at a local gym at an average speed of 12 mph on weight loss among overweight African American women? Is there a measurable reduction in hypertensive readings?

**Table 4: Sample Data Collection Sheet**

Title of Study\*

IRB Approval & Date \_\_\_\_\_

Primary Researcher: \_\_\_\_\_

Test Site: \_\_\_\_\_

Subj. Code	Date Attended	Ht	Wt	BMI**	Minutes on Bike	Avg Speed on Bike	Maximum Diastolic BP	Maximum	Maximum Heart Rate	Initials	Comments &
101	(M/D/YR)	(inches or meters)	(lbs or kg)					Systolic BP		of Ass't	No Show
	01.15.2020										
	01.17.2020										
102											
103											

\*Modify according to data to be collected

\*\*BMI = (Weight (lbs) / (Height (in))<sup>2</sup>) x 703 (kg/m<sup>2</sup>)/(lb/in<sup>2</sup>) or (kg/m<sup>2</sup>)

## Summary

The Kipling Method can effectively be used to develop a detailed quantitative research question that will form the basis for a study. It can be used to teach novice researchers and a guide for experienced ones. It can be adapted for a variety of types of research questions and for qualitative research. Each of the elements is essential but they do not imply a definitive sequence. One or more may need to be revisited as the research question evolves and becomes clearer. The literature review will provide additional insights and clarify the direction and components of the study [53-58].

## Acknowledgements

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