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16. Abstract
This study introduces two interventions designed to influence perceptions of cycling among African Americans. Results from the *2001 National Household Transportation Survey* reveal that African Americans cycle at two-thirds the rate of White and Hispanic Americans (Pucher and Renne, 2003). Moreover, African Americans are less likely to possess alternative transportation modes like a bicycle (Royal and Miller-Steiger, 2008). Researchers suggest that cycling disparities are linked to negative perceptions among inexperienced cyclists and non-cyclists –including African Americans (McCray et al, 2010). An important consideration in analyzing why African Americans generally do not cycle is that of perception. The purpose of this study is to address negative perceptions of cycling that inhibit bicycle use, including a lack of experience, knowledge, and safety. Few studies exist that explore race or ethnic-specific reasons for low levels of physical activity and this information is needed to increase physical activity among minority groups (Rogers, et al. 2007). By examining perceptions of cycling among African Americans, this study builds on existing literature and fills a significant void in addressing the lack of bicycle ridership in the African-American community.

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CHANGING PERCEPTIONS OF CYCLING IN THE AFRICAN AMERICAN COMMUNITY TO ENCOURAGE PARTICIPATION IN A SPORT THAT PROMOTES HEALTH IN ADULTS

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Changing Perceptions of Cycling in the African American Community to Encourage Participation in a Sport that Promotes Health in Adults

Southwest Region University Transportation Center
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EXECUTIVE SUMMARY

This study introduces two interventions designed to influence perceptions of cycling among African Americans. Cycling disparities are rarely addressed by race or ethnicity; however, anecdotal evidence suggests that cycling is less common among African Americans (McCray et al, 2010). Results from the *2001 National Household Transportation Survey* reveal that African Americans cycle at two-thirds the rate of White and Hispanic Americans (Pucher and Renne, 2003). Moreover, African Americans are less likely to possess alternative transportation modes like a bicycle (Royal and Miller-Steiger, 2008). Researchers suggest that cycling disparities are linked to negative perceptions among inexperienced cyclists and non-cyclists –including African Americans (McCray et al, 2010). An important consideration in analyzing why African Americans generally do not cycle is that of perception. The purpose of this study is to address negative perceptions of cycling that inhibit bicycle use, including a lack of experience, knowledge, and safety. Few studies exist that explore race or ethnic-specific reasons for low levels of physical activity and this information is needed to increase physical activity among minority groups (Rogers, et al. 2007). By examining perceptions of cycling among African Americans, this study builds on existing literature and fills a significant void in addressing the lack of bicycle ridership in the African-American community.

One of the most cited reasons for not riding is that cycling is perceived as being unsafe (Maaza, Furth, and Nixon, 2012). However, one study has shown that informing non-cyclists about facilities, route choices, and general safety can change perceptions (Stinson and Bhat, 2004). Still others hypothesize that if people perceive an increase in safety, they will be more likely to cycle (Pucher et al, 2010). A behavioral framework that addresses physical activity interventions is the social cognitive theory (Bandura, 1986), which suggests that all three: perceptions, knowledge, and habits must be altered to change behavior, i.e., choosing not to cycle (McCray, et al., 2011). Making changes to the infrastructure alone will not necessarily lead non-cyclists to change their behavior, especially if the population of interest has no history of engagement. Both an environmental transformation and a behavioral modification are needed. Environmental factors may be social or physical, and may be real, distorted, or imagined. Documenting the relationship difference between self-efficacy and physical activity among race and ethnic groups has been difficult (Martin, Prayor-Patterson, Kratt, Kim, Person, 2007; Rogers et al, 2007). Nevertheless, exposure to modeling of cycling behaviors has a statistically significant relationship with increased levels of engagement in cycling (Titze, Stronegger, Janschitz, Oja, 2008). Thus, this study proposes that an education based "nudge" toward cycling might include a "safety training" intervention that imparts cycling knowledge and models appropriate cycling behaviors (McCray, 2012, September 18).

The CAAC Study included 99 adults and commenced first in May 2012; then from September 2012 to March 2013, and ending with a final training in April 2014. It was advertised as a chance for African Americans over the age of 18, with little to no cycling experience, to participate in a study on changing perceptions of cycling. If participants did not have their own bikes or preferred not to use them, free rentals were made available. Participants were asked to commit three hours to a free safety training session that included pre-session survey, a 45-minute bike ride of with an experienced guide, followed by another survey.

We determined, using a difference of means test, that mean ratings across all measured parameters increased significantly after training. Both motivational levels of participation and the participants' level of comfort with different infrastructure design features significantly improved. During the CAAC intervention, participants were asked about their level of motivation to ride a bike for any number of various purposes; they then took part in training. After the intervention, the mean rating across all six parameters increased significantly (t = 10.31, p <.05). The greatest motivation for riding a bike that participants reported was fitness, and the training increased the level of confidence of participants to ride a bike—at least for recreational purposes. Participants were least motivated to use a bicycle for commuting, however the mean rating for this parameter increased significantly following training (See Table 6).

The Cycling in the African American Study focuses on non-cyclists and those who cycle very little. The intent was not to address the work or school trip, but to encourage cycling for pleasure, social activities, and recreation. The analyses used to analyze the 99 adults show the effectiveness of our culturally-tailored safety-training intervention. Study participants felt more confident, comfortable, knowledgeable, and motivated to cycle after the training. This training serves well as an introduction to cycling, and would be very effective as a "Part 1" in a series of community organized rides led by an experienced cyclist.

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CHAPTER 1 INTRODUCTION

INTRODUCTION

Anecdotal evidence suggests that cycling is less common among African Americans (McCray, Ball, Bennett, Choi, Gemar, Halter, Higgins, Lipscombe, Walker, 2012; McCray, Chen, Glass, Lee, Lin, Morales, Mount, Ogura, Rosenbarger, Sides, Woodward, and Zeringue, 2011; Mirk, 2009). It was hypothesized that a safety-training intervention would improve negative attitudes or perceptions towards cycling. In this sense, the purpose of this study is to address negative perceptions of cycling that inhibit bicycle use, including experience levels, knowledge, and safety concerns. The Cycling in the African American Community (CAAC) Study was developed in Austin, Texas to "nudge" more African Americans, who are often beginning cyclists or non-cyclists, to participate in a physical activity that promotes health and builds community. Ninety-nine adults participated in a 3-hour innovative training that includes a pre and post survey, used in conjunction with an on-road cycling curriculum. A difference of means test revealed participants felt more confident, comfortable, knowledgeable, and motivated to cycle after the training. Significant positive changes addressing motivational levels of participation and comfort levels with varying infrastructure design features were measured using a five-point Likert scale. The overall outcome of the study suggests that the safety-training intervention can provide prospective cyclists with enough information and confidence needed to navigate the road by bicycle.

LITERATURE REVIEW

Cycling disparities are rarely addressed by race or ethnicity; however, anecdotal evidence suggests that cycling is less common among African Americans (McCray et al, 2012; McCray et al, 2011; Mirk, 2009). The *2001 National Household Transportation Survey* reveals African Americans cycle at two-thirds the rate of White and Hispanic Americans (Pucher and Renne, 2003), and are less likely to have access to a bicycle (Royal and Miller-Steiger, 2008). This study suggests that cycling disparities are also linked to negative perceptions held by African Americans who are often inexperienced cyclists and non-cyclists (McCray et al, 2011). Still other studies associate these disparities with poor exercise patterns and eating behaviors (Rogers, McAuley, Courneya, Humphries, and Gutin, 2007; Befort, Thomas, Daley, Rhode, and

Ahluwalia, 2006). Nevertheless, studies show that perceived barriers to cycling and other forms of exercise can be overcome by culturally-tailored interventions (Cowart, Biro, Wasserman, Stein, Reider, and Brown, 2010; Griffin, 2008; Befort et al, 2006; Yanek, Becker, Moy, Gittelsohn, and Koffman 2001). Few studies exist that explore culturally-relevant reasons for low levels of physical activity among ethnic minority groups (Lee, Mama, Medina, Ho, Adamus, 2012; Rogers, et al. 2007). By examining perceptions of cycling among African Americans, this study builds on existing literature and fills a significant void in addressing the lack of cycling in the African American community. The focus is on non-cyclists and those who cycle very little. The design was not intended to address the work or school trip, but to encourage cycling for pleasure, social activities, and recreation.

Increasing cycling in cities requires the provision of safe, convenient, and attractive infrastructure that supports active travel, combined with urban forms that support high densities, mixed land use, and short trip distances (Pucher, Buehler, Bassett, Dannenberg, 2010; Pucher, and Buehler, 2006), and several governments around the world are recognizing the need to do so (Pucher, Buehler, and Seinen, 2011; Shaheen, Guzman, and Zhang 2010; USDOT, 1994; Pucher, Komanoff, and Schimek 1999; Pucher, 1997; Bowman, Vecellio, and Haynes 1994). When it comes to transportation planning, it is good to know what people do, why they do it, and how they might be nudged to do something different. Thaler and Sunstein (2008) suggest that people need to be "nudged" to take part in beneficial behaviors, particularly those that provide delayed gratification. Among adults, cycling has been shown to be positively correlated with recommended exercise levels and lower rates of obesity and diabetes (Victoria Transportation Policy Institute, 2011; Pucher et al, 2010; de Hartog, Boogaard, Nijland, Hoek, 2010; Dill, 2009). Unfortunately, these health concerns are most challenging among African Americans, and this population is not enjoying the long-term health benefits of cycling and exercises (Center for Disease Control and Prevention, 2011; McCray et al, 2011; Cowart et al, 2010; Pucher et al, 2010). Thus, a "nudge", i.e. an intervention, within the context of this study could serve to increase cycling among African Americans, as well as improve their health outcomes (McCray et al, 2011; Rogers et al, 2007; Befort et al, 2006).

Potential Health Benefits of Cycling

The Center for Disease Control and Prevention (CDC) reports that 70% of African Americans are overweight and 38% are obese (Center for Disease Control and Prevention [CDC], 2003). For the period of 2007-2010 the prevalence of obesity among Black-non Hispanics adult males and females over the age of 18 was 37% and 53%, respectively (Center for Disease Control and Prevention [CDC], 2013). Seventy-seven percent of African American women are overweight with nearly 49% obese, and 63% of African American men are overweight with 28% obese (Cowart et al, 2010). Obesity, a grave health concern in the United States, leads to other life-threatening ailments such as hypertension and diabetes, two conditions which have a disparate impact on African Americans. These illnesses have been associated with poor eating habits and sedentary lifestyles (Cowart et al, 2010). Thus, from a public health standpoint, it is important to introduce ways to reduce obesity and obesity-related illnesses among African Americans to improve their overall health outcomes.

Approximately 23% of adults in the U.S. do not exercise, but among African Americans, that number rises to 55-75% of women and 30 - 66% of men. (Cowart, et al. 2010; McCray et al, 2010; Whitt-Glover, and Kumanyika, 2009). According to several studies, the disparity can be attributed to neighborhood conditions and inequalities in the built environment, including safety (e.g., violent crime incidents), walkability (e.g., land use mix), and access to indoor and outdoor recreational amenities (Pucher, et al, 2010; Zenk, Wilbur, Wang, McDevitt, Oh, Block, McNeil, Savar, 2008; Shishehbor, Lauer, Gordon-Larson, Kiefe, and Litaker, 2007; Loukaitou-Sideris and Eck, 2007). But it's more than access that keeps people from exercising; studies also show that perceptions and beliefs about exercise contribute to these disparities(Befort, et al, 2006; Lavizzo-Mourey, Cox, Strumpf, Edwards, Lavizzo-Mourey, Stineman, Grisso, 2001; Airhihenbuwa, Kumanyika, Agurs, and Lowe, 1995).

Exercise patterns and behaviors are influenced by race and ethnicity (Kumanyika 2007; Dowda, Pate, Felton, Saunders, Ward, Dishman, Trost 2004; Crespo, Smit, Andersen, Carter-Pokras, Ainsworth 2000; Crespo, Keteyian, Heath, Sempos 1996; Airhihenbuwa et al, 1995). One study reveals exercise patterns and behaviors among African Americans are influenced by, but are not limited to, a common misperception "that occupational and daily activities provide sufficient exercise," (Befort et al, 2006, 411), and this is particularly true among African

American women who are less likely to perceive themselves as overweight and/or more likely to be bound by time constraints (e.g., work and family responsibilities), which keeps them from alloting time for exercise (Befort et al, 2006; Heesch, and Masse, 2004).

Active Transportation and the Health Connection

Active transportation has been shown to be effective in combatting low exercise levels, excess weight, and related illnesses (e.g., diabetes and heart disease) among U.S. residents and more even more acutely among adults. (Pucher et al, 2010; Dill, 2009; Bassett, Pucher, Buehler, Thompson, and Crouter, 2008; Lindstrom, 2008). Defining active transportation as the percentage of trips taken by walking, cycling, and public transit, Bassett et al (2008) found that countries with the highest levels of active transportation (e.g., European countries) generally had the lowest obesity rates (Pucher and Buehler, 2006; Pucher and Dijkstra 2003; Pucher and Dijkstra, 2000). By contrast, the U.S. had the lowest rate of active transportation (8%) and the highest rate of obesity (23.9%). The same pattern holds true across different places within the U.S.; in a survey that comparing all 50 states, researchers found that in 47 of the largest 50 U.S. cities the higher rates of walking and cycling to work were associated with "a higher percentage of adults who achieved the recommended levels of physical activity, a lower percentage of adults with obesity, and a lower percentage of adults with diabetes" (Pucher et al, 2010, 5). Like previous research findings (Pucher et al, 2010; Dill, 2009), our study suggests that cycling for transportation can be used to meet the recommended daily exercise levels, while improving health outcomes.

Cycling Interventions

Additional research is needed to understand the effectiveness of walking and cycling interventions (Pucher et al, 2010; Krizek et al, 2009). Krizek, Handy, and Forsyth outlined the challenges researchers face in their attempts to produce credible evidence on walking and cycling interventions, which include appropriate research design and conceptualizing, measurements, and sampling (2009). If different segments of the population have different patterns of walking and cycling behaviors, which some studies found, it would require an intervention to address different sets of needs. Similarly, Pucher, Dill, and Handy studied the effects of various interventions on levels of cycling, including infrastructure and bicycle-specific education and marketing programs (2010). Few studies yielded 'quantitative estimates' on the effects of facilities on overall rates of cycling. However, findings for bicycle-specific programs, such as trip reduction, travel awareness, and safety training, were more encouraging.

Developing an intervention to measure changes in walking and cycling behaviors is complex, but there is reason to believe that with the right tools, it is in fact possible. Obtaining a large enough sample size and analyzing it for statistical significance may yield inconclusive results, but it is an important first step towards expanding research in these areas (Pucher et al, 2010; Krizek et al, 2009).

Perception and Social Cognitive Theory

One of the most cited reasons for not riding is that cycling is perceived as being unsafe (Maaza, Furth, and Nixon, 2012). However, one study has shown that informing non-cyclists about facilities, route choices, and general safety can change perceptions (Stinson and Bhat, 2004). Still others hypothesize that if people perceive an increase in safety, they will be more likely to cycle (Pucher et al, 2010). A behavioral framework that addresses physical activity interventions is the social cognitive theory (Bandura, 1986), which suggests that all three: perceptions, knowledge, and habits must be altered to change behavior, i.e., choosing not to cycle (McCray, et al. 2011). Making changes to the infrastructure alone will not necessarily lead non-cyclists to change their behavior, especially if the population of interest has no history of engagement. Both an environmental transformation and a behavioral modification are needed. Environmental factors may be social or physical, and may be real, distorted, or imagined. Documenting the relationship difference between self-efficacy and physical activity among race and ethnic groups has been difficult (Martin, Prayor-Patterson, Kratt, Kim, Person, 2007; Rogers et al, 2007). Nevertheless, exposure to modeling of cycling behaviors has a statistically significant relationship with increased levels of engagement in cycling (Titze, Stronegger, Janschitz, Oja, 2008). Thus, this study proposes that an education based “nudge” toward cycling might include a “safety training” intervention that imparts cycling knowledge and models appropriate cycling behaviors (McCray, 2012, September 18).

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CHAPTER 2 METHODS

The CAAC Study included 99 adults and commenced first in May 2012; then from September 2012 to March 2013, and ending with a final training in April 2014. It was advertised as a chance for African Americans over the age of 18, with little to no cycling experience, to participate in a study on changing perceptions of cycling. If participants did not have their own bikes or preferred not to use them, free rentals were made available. Participants were asked to commit three hours to a free safety training session that included pre-session survey, a 45-minute bike ride of with an experienced guide, followed by another survey.

PARTICIPANTS

Our sample of 99 individuals was comprised of 72 (72.7%) females and 27 (27.3%) males, all of whom were primarily young and middle-aged African-American residents of Austin, Texas. The largest age bracket consisted of individuals between 26 and 35 years old; the second largest between 46 and 55 years old; and the smallest between 36 and 45 years old. (See Table 1.) This distribution is consistent with that of the city of Austin: a 2012 survey showed 21% were between 25 and 34 years old.

Table 1. Age distribution for CAAC sample, 2013-2014, Austin, Texas.

Age (years)	Count	Percentage
18-25	12	12.12%
26-35	25	25.25%
36-45	21	21.21%
46-55	24	24.24%
56-65	15	15.15%
66 and up	2	2.02%
Total	**99**	**100%**

Most participants were African American, and only 11 self-reported as Hispanic or Latino. (See Table 2.) This distribution does not mirror that of the city of Austin as a whole, which is 8% African American and 34% Hispanic or Latino;[1] only 0.4% of Hispanic or Latino residents self-reported as Black or African American[2].

[1] ACS 2012 (1-Year Estimates) (SE), ACS 2012 (1-Year Estimates), Social Explorer; U.S. Census Bureau.
[2] ACS 2012 (1-Year Estimates) (SE), ACS 2012 (1-Year Estimates), Social Explorer; U.S. Census Bureau

Table 2. Ethnicity and race distribution for the CAAC sample, 2013-2014, Austin, Texas.

Ethnicity	Count	Percentage
Hispanic or Latino	11	11.11%
Non-Hispanic or Latino	88	88.89%
Total	**99**	**100%**
Race	**Count**	**Percentage**
African-American	87	87.88%
Non-African American	12	12.12%
Total	**99**	**100%**

In terms of education, the largest group of participants the survey had obtained a bachelor's degree (40%); the second largest group had a graduate degree. Only one participant reported having less than a high school education. (See Table 3.)

Table 3. Highest level of education obtained for CAAC sample, 2013-2014, Austin, Texas.

Level of education	Count	Percentage
High-school/GED or less	7	7.07%
Some College	11	11.11%
Associate's Degree/Trade/Vocational School	8	8.08%
Bachelor's Degree	40	40.40%
Graduate Degree	33	33.33%
Total	**99**	**100%**

While one-quarter of participants reported an income of less than $25,000, a larger group earned between $35,000 and $75,000 (42%); a third group (24%) had incomes higher than $75,001 (See Table 4). A cross tabulation analysis for income and education revealed that participants with incomes higher than $75,001 also had a bachelor's or a graduate degree.

Table 4. Income distribution for the CAAC sample, 2013-2014, Austin, Texas.

Income	Count	Percentage
Less than $25,000	25	25.25%
$25,001-$35,000	6	6.06%
$35,001-$50,000	19	19.19%
$50,001-$75,000	23	23.23%
$75,001-$100,000	12	12.12%
$100,001 or more	12	12.12%
Total	**97**	**100%**

Fifty-seven percent of participants had one or more children. The data on car ownership shows that the largest group of participants had two or more cars (55%), the second-largest group had one car (39%), while the smallest group reported not owning a car (6%). As shown in Table 5, most of the participants (80%) reported using a car or motorcycle as their primary mode of transportation to work or school, while 8% of participants primarily rode buses. Only 5% used a bicycle as their primary mode of transportation (5%). As a secondary mode of transportation to work or school, the largest group of participants reported using buses (22%), while 17% used a car or motorcycle as their secondary mode. Again, few participants indicated using the bicycle as their secondary mode.

Table 5. Primary and secondary modes of transportation for CAAC sample, 2013-2014, Austin, Texas.

Primary Mode			**Secondary Mode**		
Mode	Count	Percentage	Mode	Count	Percentage
Walk	3	3.03%	Walk	11	11.11%
Car or motorcycle	79	79.80%	Car or motorcycle	17	17.17%
Bus	8	8.08%	Bus	22	22.22%
Rail	1	1.01%	Rail	1	1.01%
Bicycle	5	5.05%	Bicycle	5	5.05%
Other	0	0.00%	Other	3	3.03%
Total	**96**	**100%**	**Total**	**98**	**100%**

A majority (59%) of individuals in the survey had access to a bicycle (59%), but only 5% rode daily. A significant number (29%) reported using a bike only few times a year, while an even larger group (36%) never bike. The primary reason most participants did not bike was fear of being victim of crime, while the second most common reason cited by participants was that they did not have a biking companion. It was also common for members of the sample to report that the main reason they do not ride their bikes to work or school is because these destinations are simply too far from their homes, or because there is heavy traffic on the roads. The perceived high cost of owning a bicycle was the primary reason participants without bikes did not own them; these individuals also cited a fear of theft or not having a place to storage. Before the training, 41% of the participants considered themselves to have an intermediate level of biking experience.

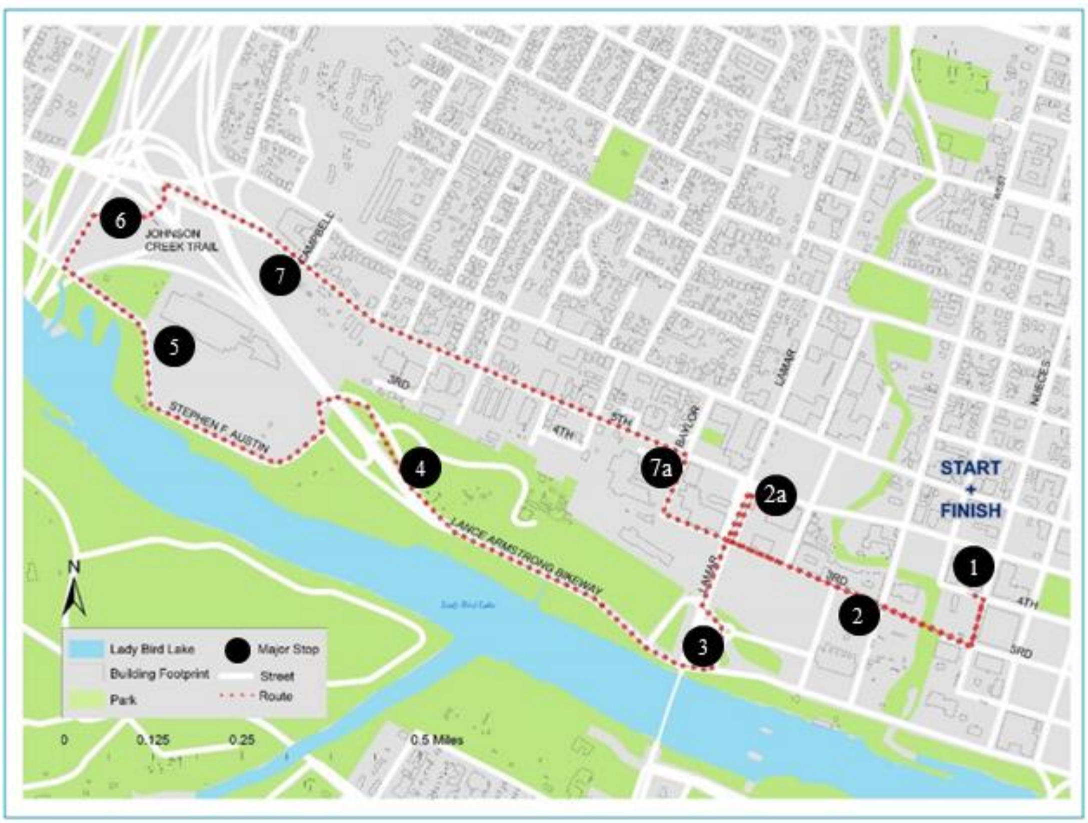
ENVIRONMENT OF THE CAAC

The CAAC Safety-Training Intervention, a three-hour commitment, is comprised of the following:

1. Pre-survey – 36 questions
2. Intervention – Safety Training
3. Post Survey – 14 questions
4. Wrap-Up – Discussion and Questions

The CAAC intervention was developed in two locations—West 3rd Street and West 5th Street—in Austin, Texas, between May 2012 and March 2013. The first phase of the curriculum was presented at Mellow Johnny's Bike Shop, and included: a helmet fit, "interpreting the City of Austin" bicycle map, bike fit, A.B.C quick check, a pre-ride demo, and on-bike practice. The second half of the intervention exposed participants to different types of bicycle infrastructure and riding scenarios.

Figure 1. West side route, CAAC event 2013-2014 - Austin, Texas.



Major stops and talking points for the West side route are the following:

1. Mellow Johnny's Bike shop (4th & Nueces)
2. 3rd Street & West Avenue
3. Stop light at Sandra Muraida Way
4. Along the Lance Armstrong Way
5. Stephen F. Austin Drive
6. Meadow at Johnson Creek Trail
7. Stop before Campbell

The East Side of Austin was chosen as a location for the CAAC Safety-Training Intervention in April 2014, with St. James Missionary Baptist Church hosting the first portion of the curriculum in its parking lot. The curriculum included the same information provided to participants during the West side intervention, but instead of West 3rd and 5th Streets, participants were exposed to riding scenarios along E M Franklin Ave, Manor road, and 12th street, among others.

Figure 2. East side route, CAAC event 2013-2014 - Austin, Texas.

Major stops and talking points for the East side route are the following:

1. E M Franklin Avenue
2. Threadgill St. & Zach Scott St.
3. McCloskey St. & Pinckney St.
4. Tom Miller St. & Mattie St.
5. Airport Boulevard & Manor Road
6. Cedar Avenue & E 12th St.
7. Airport Boulevard & E 12th St.
8. E M Franklin Avenue & E 12th St.

During the expert-guided bike ride in both locations, participants were exposed to, and given strategies to navigate, common scenarios including: avoiding door zones, lane placement for visibility, route choices, sidewalk riding restrictions, anticipating conflict zones, differences in road markings, and negotiating with drivers (McCray, Durden, & Schaubert, 2013).

MEAN DIFFERENCE AND EXPLORATORY FACTOR ANALYSIS

A mean difference and an exploratory factor analysis (PCA + Scree test) was performed to examine the data set that resulted from the CAAC safety-training intervention. These analysis methods were applied separately to the pre and post survey data. The mean differences were calculated using an Excel spreadsheet, while the t-test values and p-values were calculated using the R environment. R is a software that allows statistical computing and provides an integrated suite of software facilities to manipulate data and perform different calculations. It also allow graphical display. This software was also used to calculate the principal components analysis outputs. The scree plots were produced in an Excel spreadsheet using the eigenvalues calculated for the PCA.

Many studies are concerned with estimating, hypothesizing and testing between-group mean differences; techniques that are fundamental to the social and organizational sciences. When performing a mean differences analysis responses to scales are summed, and the mean of the summed score is then compared across groups applying standard statistical tests – like t-test – and described using d values (Sharma, Durvasula, Ployhart, 2011).

The analysis of means (ANOM) procedure was first introduced by Ott (1967) as a graphical method for testing differences between several populations' means. This is a technique used to compare a group of means and evaluate how different they are from the overall mean; it can also be considered an alternative to the analysis of variance (ANOVA) method (Nelson, 1993).

Exploratory factor analysis (EFA) can be defined – essentially – as a method of comparing and combining the results of a number of different tests, all performed on the same group of individuals (Lawley and Maxwell, 1962). The general purpose of factor analysis techniques is to reduce the number of variables and to detect structure in the relationships between them. Similar to the mean differences analysis, factor analysis and its extensions are commonly used in the social, behavioral, and applied sciences, and are useful tools when performing multivariate analysis (Yalcin & Amemiya, 2001). EFA has been also used as a technique to determine how each item in a data set relates to its own concept, as well as to other similar concepts (Gorsuch, 2010). The sample size issue has been widely analyzed in factor analysis literature, particularly those issues related to the minimum sample size needed to guarantee stable factors solutions that correspond to population factors. The minimum sample size in factor analysis depends on several aspects of any type of study, reason why it is not possible to generalize the minimum sample size needed (MacCallum, Widaman, Zhang, and Hong, 1999).

To determine the number of variables that needed to be reduced in the CAAC data set, two techniques were used: principal component analysis and scree test. Principal component analysis (PCA) is a known technique and a standard tool in multivariate data analysis to reduce the number of dimensions, while retaining as much as possible of the data's variation (Tipping & Bishop, 1999; Reisfeld, & Mayeno, 2013; Zou, Hastie, & Tibshirani, 2006). With the implementation of the PCA method it is possible to explore the first few components that represents the largest portion of the data's variation, instead of having to investigate all of the original variables. The statistical analysis of these principal components contribute to find similarities and differences between samples. Important original variables that are the major contributors to the first few components can be also discovered (Reisfeld, & Mayeno, 2013). A scree test or plot is a widely used criteria also implemented to determine how many components should be retained in order to explain a high percentage of the variation in the data. In this graphical test Eigenvalues constitute the Y axis of a graph, and the factors are plotted in order of extraction along the X axis (Streiner, 1998).

The first method to determine the number of retained factors was the Kaiser-Guttman criterion. The Guttman-Kaiser technique was suggested by Guttman in 1954 and then adapted and popularized by Kaiser in 1960. According to this technique the typical method for determining the correct number of factors is to take the number of components with eigenvalues greater than one (Yeomans & Golder, 1982). Guttman (1954) provides justification for this technique "in terms of it providing a lower bound for the number of common factors underlying a correlation matrix of observed varieties having unities in the main diagonal" (Yeomans & Golder, 1982, pp. 222). In other words, no component that explains less than the variance of an original variate can be considered to represent a significant source dimension. Despite the validity of this criterion, theoretical and empirical objections have been raised regarding its use (Streiner, 1998). In this sense, the scree test was performed to corroborate the number of factors that should be retained. According to Streiner "one major drawback in the use of scree tests is that it is primarily a visual procedure to determine where the resulting curve levels out" (1998, pp 688). There are some rules that have to be applied to reduce the subjectivity associated to this method. According to Zoski and Jurs (1990) when performing a scree test the minimum number of points for drawing the scree must be three and the first break in the curve have to be used if more than one exists. The number of factors to retain would be those placed before the first break of the curve.

CHAPTER 3 RESULTS

MEAN DIFFERENCE

We determined, using a difference of means test, that mean ratings across all measured parameters increased significantly after training. Both motivational levels of participation and the participants' level of comfort with different infrastructure design features significantly improved. During the CAAC intervention, participants were asked about their level of motivation to ride a bike for any number of various purposes; they then took part in training. After the intervention, the mean rating across all six parameters increased significantly (t = 10.31, p <.05). The greatest motivation for riding a bike that participants reported was fitness, and the training increased the level of confidence of participants to ride a bike—at least for recreational purposes. Participants were least motivated to use a bicycle for commuting, however the mean rating for this parameter increased significantly following training (See Table 6).

Table 6. Mean difference analysis for the likelihood of biking for the following reasons.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**3.26**	**1.53**	**3.72**	**1.39**	**10.31**	**6.21E-23**
For commuting (to/from work or school)	2.20	1.46	2.79	1.49	5.68	1.44E-07
For social activity?	3.53	1.39	4.09	1.12	4.53	1.75E-05
For fitness	4.47	0.76	4.69	0.65	3.52	6.79E-04
For shopping	2.63	1.43	3.21	1.36	5.24	9.96E-07
For recreation	4.23	1.02	4.50	0.88	2.64	9.73E-03
For other personal business	2.59	1.41	3.06	1.34	3.78	2.71E-04

Note. – Rating scale is 1: Not likely to 5: More likely
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When asked how comfortable they felt riding a bike in different locations or scenarios, the mean rating across all six parameters increased significantly after the training (t = 7.27, p <.05). After the CAAC event participants said they felt more comfortable riding a bike in their neighborhoods, on a bike path or on a trail, but *less* confident about riding in a bike lane on a street with speed limits higher than 30 mph (See Table 7).

Table 7. Mean difference analysis for the comfort level when riding a bike in the following locations/scenarios.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**3.76**	**1.34**	**4.08**	**1.12**	**7.27**	**1.13E-12**
In your neighborhood?	4.43	0.92	4.52	0.83	1.32	0.191
In surrounding neighborhood?	4.20	0.99	4.42	0.92	2.73	0.007
On a bike path/trail?	4.40	0.82	4.61	0.69	2.87	0.005
On a sidewalk?	3.61	1.34	3.84	1.14	2.34	0.021
On a street with speed limit of 30 mph or under?	3.40	1.34	3.99	0.97	5.07	0.000
In a bike-lane on a street with speed limit that is higher than 30 mph?	2.55	1.43	3.07	1.28	3.46	0.001

Note. – Rating scale is 1: Not comfortable to 5: Very comfortable
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants were asked about factors that discourage them from riding, the mean rating across all nine parameters increased significantly after the training (t = 9.77, p <.05). Biking with cars was the single most discouraging factor, but the remoteness of the destination also played a major role. That said, participants' ability to cycle with cars increased after training and they found distance less discouraging. The fear of being a victim of crime was considered by participants as the less discouraging factor among the nine they were asked about (See Table 8).

Table 8. Mean difference analysis for items that discourage cycling more often or at all.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**2.74**	**1.35**	**3.18**	**1.30**	**9.77**	**1.90E-21**
Biking with cars	2.17	1.17	3.09	1.13	6.74	1.16E-09
Lack of bike lanes	2.39	1.18	2.93	1.18	3.64	4.42E-04
Crossing major streets	2.40	1.25	3.16	1.12	5.49	3.36E-07
Destinations are too far away	2.33	1.30	2.56	1.36	1.88	6.26E-02
Fear of being a victim of crime	3.33	1.35	3.60	1.40	2.16	3.30E-02
Too hilly	3.02	1.26	3.26	1.24	1.90	6.09E-02
No one to bike with	3.27	1.27	3.69	1.19	2.77	6.77E-03
Weather above 85 degrees	3.04	1.42	3.29	1.35	1.76	8.20E-02
Weather below 40 degrees	2.67	1.38	3.05	1.37	2.92	4.39E-03

Note. – Rating scale is 1: Very discouraging to 5: Not discouraging
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants were asked how safe they felt riding in different situations, the mean rating across all seven parameters increased significantly after the training (t = 15.63, p <.05).

Cycling on a road in shared lane with a high speed limit was considered by participants as the most unsafe situation, followed by biking on a road with potholes/debris and biking at night. Biking with one or more people was the biggest motivator and participants indicated felling safe when they had the opportunity to participate in a group ride (See Table 9).

Table 9. Mean difference analysis for safety perceptions when cycling in the different situations

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**2.76**	**1.33**	**3.41**	**1.25**	**15.63**	**4.17E-47**
On a road in shared lane with high speed limit (35 mph or more)?	1.74	0.97	2.55	1.21	6.42	5.15E-09
On a road in shared lane with low speed limit (Lower than 35 mph)?	2.92	1.20	3.77	0.96	7.59	2.10E-11
At night?	2.10	1.24	2.88	1.24	6.38	7.12E-09
On a road in bike lane?	3.30	1.18	3.98	1.06	5.82	8.67E-08
On a road with potholes / debris?	2.08	0.98	2.84	1.12	7.34	7.73E-11
Alone?	3.11	1.11	3.51	1.13	3.85	2.13E-04
With 1 or more people?	4.02	0.97	4.37	0.84	3.93	1.60E-04

Note. – Rating scale is 1: Very unsafe to 5: Very safe
If $p<0.05$, then the means are likely different, whereas $p>0.05$ provides no such evidence.

Participants were exposed to a variety of street design features along the routes followed during the safety training, bike lanes, specialized pavement, buffer zones or barriers, sidewalks, multi-use paths, street and traffic signs for cyclists, and storage facilities for bikes (See Figure 1 and 2). The mean rating across all eight features increased significantly after the training (t = 8.04, p <.05) when participants reported which design feature made them more likely to ride a bike. Riding in a bike lane with buffer zones or barriers was the greatest motivator. Participants also felt motivated to bike if more bike lanes and multi-paths are available. The presence of sidewalks was reported as the lowest motivator to bike (See Table 10).

Table 10. Mean difference analysis for the design features that would motivate cycling.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**3.91**	**1.04**	**4.21**	**1.01**	**8.04**	**3.27E-15**
More bike lanes	4.01	0.99	4.44	0.81	4.41	2.73E-05
Specialized pavement markings (i.e. shared lane markings or green painted lanes)	3.93	0.94	4.44	0.77	5.31	7.04E-07
Bike lanes with buffer zones or barriers	4.38	0.83	4.58	0.73	2.62	0.01
Sidewalks	3.52	1.14	3.76	1.13	1.96	0.05
Multi-use paths (i.e. wider pathways shared by bicyclists and pedestrians)	3.95	1.08	4.13	1.03	1.43	0.16
Bicycle street signs (i.e. share the road, bike route, bike lane)	3.69	1.02	4.07	1.11	3.74	0.00
Traffic signals for cyclists	3.92	1.03	4.18	1.08	2.37	0.02
Better storage facilities for bikes (i.e. bicycle parking)	3.90	1.08	4.10	1.08	1.92	0.06

Note. – Rating scale is 1: Not likely to 5: More likely
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants reported what motivates them to ride a bike, the mean rating across all seven factors increased significantly after the training (t = 8.55, p <.05). Riding a bike for exercise was very motivating, as was enjoying the outdoors and riding with a group. Participants reported feeling less motivated to use a bike when comparing travel time using a bike to using a car or public transport. Racing was considered as the lowest motivator to cycle (See Table 11).

Table 11. Mean difference analysis for motivating factors to ride a bike.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**3.52**	**1.40**	**3.82**	**1.35**	**8.55**	**8.03E-17**
Exercise	4.67	0.64	4.73	0.60	1.35	0.18
Racing	2.21	1.19	2.47	1.27	2.44	0.02
Social/Group ride	4.19	0.97	4.49	0.83	2.96	0.00
Environment/Air quality	3.62	1.13	4.02	1.09	4.59	1.33E-05
To enjoy time outdoors	4.31	0.91	4.58	0.84	3.62	0.00
Cost compared to driving/transit	3.13	1.39	3.45	1.33	2.94	0.00
Travel time compared to driving/transit	2.53	1.32	2.97	1.37	4.66	9.92E-06

Note. – Rating scale is 1: Not motivating to 5: Very motivating
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants were asked if having access to specific resources would encourage them to bike more, the mean rating increased significantly after the training (t = 7.79, p <.05). Being part of a bike safety class with bike ride was considered among participants as highly encouraging, as was riding with an expert guide; these were two major elements of the CAAC event. Map training was not included in the CAAC event, but participants indicated that having access to a bike map with road ratings would be a great motivator to bike more (See Table 12).

Table 12. Mean difference analysis for resources that encourage biking.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**3.92**	**1.13**	**4.33**	**1.02**	**7.79**	**1.21E-13**
Bike map with road ratings	3.70	1.18	4.12	1.07	4.36	3.24E-05
Bike ride with expert guide	3.94	1.14	4.41	1.04	5.67	1.47E-07
Bike safety class with bike ride	4.13	1.05	4.45	0.91	3.56	5.83E-04

Note. – Rating scale is 1: Not encouraging to 5: Very encouraging
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants were asked how likely they were to use some features while cycling, the mean rating increased significantly after the training (t = 5.63, p <.05). They felt highly motivated to use a reflector on their bikes, as well as to use a rear and front light, and to wear bright clothes (See Table 13).

Table 13. Mean difference analysis for the likelihood of wearing some equipment when riding at night.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**4.52**	**0.88**	**4.70**	**0.63**	**5.63**	**3.36E-08**
Bright Clothes	4.30	0.92	4.54	0.75	3.77	0.000
Reflector on bicycle	4.77	0.53	4.82	0.48	0.90	0.372
Front Headlight	4.46	0.99	4.70	0.65	3.25	0.002
Rear light	4.53	0.93	4.73	0.60	3.13	0.002

Note. – Rating scale is 1: Never to 5: Always
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

When participants were asked which resources would encourage them to try new cycling routes, the mean rating increased significantly following the training (t = 7.13, p <.05). Participants indicated to feel more comfortable to try a new route if they have access to a bike safety class, followed by participating in a bike ride with an expert guide. During the CAAC event, participants were exposed to these two resources. Having access to a bike map was also considered as encouraging when trying a new route (See Table 14).

Table 14. Mean difference for resources that would encourage participants to try new routes.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
All	**4.00**	**1.14**	**4.38**	**0.93**	**7.13**	**8.34E-12**
Bike map	3.65	1.26	4.14	1.02	4.34	3.68E-05
Bike ride with expert guide	4.25	1.07	4.51	0.90	3.32	1.30E-03
Bike safety class	4.12	0.98	4.48	0.82	4.78	6.65E-06

Note. – Rating scale is 1: Not encouraging to 5: Very encouraging
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

Although a map training was not included, participants on the CAAC event reported to feel more comfortable planning a route to work or school if they use a bike map (See Table 15). The mean rating increased significantly with t = 3.38 and p = 0.001.

Table 15. Mean difference for the comfort rate when a route to work/school using a bike map.

	Pre Survey		Post Survey			
	Mean	SD	Mean	SD	*t*	*p*
	3.58	1.54	4.14	1.42	3.38	0.001

Note. – Rating scale is 1: Not comfortable to 5: Very comfortable
If p<0.05, then the means are likely different, whereas p>0.05 provides no such evidence.

EXPLORATORY FACTOR ANALYSIS

As mentioned before, a principal components analysis and a scree test was performed in order to determine the number of components that needed to be retained to explain a high percentage of the variation in the data.

All the questions for which the scree test was applied met the basic rules mentioned before. Furthermore, in most questions the number of factors to be retained according to the principal component analysis and the scree test concur. Below, the tables for the principal components analysis and the scree plots are provided with a more detailed explanation of the outcome obtained.

For the likelihood of biking due to several reasons, the principal components analysis determined that two components should be retained for the pre-survey and post-survey data, according to the Kaiser-Guttman criterion (Eigenvalues >1). In the pre-survey data the two components to be retained account for 71% of the variance, while for the post-survey data the two retainable components account for 66% of the variance (See Table 16). The scree test shows that both curves have two components before the first break of the curve, which represent the number of components to be retained (See Chart 1 and 2).

Table 16. Likelihood of biking for the following reasons. Principal components analysis.

Pre-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*2.702796*	*0.450466*	*2.702796*	*45.0466*
Comp.2	*1.575686*	*0.262614*	*4.278482*	*71.30803*
Comp.3	0.623689	0.103948	4.902171	81.70285
Comp.4	0.5579	0.092983	5.460071	91.00119
Comp.5	0.333161	0.055527	5.793232	96.55387
Comp.6	0.206768	0.034461	6	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*2.515378*	*0.41923*	*2.515378*	*41.92296*
Comp.2	*1.455315*	*0.242553*	*3.970693*	*66.17822*
Comp.3	0.687863	0.114644	4.658556	77.64261
Comp.4	0.588649	0.098108	5.247205	87.45342
Comp.5	0.417114	0.069519	5.66432	94.40533
Comp.6	0.33568	0.055947	6	100

Chart 1. Scree test for the likelihood of biking for the following reasons. Pre-Survey.

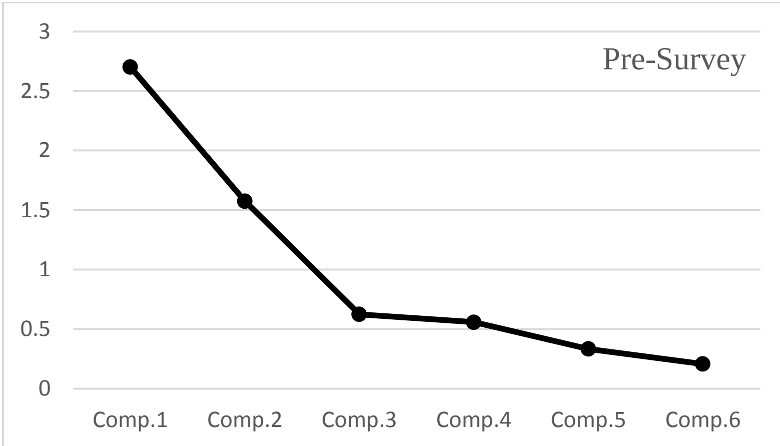
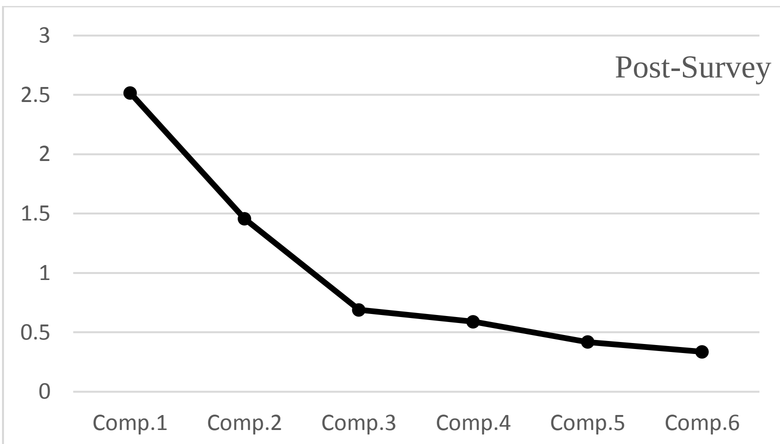


Chart 2. Scree test for the likelihood of biking for the following reasons. Post-Survey.



According to the principal component analysis, two components should be retained when analyzing the comfort level during a bike ride in different scenarios (See Table 17). The scree test results determine that one or two components should be retained (See Chart 3 and 4).

Table 17. Comfort level when riding a bike in the following locations/scenarios. Principal components analysis.

Pre-Survey	Eigenval	% Total Variance	Cumul. Eigenval	Cumul. %
Comp.1	*2.725823*	*0.454304*	*2.725823*	*45.43039*
Comp.2	*1.156798*	*0.1928*	*3.882622*	*64.71036*
Comp.3	0.920353	0.153392	4.802974	80.04957
Comp.4	0.673317	0.112219	5.476291	91.27152
Comp.5	0.327051	0.054508	5.803342	96.72237
Comp.6	0.196658	0.032776	6	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*2.929364*	*0.488227*	*2.929364*	*48.82274*
Comp.2	*1.174404*	*0.195734*	*4.103769*	*68.39615*
Comp.3	0.851801	0.141967	4.95557	82.59284
Comp.4	0.484671	0.080778	5.440241	90.67068
Comp.5	0.365206	0.060868	5.805447	96.75745
Comp.6	0.194553	0.032426	6	100

Chart 3. Scree test for the comfort level when riding a bike in different scenarios. Pre-Survey.

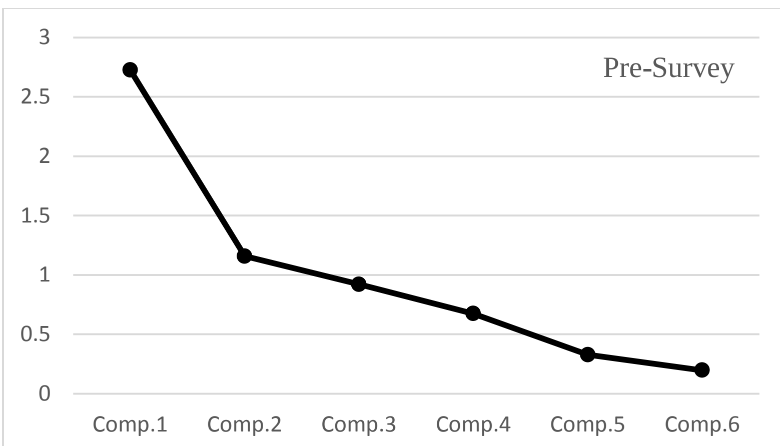
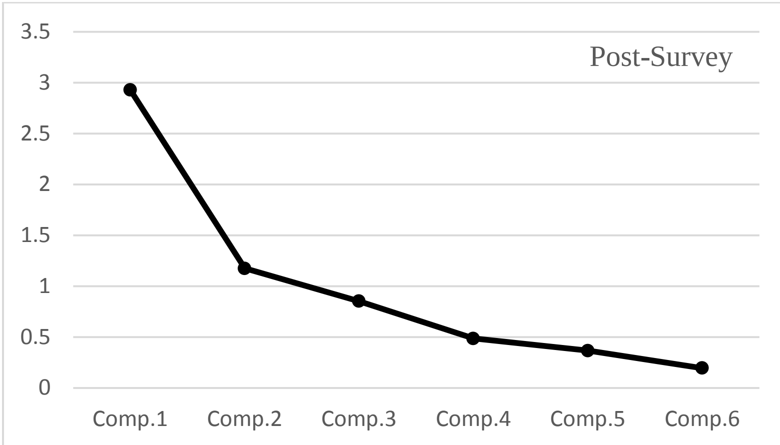


Chart 4. Scree test for the comfort level when riding a bike in different scenarios. Pre-Survey.



Principal components analysis determined that two components with Eigenvalues greater than one (1) should be retained (See Table 18). The scree test shows that there is one component before the break point of the curve, which means that it is possible to retain one or two components depending on the interpretation made. Since the PCA determined that two components should be retained, the scree test can be used as a confirmation of the previous statement (See Chart 5 and 6).

Table 18. Items that discourage cycling more often or at all. Principal components analysis.

Pre-Survey	Eigenval	% Total Variance	Cumul. Eigenval	Cumul. %
Comp.1	*3.464411*	*0.384935*	*3.464411*	*38.49346*
Comp.2	*1.251145*	*0.139016*	*4.715556*	*52.39506*
Comp.3	0.979111	0.10879	5.694667	63.27407
Comp.4	0.785633	0.087293	6.4803	72.00333
Comp.5	0.705351	0.078372	7.18565	79.84056
Comp.6	0.645597	0.071733	7.831247	87.01386
Comp.7	0.581003	0.064556	8.41225	93.46944
Comp.8	0.316134	0.035126	8.728384	96.98204
Comp.9	0.271616	0.03018	9	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*4.269701*	*0.474411*	*4.269701*	*47.44112*
Comp.2	*1.175917*	*0.130657*	*5.445617*	*60.50686*
Comp.3	0.904924	0.100547	6.350541	70.56157
Comp.4	0.66455	0.073839	7.015091	77.94545
Comp.5	0.558662	0.062074	7.573752	84.1528
Comp.6	0.45248	0.050276	8.026232	89.18036
Comp.7	0.414124	0.046014	8.440356	93.78174
Comp.8	0.327507	0.03639	8.767863	97.4207
Comp.9	0.232137	0.025793	9	100

Chart 5. Scree test for items that discourage cycling more often or at all. Pre-Survey.

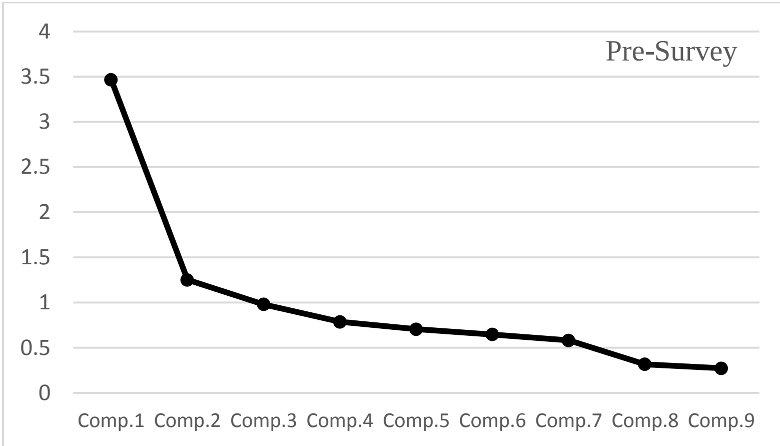
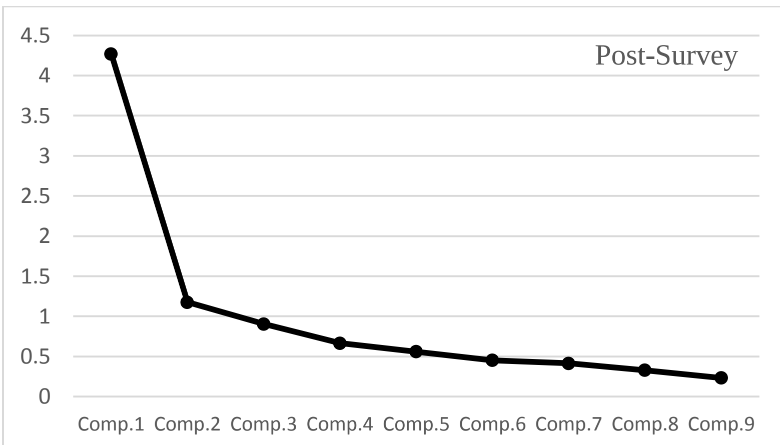


Chart 6. Scree test for items that discourage cycling more often or at all. Post-Survey.



According to the PCA performed, there are two components with Eigenvalues greater than one (1), which indicates the number of components that should be retained to explain 67% of the variance in the pre-survey data and 65% in the post-survey data (See Table 19). The scree test confirms this interpretation (See Chart 7 and 8).

Table 19. How safe do you feel cycling in the following situations?
Principal components analysis.

Pre-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*3.66095*	*0.522993*	*3.66095*	*52.29928*
Comp.2	*1.030318*	*0.147188*	*4.691268*	*67.01811*
Comp.3	0.731531	0.104504	5.422799	77.46855
Comp.4	0.578924	0.082703	6.001722	85.73889
Comp.5	0.373766	0.053395	6.375488	91.07839
Comp.6	0.347495	0.049642	6.722983	96.04261
Comp.7	0.277017	0.039574	7	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*3.48855*	*0.498364*	*3.48855*	*49.83643*
Comp.2	*1.093712*	*0.156245*	*4.582263*	*65.46089*
Comp.3	0.817011	0.116716	5.399274	77.13249
Comp.4	0.564202	0.0806	5.963476	85.19252
Comp.5	0.453765	0.064824	6.417241	91.67487
Comp.6	0.333878	0.047697	6.751119	96.44456
Comp.7	0.248881	0.035554	7	100

Chart 7. Scree test for safety perceptions when cycling in different situations. Pre-Survey.

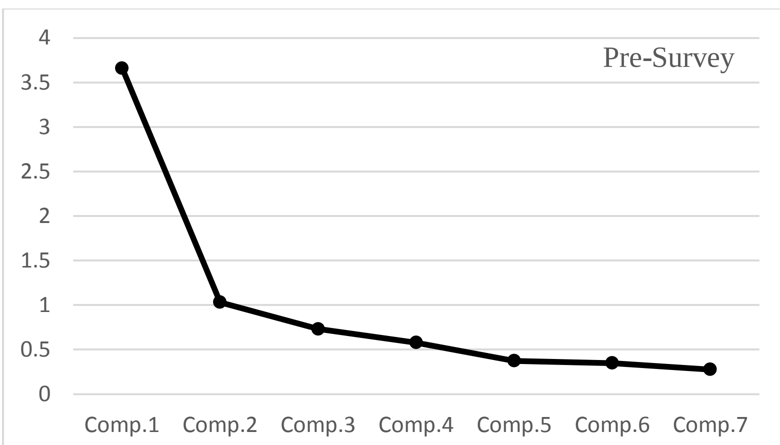
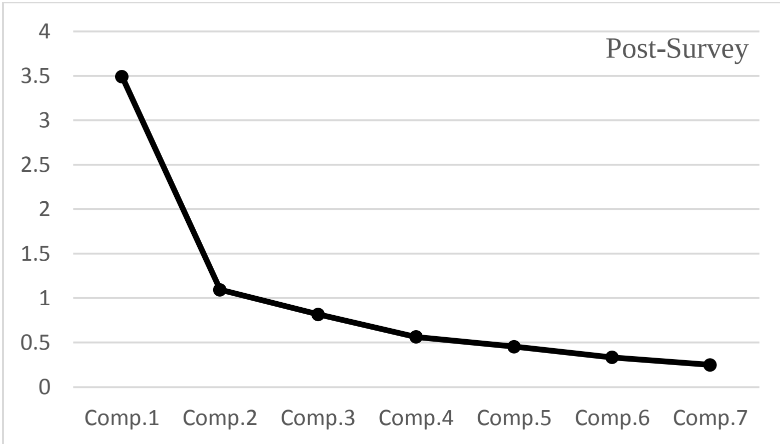


Chart 8. Scree test for safety perceptions when cycling in different situations. Post-Survey.



The PCA performed indicates that two components should be retained for the pre-survey data accounting for 69% of the variance. For the post-survey just one (1) component should be retained accounting for 63% of the variance (See Table 20). The scree test shows that for the pre-survey data, it is possible to retain two components. For the post-survey it is more likely that only one component should be retained (See Chart 9 and 10).

Table 20. Design features that would make you more likely to bike.
Principal components analysis.

Pre-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*4.292709*	*0.536589*	*4.292709*	*53.65886*
Comp.2	*1.245376*	*0.155672*	*5.538085*	*69.22606*
Comp.3	0.738744	0.092343	6.276829	78.46036
Comp.4	0.523324	0.065416	6.800153	85.00192
Comp.5	0.437471	0.054684	7.237624	90.4703
Comp.6	0.339053	0.042382	7.576677	94.70847
Comp.7	0.24808	0.03101	7.824757	97.80946
Comp.8	0.175243	0.021905	8	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*5.078423*	*0.634803*	*5.078423*	*63.48029*
Comp.2	0.7402	0.092525	5.818623	72.73279
Comp.3	0.609667	0.076208	6.42829	80.35363
Comp.4	0.571243	0.071405	6.999533	87.49417
Comp.5	0.34952	0.04369	7.349053	91.86316
Comp.6	0.284515	0.035564	7.633568	95.41961
Comp.7	0.214384	0.026798	7.847952	98.09941
Comp.8	0.152048	0.019006	8	100

Chart 9. Scree test for design features that would make participants more likely to bike. Pre-Survey.

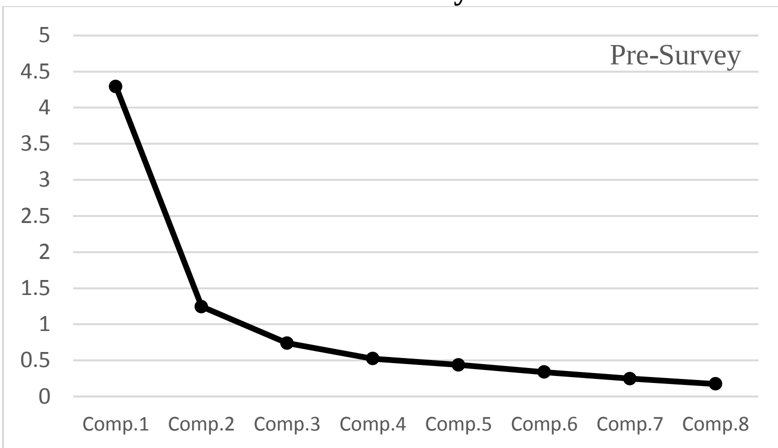
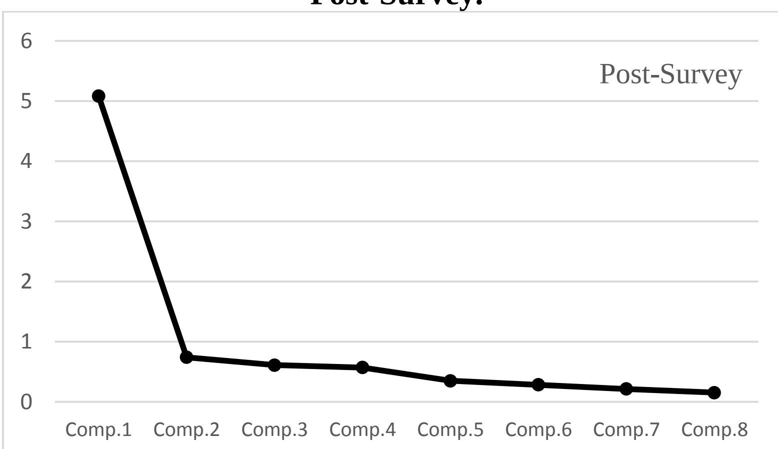


Chart 10. Scree test for design features that would make participants more likely to bike. Post-Survey.



For the pre-survey data the PCA determined that three components should be retained in other to explain 72% of the variance. For the post-survey two components should be retained if the Kaiser-Guttman criterion is applied. This two components will account for 65% of the variance (See Table 21). The scree test outcomes for this data contributes to confirm the number of factor that should be retained (See Chart 11 and 12).

Table 21. Factors motivating you to ride a bike. Principal components analysis.

Pre-Survey	Eigenval	% Total Variance	Cumul. Eigenval	Cumul. %
Comp.1	*2.228933*	*0.318419*	*2.228933*	*31.8419*
Comp.2	*1.820829*	*0.260118*	*4.049763*	*57.85375*
Comp.3	*1.004586*	*0.143512*	*5.054349*	*72.20498*
Comp.4	0.651212	0.09303	5.705561	81.50802
Comp.5	0.479261	0.068466	6.184822	88.3546
Comp.6	0.428474	0.061211	6.613296	94.47566
Comp.7	0.386704	0.055243	7	100
Post-Survey	**Eigenval**	**% Total Variance**	**Cumul. Eigenval**	**Cumul. %**
Comp.1	*2.962111*	*0.423159*	*2.962111*	*42.31587*
Comp.2	*1.588923*	*0.226989*	*4.551034*	*65.01477*
Comp.3	0.983512	0.140502	5.534545	79.06493
Comp.4	0.495722	0.070817	6.030267	86.14667
Comp.5	0.398013	0.056859	6.42828	91.83257
Comp.6	0.33021	0.047173	6.75849	96.54986
Comp.7	0.24151	0.034501	7	100

Chart 11. Scree test for factors motivating you to ride a bike. Pre-Survey.

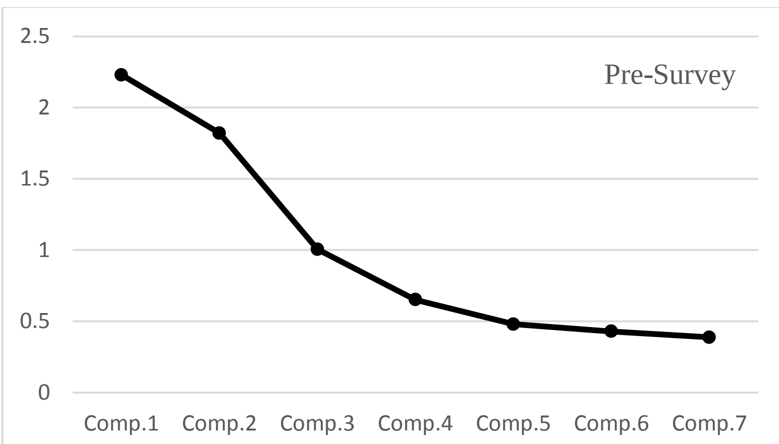
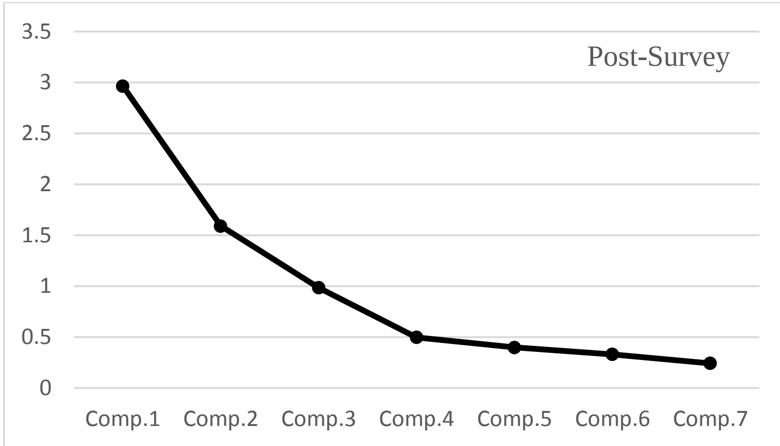


Chart 12. Scree test for factors motivating you to ride a bike. Post-Survey.



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CHAPTER 4 CONCLUSION

The Cycling in the African American Study focuses on non-cyclists and those who cycle very little. The intent was not to address the work or school trip, but to encourage cycling for pleasure, social activities, and recreation. The analyses used to analyze the 99 adults show the effectiveness of our culturally-tailored safety-training intervention. Study participants felt more confident, comfortable, knowledgeable, and motivated to cycle after the training. This training serves well as an introduction to cycling, and would be very effective as a "Part 1" in a series of community organized rides led by an experienced cyclist.

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