Bike Safety Communications Campaign

College of Public Health

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In partnership with the City of Iowa City

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Improving Interactions with Current Biking Infrastructure: Iowa City

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Table of Contents

Project Goal

In collaboration with the City of Iowa City and the Metropolitan Planning Organization of Johnson County (MPOJC) our team has decided to address one of the most important issues surrounding safe cycling in Iowa City. Our goal, born out of our formative evaluation (see below), is to create a campaign to increase knowledge of safe cyclist and motorist behaviors as they pertain to the use of sharrows, or shared vehicle/bicycle roadways. Currently, knowledge about sharrows and their use is very low. Our objective is to promote proper cyclist and motorist behavior through education regarding sharrows and safe passing. If the goal is achieved, it is our belief that we will observe a greater percentage of safe interactions between bicyclists and motorists.

Significance of the Problem

According to reports from the Centers for Disease Control and Prevention (CDC), pedal cycling injuries ranked as the 17th leading cause of unintentional injury death among persons aged 18 to 65 years between 2010 to 2014 (NCIPC, 2014). Further, in 2010 alone the combined cost of medical treatment and costs associated with work lost amounted to nearly $700 million (NCIPC, 2010). According to a Iowa Bicycle Coalition report using Iowa Department of Transportation data, a reported 10,000 fatal and non-fatal bicycle crashes were reported in Iowa between 2010 and 2014 (Iowa Bike Coalition,2014). As such, reducing the injury risk associated with cycling either via behavior, infrastructure, and/or policy change is imperative. One way to achieve this is by meeting current standards associated with safe biking communities.

Due to Iowa City's commitment to cycling demonstrated through events such as "Bike to Work Week" and the presence of an active bicycle advisory committee, the League of American Bicyclists classifies Iowa City as a “silver” level bike friendly community (League of American Cyclists, 2013). While this is an important accomplishment, there are still improvements to be made before Iowa City can be at its best for bicycle safety. There are many barriers for cyclists, particularly for novice cyclists. While improving infrastructure will increase the number of safe routes within the Iowa City bicycle network over time, there is an immediate need for reducing risks to cyclist safety utilizing the bicycle infrastructure already in place.

The Johnson County Council of Governments (JCCOG) outlined a Metropolitan Master Bicycle Plan identifying current issues for cyclists in Johnson County and recommendations for addressing these problems. In the 1980’s most of Iowa City and Coralville’s bike lanes were removed in order to provide more freedom for cyclists. However, feelings of danger and a desire to have more designated bike lanes top the list of barriers for cyclists, according to our formative evaluation (see below).

While wider sidewalks have been constructed in Iowa City and Coralville to accommodate more pedestrians and cyclists, the number of safe bike routes have not been increased. In fact, there are between 1.8 and 2.5 times more collisions involving cyclists on extra wide sidewalks than on roadways (JCCOG, 2009). While not specific to Johnson county, evidence suggests that sidewalks pose the highest risk to cyclists (Reynolds, et al., 2009). However, many of the roads are too narrow for cyclists and motorists to share the lane side by side, therefore increasing the popularity and necessity of sharrows. Sharrows do not separate cyclists into a bike lane, but

mark the pavement to ideally direct cyclists to travel in the proper lane and remind motorists to share the roadway. When utilized correctly, sharrows help increase safe passing distance between motorists and cyclists and the distance between motorists and parked cars (JCCOG, 2009). Unfortunately, many of the sharrows in Iowa City are improperly placed and their meaning is not well understood by road users.

The highest number of bicycle collisions takes place on streets where bicycle and motorist traffic are both high. In Iowa City this includes Burlington, Gilbert, and Dodge Streets (JCCOG, 2009). On-street pavement markings are commonly used on these streets, but need to be improved and used in conjunction with appropriate signage, particularly on road segments with high crash rates. There is currently no regulated campaign geared at cyclists and motorists safely, effectively, and legally sharing the road, and it is our belief that addressing this problem can help improve bicycle safety in Iowa City.

Partnerships

For this campaign, we worked most closely with Sarah Walz of the Metropolitan Planning Organization of Johnson County (MPOJC). Especially in the early phases of the project, we also worked with Mark Wyatt of the Iowa Bicycle Coalition (IBC) to complement their future radio campaign, which will be targeted at motorist passing distance. This coalition is a statewide entity that promotes bicycle safety and lobbies for improved bicycling-related legislature. Our goal was to align our project with the goals of the city and complement the work of other bike organizations in the city. However, during the pilot testing phase of the project, it became clear

that the priorities of the IBC did not include sharrows. We adjusted the message to be more acceptable to the IBC, while still focusing on the goals of the City.

During the formative evaluation process, we also reached out to a number of organizations and key stakeholders in the community. Groups members spoke to John Fuller, a faculty member in the Urban and Regional Planning department; Liz Christiansen from the Office of Sustainability; Marcia Bollinger, the Neighborhoods Outreach Coordinator for the City of Iowa City; Emily Robnett of the University's Bicycle Advisory Committee's Safety Sub-Committee; Cara Hamann from the University of Iowa; as well as local bike shops including 30th Century Bikes, World of Bikes and Geoff's Bike and Ski.

Target Audience

Our aim is to target primarily motorists, given that survey respondents mentioned feeling unsafe as a barrier to bicycling in the downtown area and that many people feel motorists and cyclists alike either do not know or ignore current laws surrounding bicycling. Further, our formative evaluation indicated a poor understanding of the purpose of and appropriate use of sharrows among motorists and cyclists. Through this campaign, we aimed to increase motorists' knowledge of and adherence to laws and safe practices surrounding bicycles, such as giving bicycles the full lane when passing. We also expect bicyclists will likely be privy to the campaign and benefit from it. While targeting such a wide audience is not always advisable, we feel this was the best approach given our community partners, their goals, and available resources.

Literature Review

Our literature review revealed three key factors that influence bicycling safety: the built environment, current state legislation, and behavior (of cyclists and motorists).

Built Environment

Reviewed literature indicates aspects of the built environment that influence bicycling safety and behavior- the availability and type of bicycle facilities, infrastructure, signs, and road markings- have been connected to some communities to increased safety and bicycling behavior.

Several studies have examined the impacts of the availability and type of bicycle infrastructure and facilities. One literature review revealed that many previous studies showed a positive relationship between increased infrastructure (bike lanes, shared bike/bus lanes, bike parking, etc.) and increased bicycling behavior (Pucher& Dijkstra, 2003). Telephone surveys conducted in four metropolitan areas of Missouri also identified associations between features of the built environment and leisure physical activity- increasing bicycle facilities was linked to increased amount of physical activity for both leisure and commuting (Adlaka et al., 2015). Another study found that bike lanes specifically are an effective way to reduce severe crashes by drawing the attention of the motorist to the cyclists on the road (Park et al., 2015). Without these on-street bike lanes, risks for bicyclists were found to be three to four times higher in a review of crash data and average daily traffic (Pulugurtha & Thakur, 2015). Of the available facilities and infrastructure, certain types, such as cycle tracks, bike lanes on major streets with no parking, and off-street bike paths, were determined to have lower injury risk than other facilities, like sidewalks and multi-use paths (Teschke et al., 2012). This research indicates that attention to

biking infrastructure is imperative to increasing safety for bicyclists but specific needs may vary by community and should be assessed accordingly.

In addition to facilities, supportive signage and road markings also influence bicycling safety and behavior. Using video footage of four different streets in Austin, TX, Brady et al. (2011) found that using sharrows or other lane markings improved safety for bicyclists and motorists, even when they were not paired with additional education. The increase in safety was due to cyclists riding in more appropriate locations and motorists passing at more respectful distances (Brady et al, 2011). Further, a web-based survey conducted by Hess and Peterson (2015) found that certain supportive signs stating “Bicycles May Use Full Lane” were the most effective in increasing understanding among bicyclists and motorists.

By further developing infrastructure and facilities as well as providing signage and road markings, cycling can be made safer and more accessible to different groups.

Current State Legislation

To address safety issues, current Iowa policy regarding bicycle and motor vehicle interaction focuses on passing and acceptable and safe usage of roadways. According to the Iowa Legislature Section 321.281, "A person operating a motor vehicle shall not steer the motor vehicle unreasonably close to or toward a person riding a bicycle on a highway, including the roadway or the shoulder adjacent to the roadway" (Iowa Legislature). There is no specific measurement for distances that are unreasonably close denoted by Iowa State Legislature. Bicycles should ride on the right side of the road but contrary to the assumptions of many drivers, bicycles do not have to ride as close to the right side of the road as possible. The law

states that bicycles, like motor vehicles, should ride on the right half of the road whenever it is safe to do so (Iowa Legislature).

Behavior

Behavior is another important factor in creating a campaign for increased cycling safety. Current literature suggests that cyclists tend to bike more safely when they feel they are not in danger (Chuang, et al., 2013; Shaw, et al., 2014). More specifically, when bicyclists felt they were given adequate space while being passed, and when vehicles, particularly buses, were not crossing into bike lanes, cyclists had more control over their bicycles and felt safer (Brady, et al., 2011; Chuang, et al., 2013).

Brady et al. (2011) identified that sharrows do improve bicycle safety, but that better markings and associated signage would increase both motorist and cyclist understanding of sharrows and further enhance safety. The authors suggest locating shared lane markings in the center of the lane and adding improved "share the road" signage so motorists and cyclists are more aware of the cyclist's right to road usage. Hess and Peterson (2015) suggested that signage raising awareness of cyclists' ability to utilize the full lane is most effective in addressing the lack of understanding surrounding sharrows from both a motorist and a cyclist perspective.

A study examining what factors contributed to cyclist violation of road laws found that increased speed of traffic and other feelings of danger were the two main factors in contributing to unlawful cyclist behaviors (Shaw et, al., 2014). These "other" feelings of danger include busy roadways, narrow streets, and concerns regarding the visibility of drivers. Perceptions of motorist impatience and aggression are two other reasons why cyclists reported breaking road

laws (Shaw et, al., 2014). The most commonly cited infractions were biking on sidewalks and cycling through red lights. The authors felt this aligned with cyclist fears of crowded and dangerous roadways, high vehicle speeds, and motorist visibility (Shaw et, al., 2014).

Past studies have shown that increased numbers of pedestrians and cyclists contribute to decreased incidents of motor-vehicle bicycle crashes (Ekman, 1996). Importantly, these studies did not examine if bicyclist, pedestrian, and/or motorists behavior was affected. A more recent study by Jacobson (2003) not only replicated this finding in American and Danish cities, but went a step further and found that pedestrian and cyclists behaviors remained largely unchanged, but rather motorists modified their behavior to accommodate increased numbers of vulnerable road users.

Formative Evaluation

In order to gain a better understanding of current biking behaviors and potential barriers to bicycling in Iowa City, we created a simple, 12-question survey. The survey included questions designed to provide information on: demographics (i.e., age, gender, and ethnicity), how far respondents lived from downtown, their typical mode of transportation, how often they bike downtown, what barriers prevent them biking downtown, reasons for biking, opinions on biking infrastructure, how safe respondents felt when biking downtown, opinions on what safety concerns exist and how the city might address them (visit https://uiowa.qualtrics.com/SE/?SID=SV_02sJIU5LKLBTwtD to see the full survey). We solicited responses two ways: 1) an online version of the survey was distributed via social media channels and 2) group members sought respondents in downtown Iowa City.

One hundred and seventy-three respondents completed the survey. Forty-two percent of respondents were between 18- and 25-years-old, followed by those in the 26- to 35-year-old age group (37%), the 36- to 45-year-old age group (12%), the 46- to 55-year-old age group (6%), and the 56- to 65-year-old age group (4%). No respondents fell into the 65-year plus category. Most respondents were female (63%). The sample was primarily White (75%), but also included a number of respondents who identified as African-American (4%), Native-American (0.6%), Asian/Pacific Islander (11%), Hispanic (5%), and other (5%). See Table 1 for detailed descriptive statistics on all variables.

In order to better assess current biking behavior among respondents and barriers associated with them, we ran a series of Pearson correlations using responses from the survey. First, we examined the association between age and transportation type, typical biking activities. Being an older adult was significantly associated with biking as a means of getting downtown, $r = .23$, $p = .002$, while being a younger adult was significantly associated with walking downtown, $r = -.24$, $p = .001$. Additionally, being an older adult was significantly associated with an increase in using a bike for running errands, $r = .23$, $p = .003$. When examining the association between gender and transportation type, a positive, significant association between being female and increased use of motor vehicles to get downtown was found, $r = .16$, $p = .04$.

Significant associations were also found between the distance lived from downtown and transportation type. A moderately significant correlation, $r = -.14$, $p = .06$, was found between living further away from downtown and biking to get downtown. Similarly, living further away from downtown was associated with less walking to get downtown, $r = -.49$, $p < .001$. Finally,

living further away from downtown was associated with increased driving to get downtown, r = .34, p < .001. When examining the association between days biked and typical biking activities, positive associations were found between an increased number of days biked per week and increased bicycling behaviors of commuting to work or school, r = .68, p < .001, running errands, r = .51, p < .001, and exercising, r = .24, p < .001.

When analyzing barriers to biking downtown, we found negative associations between respondents mentioning that it was too far to bike downtown, r = -.25, p = .002, or took too long to bike downtown, r = -.25, p = .002, with a decrease in days biked. Additionally, forty-percent of respondents mentioned safety being a barrier to bicycling downtown. This varied by age group, with those in the 18- to 25-year–old age group mentioning this as a barrier most often. Further, females rated safety as a barrier to their biking downtown, although this finding was only marginally significant, $F(1,165) = 3.20$, $p = .08$.

Finally, when asked what safety concerns people had when bicycling, respondents most often mentioned a lack of bike lanes and fear of being hit by a motor-vehicle. When asked what the city could do to improve safety for cyclists the addition of bike lanes was the overwhelming response, with 85% of respondents mentioning them. Given that adding bike lanes was beyond the scope of a semester long campaign, we describe in detail below our efforts to develop a campaign that will increase knowledge of sharrows and increase safe interactions between motorists and cyclists.

Additional formative evaluation steps were taken in order to better inform the creation of campaign materials and are explained in greater detail below (see *Message Development*).

Theoretical Application

Social Cognitive Theory, posits that three factors continuously interact with one another to explain behavior: environmental, personal, and behavioral (Bandura, 1986). This theory has been widely used in psychology and communication. Interestingly, this theory was expanded from Bandura's early research in social learning (Bandura, 1976). Bandura's early experiments examined the role of social modeling on behavior and found that when children observed violent behavior toward the now infamous Bobo doll, preschool aged children went on to exhibit not only the same behaviors, but novel aggressive behaviors as well. In essence, these experiments showed that others can learn from observing the experiences of others (modeling), as well as from their own experiences. In health campaigns, Social Cognitive Theory is also used to influence and modify health behaviors. Importantly, for Social Cognitive Theory to be successful when modifying health behaviors, the use of self-control, reinforcement, and self-efficacy are essential. Further, a person must believe that the change in behavior will lead to a different outcome (outcome expectations). Perhaps, most important among these is self-efficacy or a person's belief in their ability to complete an action (Glanz & Bishop, 2010). For example, when quitting smoking, a person with high self-efficacy will persist in the quitting behavior, even when cravings hit, because they know they are up to the challenge.

Given that self-efficacy is such an integral part of changing health behaviors under Social Cognitive Theory, it is an important construct for health communication campaigns to utilize. Typically, the goal is to increase self-efficacy via setting small, achievable goals, using behavior contracts that have set goals and rewards, and monitoring/reinforcement. In addition, behavior change with this theory is cyclical, in that those being targeted by the campaign also help

reinforce the behavior change in others via modeling the desirable behavior. For example, if the current campaign is successful in its long term goal of increasing safe biking behavior by targeting motorist/cyclist interactions and increase knowledge of current infrastructure, others will see an increase in the behavior and become more likely to adopt the behavior themselves (Glanz & Bishop, 2010).

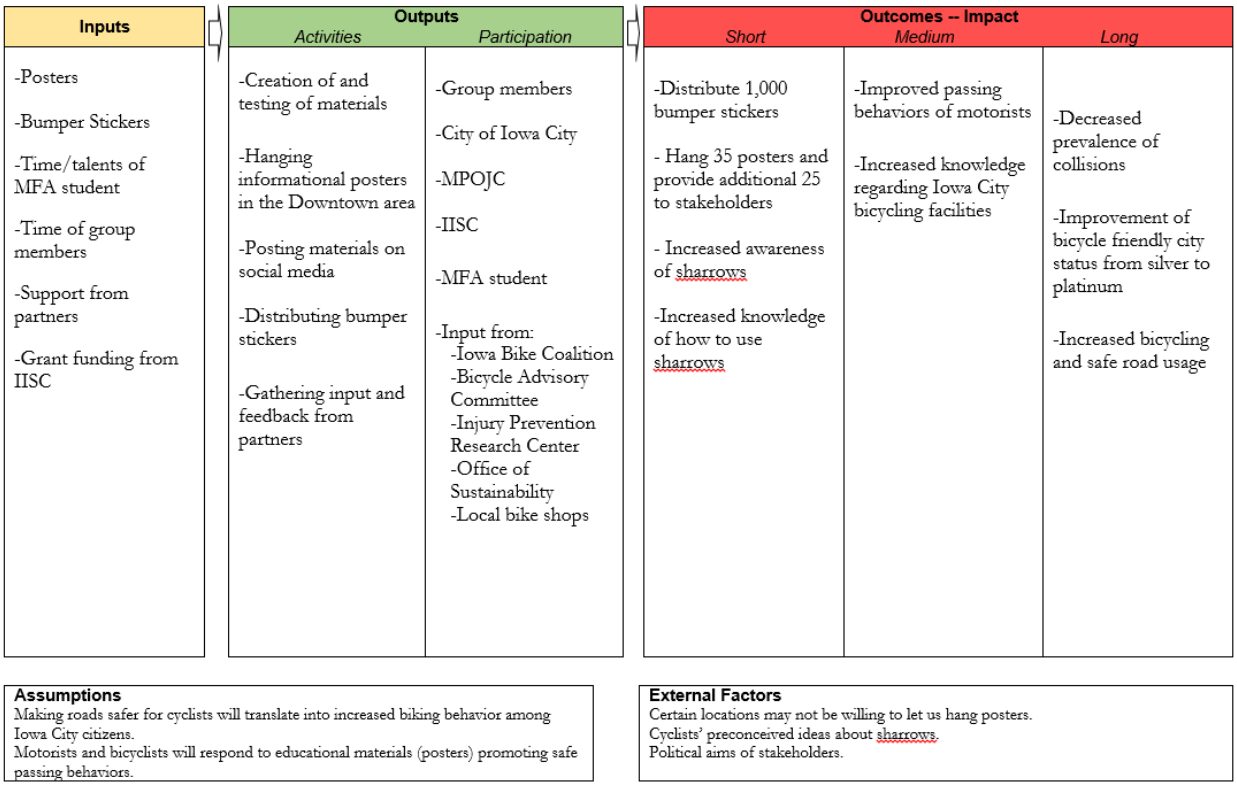
Our formative evaluation illuminated the different ways in which personal factors, environmental factors, and human behavior influence one another and, in turn, bicycling in Iowa City. Due to the nature of our goal and based on the results of the formative evaluation, we used Social Cognitive Theory in order to develop our health communications campaign. As described in more detail under the *Formative Evaluation* section, we found that safety was a major barrier to bicycling downtown and that respondents felt that additional bike lanes (an environmental factor) could improve bicycle safety in Iowa City. Personal factors also came to light, with transportation preferences leaning toward walking or driving a motor-vehicle. Additionally, informal conversations during our formative evaluation indicated that though various bicycle facilities and supportive policies are in place in Iowa City, cyclists and motorists may not abide by existing policies or are often unaware of how to appropriately use the facilities (behavioral factor), such as shared lanes. This general lack of awareness about the meaning of different signs and street markings contributes to unsafe behaviors for both cyclists and motorists. These findings, along with the personal conversations that the researchers had with members of the community, show that self-efficacy is low among those in the community who would like to bike more often, but feel unsafe doing so. We sought to increase safety with current bike infrastructure, by increasing awareness of how motorists should interact with cyclists (i.e., bikes

may use the full lane, the meaning of sharrows, etc.). In doing so, we hoped to make it possible for those who do not bike due to safety concerns will be more likely to take up the behavior in the future.

In addition to the use of Social Cognitive Theory, we also utilized Social Judgement Theory as a means to change behavior through this campaign. Social Judgment Theory argues that people use their present viewpoint to consider new ideas (Griffin, 2011). The theory also considers that people hold their opinions on a spectrum of what they think is generally acceptable from other's point of view (Mallard, 2010). This balance of one's own opinion and perceptions of acceptability of others forms their latitude of acceptance, rejection, or non-commitment (Sherif, Sherif, & Nebergall, 1965; Griffin, 2011).

People with an extreme latitude of rejection often have a high level of ego involvement and therefore are deeply committed to the issue and hold an attitude that is unlikely to change (Griffin, 2011). Those who are not involved in a topic have high latitude of non-commitment and therefore are more accepting of new ideas due to a lack of commitment surrounding an issue. Those within the latitude of acceptance have a low ego involvement and are also more ready to accept new ideas (Mallard, 2010; Sherif, Sherif, & Nebergall, 1965). Through our formative evaluation, we discovered that most people surveyed likely had a high latitude of non-commitment or a high latitude of acceptance, as most people indicated that they were not aware of sharrows or how to use them, but were in favor of advocating for safer bicycling in Iowa City.

Logic Model



Inputs	Outputs		Outcomes -- Impact		
	Activities	*Participation*	*Short*	*Medium*	*Long*
-Posters -Bumper Stickers -Time/talents of MFA student -Time of group members -Support from partners -Grant funding from IISC	-Creation of and testing of materials -Hanging informational posters in the Downtown area -Posting materials on social media -Distributing bumper stickers -Gathering input and feedback from partners	-Group members -City of Iowa City -MPOJC -IISC -MFA student -Input from: -Iowa Bike Coalition -Bicycle Advisory Committee -Injury Prevention Research Center -Office of Sustainability -Local bike shops	-Distribute 1,000 bumper stickers - Hang 35 posters and provide additional 25 to stakeholders - Increased awareness of sharrows -Increased knowledge of how to use sharrows	-Improved passing behaviors of motorists -Increased knowledge regarding Iowa City bicycling facilities	-Decreased prevalence of collisions -Improvement of bicycle friendly city status from silver to platinum -Increased bicycling and safe road usage

Additional Formative Evaluation Findings

Message

To develop our message, we conducted a second survey (https://uiowa.qualtrics.com/SE/?SID=SV_cOpmjUFAUmZXTmd). Similarly to the first, we gathered demographic and transportation information- again, most respondents preferred motor vehicles as their mode of transportation (54%), with those who preferred to walk, use public transportation, and bicycle being evenly distributed among the remaining respondents. Through this survey, we also asked respondents to identify unsafe areas for motorist/cyclist interaction and many of the streets downtown, such as Burlington, Gilbert, Market and College

were identified. We also asked respondents to rank the following safety priorities: use of shared and/or separated bike lanes; obeying traffic/bike laws; stop signs/ lights/ intersections; passing distance; and hand signals. Use of shared and/or separated bike lanes came out as the top priority of survey respondents. The survey also contained several questions about sharrows and revealed that 29 percent of respondents had never seen a sharrow and that there was confusion about what a sharrow actually means and/or how to use one. In fact, most respondents (motorists and cyclists alike) thought that a sharrow indicated the placement of a bike lane, indicated that a bike lane was ahead, or that motorists should watch out for cyclists. This survey also indicated that humorous and serious/factual messages were the most popular framing options. Due to these results, our group decision to develop messaging around how cyclists and motorists should interact in areas where sharrows are present was reinforced.

Together we brainstormed a variety of both humorous and serious/factual messages and sent the list of ideas to Sarah Walz to receive the City's comments and suggestions. The messages that were most popular included those that emphasized safety and law, had a friendly tone, and encouraged motorists and cyclists to "Share the Street." At this point, we intended to use the message "May Use Full Lane" on the bumper stickers as it was found in the literature to be the most effective message to increase understanding of how to use sharrows. Based on the response we received from Sarah and her co-workers, messages that included these aspects were developed and later adjusted after a second round of feedback. These changes resulted in the following message components: the presence of sharrows means that bicycles may use the full lane, cars should move to the left lane, moving to the left lane is the safest and legal way to

pass, and to "Share the Street." Some of this messaging eventually shifted based on other stakeholder responses to the message and is detailed further in the following section.

Channel and Pilot Materials Development and Testing

Results from our second survey also indicated that respondents thought social media, bumper stickers, and print media would be the best ways to reach cyclists and motorists. Using this information and the feedback that was provided by the City, a design consultant developed three poster designs for print and social media and two for bumper stickers (see Appendix- *Poster Design 1, 2, & 3* and *Bumper Sticker Design 1 & 2*). The three posters represented three different versions of the message above. Both bumper stickers included the sharrow symbol, "May Use Full Lane," and "Share the Street" but they differed in shape and one also included "Be Iowa Nice" in an effort to maintain a friendly tone.

We used another survey to pilot test the posters and bumper stickers (https://uiowa.qualtrics.com/SE/?SID=SV_3sDdKjgBuzXg6mV). This allowed respondents to select their favorite options and provide their input on the message to determine if anything was unclear or needed to be changed. Most respondents' interpretations of the message were consistent with what we were trying to convey: 100 percent indicated that the message was realistic and 79 percent indicated that it was a clear message. We also asked respondents if they preferred the phrase "will use full lane" or "may use full lane" and 75 percent supported the latter. Overall, the message was received positively with most respondents suggesting formatting changes for the graphics rather than message changes. Responses indicated that the poster with both the car and bike and the square bumper sticker were the most popular

(Appendix- *Poster Design 3* and *Bumper Sticker Design 2*). Approximately 79 percent of respondents also indicated that they would be willing to place the sticker on their car, laptop, water bottle, etc.

These designs were sent to partners to update them on our progress and to keep them informed regarding our group's progress. As one of the organizations is largely focused on law and how it relates to biking, one partner expressed concerns regarding the message's alignment with the law and how it might misinform the public. After receiving that response, we worked with the City to develop a message that would be in line with the law, meet the needs of the city, and convey appropriate information regarding sharrow use. It took a number of emails and several phone calls to develop a new message (Appendix- *Final Poster* and *Final Bumper Sticker*). While this message addresses some of the aforementioned concerns, it faced some limitations. Our timeline was too short to run another round of pilot testing on the message so we had to go with the input of our client on the direction to go. As a result, we do not have initial public perceptions of the poster and message.

Implementation Plan

To reach as many people in the downtown community as we could, we put posters and bumper stickers in areas with high visibility and businesses that are likely to be supportive of increasing bike safety. A total of sixty posters and a thousand hundred bumper stickers were printed and distributed.

Posters and/or bumper stickers were left at the following businesses:

John's Grocery	Java House	Forbidden Planet
Aspen Leaf	Yotopia	Active Endeavors
Molly's Cupcakes	Mesa Pizza	Mama's Deli
Running Wild	Daydreams Comics	Pullman
Prairie Lights	Pita Pit	Oasis Falafel
Taste of China	Home Ec Workshop	Hamburg Inn No. 2
High Grounds	Motley Cow	30th Century Bikes
World of Bikes	Geoff's Bike and Ski	New Pioneer Food Co-Op
Iowa City Public Library	College of Public Health	Department of Psychological & Brain Sciences

Each of these establishments were open and receptive to hanging posters in their windows and/or placing a stack of stickers near their cash register for patrons to take. Workers at the three bike shops we visited were especially excited about the materials and making them available to their customers. A day after receiving the stickers, the owner of Home Ec told one of our group members that people had been very interested in the stickers and happy to take them home. Customers in that particular shop also shared that they had seen them in several downtown establishments.

Twenty posters and two hundred bumper stickers were given to Sarah Walz for use during MPOJC and Bike Month events. One hundred stickers and five posters were also given to Liz Christiansen at the Office of Sustainability. There are multiple upcoming events for Bike Month where these materials will be used and available for participants to take home. Multiple posters were hung in the common spaces of the College of Public Health Building and stickers were left in the Community and Behavioral Health office suite. The images of the poster and bumper sticker were also shared with Sarah Walz, Liz Christiansen, Nancy Bird at Iowa City Downtown

Development, The Iowa City Bike Boulevard campaign, and the College of Public Health to share on social media.

Theory-driven Process and Outcome Evaluation Plan

A theory-based process evaluation should be carried out during the implementation of this campaign. Quantitative measures collected should include tracking the number of materials distributed and surveys that determine the rate of recall and recognition of our posters and bumper stickers (Kotler & Lee, 2008). Qualitative measures should include the audience impression regarding the materials' ability to garner attention, be convincing, and be credible (Noar, et al, 2014). Audience opinion of likeability of the campaign and what details the audience would or would not change are additional important measures and can be compared to our pre-campaign implementation surveys that included these measures. One important aspect of audience opinion is perceived sensation value, the degree of how dramatic, intense, and emotionally arousing a message is (Noar, et al, 2014). While measures of sensation value were initially expected to be relatively low due to the campaign using intentionally neutral strategies, the topic of sharrows turned out to be emotionally and politically charged across various audiences. Therefore, there is potential for an unexpectedly high sensation value in some individuals within our audience.

The idea that our campaign may have an unexpected sensation value relates to the construct of ego involvement, or the importance of an issue in a person's life (Sherif, Sherif, & Nebergall, 1965). A person's identity and group affiliations directly impact their level of involvement relating to a topic, and thereby has an effect on the intensity of their attitude toward a topic or

issue (Sherif, Sherif, & Nebergall, 1965). Given the level of ego involvement and sensation value involved in the campaign, we expect at the very least that our campaign will generate discussion among community stakeholders and the target audience.

Our evaluation plan utilizes ego involvement as an important component of Social Judgment Theory, which will be applied to our evaluation to measure audience perceptions of our campaign as they compare to current attitudes surrounding our topic. Due to the potential for a wide variety of affective responses to our campaign, it is recommended to use Social Judgment Theory to evaluate the different reactions in different segments of our audience (Noar et al, 2014). We would expect that those with high ego involvement may also have a high latitude of rejection or acceptance, depending on their opinion of sharrows (a divisive issue in the bicycling community). However, as our formative evaluation indicated, a majority of community members have a high latitude of non-commitment and have the potential to be persuaded by the campaign.

We suggest that the outcome evaluation following the implementation of the campaign include both quantitative and qualitative measures of knowledge and behavior change, as well as indicators of reactions to the campaign. Quantitative measures could include pre- and post-evaluation of motorist and cyclist interactions in areas known to be problematic. For example, observing cyclists' and motorists' behavior when interacting could include counts of acceptable/inacceptable passing behavior or instances in which cars yielded the right of way to cyclists. For rare events, such as crashes, comparing past and future bicycle crash data could provide long term evaluation of the contribution of the campaign to increased safety for

bicyclists. Qualitative survey results will measure the public's understanding of our message and awareness of what sharrows are and how to use them properly. This survey could be compared to the survey data collected during the creation and testing of campaign materials to determine if there was an increase in knowledge and/or shifts in perceptions of cyclist safety and barriers to cycling.

Another important measurement is self-efficacy as it relates to cycling. Self-efficacy, a person's belief in their ability to partake in a behavior, is an important aspect of the Social Cognitive Theory (Glanz & Bishop, 2010). Our formative evaluation indicated that self-efficacy was low. A comparison of pre- and post- campaign self-efficacy, via redistribution of the survey from our formative evaluation, would be an indicator of the campaign's impact. Bandura's concept of reciprocal determinism, the idea that a person's behavior impacts and is impacted by both personal characteristics and factors of their environment, fits our campaign goals well (Bandura, 1976). Utilizing the assumptions of Social Cognitive Theory, increasing self-efficacy toward cycling will make a person more likely to engage in the behavior, and therefore properly utilize the existing cycling infrastructure in Iowa City.

Personal factors measured in the outcome evaluation include changes in preferred mode of transportation, knowledge of safe cycling and motorist behaviors pertaining to sharrows, self-efficacy, and attitudes surrounding cycling and use of sharrows. Behavioral factors measured include frequency of cycling and proper use of current infrastructure. Environmental factors include the presence of sharrows and any changes to road markings or the future addition of infrastructure to promote safe cycling in Iowa City.

Timeline

- Early February: Brainstorming, outreach to potential community partners and stakeholders
- Mid February: Formative evaluation to determine focus
- Late February and early March: Literature review; meetings with Sarah Walz and Mark Wyatt
- Mid March: Additional evaluation to determine method of campaign implementation
- Early to mid April: Message and image design, refinement, and pilot testing
- Mid April: Rework message based on input from community partners
- Late April: Printing of materials
- Early May: Distribution of materials
- Future: Process and outcome evaluation

Budget and Justification

60 8.5" x 11" color posters: $39.44

1,000 4" x 4" color bumper stickers: $274.51

Pre-Press: $24.25

Total: $338.20

As indicated above, the majority of the project budget was put toward bumper stickers because they are more durable than posters and are able to be placed on cars, bikes, computers and water bottles, where others will see them. Bumper stickers are a low cost way to increase viewers of a particular message because of their popularity and placement. When someone puts the sticker on their bumper, the message is likely to be seen by everyone who drives or stops behind that particular car.

The posters emphasize the educational component of the "Shared Streets, Safe Streets" message on the bumper stickers and are therefore an important component to the campaign. However, the downtown area of Iowa City can become saturated with posters, especially at the end of the academic year, and we therefore decided to allocate a smaller portion of our budget

to posters. We initially requested 1,000 stickers and 60 posters and asked that any remaining funds be used for stickers but, due to a combination of miscommunication and lack of time, additional materials were not printed. Our budget does not include any other costs because the graphic design work was provided by a volunteer MFA student. Further, the images were provided to community partners and will therefore be easy to replicate if the City and other organizations are interested and share on social media.

Recommendations

A number of recommendations have been developed to further the impacts of this project and other efforts on bicycle safety in Iowa City. It is currently Bike Month and there are numerous opportunities in which these materials can be used. To fully see the impacts of this type of education, it would be beneficial to scale up the outreach and distribution of these resources. The regular provision and promotion of additional materials on current laws and regulations might also be beneficial as laws regarding passing distance requirements, etc. might change in response to growing numbers of cyclists.

In addition to expanding the reach of these materials, there are some changes to the built environment that could enhance bicycle safety as well. If the City is still planning to use sharrows, correct placement and maintenance should be taken into further consideration. Pairing new and existing sharrows with educational signage might also encourage safer interactions between cyclists and motorists. In conclusion, while the addition of bike lanes was indicated by the community to be the most desirable way to increase safety, improving

knowledge of existing infrastructure is an effective method to improve the safety of motorist and bicycle interactions.

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Appendix

Table 1

Variable (n, %)	Distance lived*	Transportation Type				Barriers			Days biked	Biking activity			Safety Rating
		Bike	Walk	Public	MV	Distance	Time	Safety		commute	errands	exercise	
		M (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	*M* (SD)	
Age													
18 – 25 (n = 72, 42%)	1.01 (1.97)	.22 (.42)	.64 (.48)	.42 (.50)	.39 (.49)	.16 (.37)	.10 (.30)	.49 (50)	1.01 (1.97)	.28 (.45)	.16 (.37)	.61 (.49)	5.15 (2.02)
26 – 35 (n = 64, 37%)	1.07 (1.97)	.23 (.43)	.33 (.47)	.36 (.48)	.61 (.49)	.21 (.41)	.27 (.45)	.33 (.48)	1.07 (1.97)	.37 (.49)	.24 (.43)	.56 (.50)	5.55 (1.96)
36 -45 (n = 20, 12%)	2.40 (.94)	.35 (.49)	.30 (.47)	.25 (.44)	.70 (.47)	.16 (38)	.37 (.50)	.42 (.51)	1.08 (1.80)	.35 (.50)	.70 (.47)	.55 (.51)	6.00 (2.32)
46 – 55 (n = 10, 6%)	2.6 (1.51)	.50 (.53)	.20 (.42)	.20 (.42)	.50 (.53)	.10 (.32)	.00 (.00)	.30 (.48)	1.93 (2.56)	.50 (.53)	.60 (.52)	.80 (.42)	4.44 (1.51)
56 -65 (n = 7, 4%)	2.29 (.49)	.71 (.49)	.43 (.54)	.29 (.49)	.43 (.54)	.00 (.00)	.17 (.41)	.33 (.52)	2.50 (2.65)	.43 (54)	.57 (.54)	.57 (.54)	5.586 (2.27)
Gender**													
Male (n = 63, 36%)	2.29 (1.24)	.35 (.48)	.44 (.50)	.38 (.49)	.41 (50)	.15 (.36)	.18 (.39)	.32 (47)	1.34 (2.21)	.43 (.50)	.23 (.43)	.65 (.48)	5.588 (1.98)
Female (n = 109, 63%)	2.27 (1.14)	.24 (.43)	.45 (.50)	.34 (.48)	.58 (.50)	.18 (.38)	.20 (.40)	.46 (.50)	1.01 (1.87)	.30 (.46)	.23 (.42)	.59 (.49)	5.09 (2.02)
Ethnicity													
African-American (n = 7, 4%)	2.43 (.98)	.43 (.54)	.43 (.54)	.57 (.54)	.14 (.38)	.17 (.41)	.17 (.41)	.00 (.00)	.60 (1.34)	.29 (.49)	.29 (.49)	.57 (.54)	7.00 (2.53)
Native American (n = 1, .6%)	-	-	-	-	-	-	-	-	-	-	-	-	-
Asian/Pacific Islander (n = 19, 11%)	2.32 (.95)	.16 (.38)	.47 (.51)	.53 (.51)	.37 (.50)	.26 (.45)	.11 (.32)	.42 (.51)	1.00 (2.20)	.12 (.33)	.18 (.39)	.71 (.47)	5.94 (2.44)
White (n = 130, 75%)	2.33 (1.23)	.30 (.46)	.43 (.50)	.32 (.47)	.55 (.50)	.17 (.37)	.21 (.41)	.40 (.49)	1.21 (2.04)	.38 (.49)	.23 (.42)	.63 (.48)	5.28 (1.96)
Hispanic (n = 8, 5%)	1.88 (.99)	.25 (.46)	.63 (.52)	.13 (.35)	.63 (.52)	.13 (.35)	.13 (.35)	.38 (.52)	.75 (1.84)	.38 (.52)	.50 (.54)	.63 (.52)	5.63 (1.47)
Other (n = 8, 5%)	1.63 (.92)	.13 (.35)	.50 (.54)	.75 (.46)	.63 (.52)	.00 (.00)	.25 (.46)	.63 (.52)	.69 (1.28)	.25 (.46)	.13 (.35)	.25 (.46)	4.75 (1.67)
Distance from downtown													
Less than 1 mile (n = 40, 23%)	-	.25 (.44)	.85 (.36)	.15 (.36)	.15 (.36)	.00 (.00)	.00 (.00)	.33 (.48)	1.09 (1.94)	.33 (.48)	.31 (.47)	.56 (.50)	5.29 (1.81)
1 – 3 miles (n = 82, 47%)	-	.40 (.49)	.48 (.50)	.49 (.50)	.55 (.50)	.08 (.27)	.19 (.40)	.39 (.49)	1.65 (2.28)	.45 (.50)	.28 (.45)	.62 (.49)	5.63 (2.08)
3 – 5 miles (n = 25, 14%)	-	.08 (.28)	.04 (20)	.32 (.48)	.84 (.37)	.33 .48)	.33 (.48)	.50 (.51)	.37 (1.23)	.17 (.38)	.00 (.00)	.71 (.46)	5.48 (2.23)
5 – 10 miles (n = 16, 9%)	-	.13 (.34)	.13 (.34)	.44 (.51)	.69 (.48)	.63 (.50)	.50 (.52)	.44 (.51)	.22 (.66)	.20 (.41)	.20 (.41)	.67 (.49)	5.37 (2.06)
10 – 20 miles (n = 4, 2%)	-	.00 (.00)	.25 (.50)	.00 (.00)	.75 (.50)	.50 (.58)	.25 (.50)	.75 (.50)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.25 (.50)
20+ miles (n = 5, 3%)	-	.20 (.45)	.00 (.00)	.20 (.45)	.60 (.55)	.40 (.55)	.00 (.00)	.20 (.45)	1.00 (2.24)	.40 (.55)	.60 (.55)	.80 (.45)	3.60 (1.82)
Total	2.27 (1.17)	.28 (.45)	.45 (.50)	.36 (.48)	.51 (.50)	.17 (.37)	.19 (.39)	.40 (.49)	1.12 (1.99)				

Poster Design 1

Poster Design 2

Poster Design 3

Bumper Sticker Design 1

Bumper Sticker Design 2

Final Poster

Final Bumper Sticker