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BEHIND BARS: USING PERSPECTIVE-TAKING TO IMPROVE BEHAVIOR OF
MOTORISTS TOWARDS CYCLISTS

by

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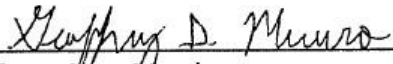
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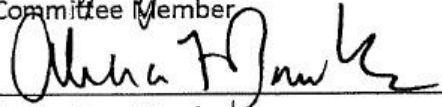
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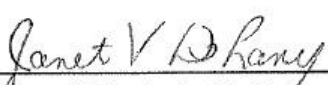
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Abstract

Behind Bars: Using Perspective-Taking to Improve Behavior of Motorists Towards Cyclists

Charles J. Arayata

This study's purpose was to test two possible interventions framed within the Theory of Planned Behavior (Ajzen, 1991) that may improve motorists' attitudes towards cyclists, as well as motorists' intentions to improve their on-road behavior around cyclists. A 2x2 factorial design was used, with participants randomly assigned to either read commercial vehicle laws or bicycle laws, and either watch a traffic camera video, or a first-person bicyclist crash video. Participants then completed a measure of their attitudes and intentions during the lab session and again approximately two weeks later. It was expected that participants who read the bicycle legislation information and also watched the crash video would show the most improved attitudes and intentions to behave after the lab session relative to control; however, no significant effect of either manipulation was found. Further refinements would include a more multi-faceted approach to the Theory of Planned Behavior.

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Chapter 1

Introduction

More and more North American citizens are choosing to take to the streets on two wheels, especially in larger cities that are shifting away from a car-centric focus on transportation (Pucher, Buehler, & Seinen, 2011). Even though there is a large potential for the bicycle to change the way Americans think about sustainable transportation, decades of car culture are deeply ingrained and hard to override. Insufficient driver education, which fails to include how to interact with cyclists, coupled with issues such as a lack of bicycle facilities and legislation protecting cyclists, fuels the conflict between cyclists and motorists, and leads to problems such as harassment by motorists towards cyclists (Heesch, Sahlqvist, & Garrard, 2011). This conflict is especially troubling when one realizes the disparity and potential for harm between a driver encased in a motor vehicle, typically weighing one ton or more, and a rider atop a bicycle, which often weighs roughly 20 pounds.

Problematic driving behaviors, such as aggression, between motorists have been thoroughly researched in both the social psychology and the transportation literature. However, little research has been done that illuminates the relationship between motorists and cyclists. A deeper insight into this relationship is needed if cycling is to become a more widely acceptable and, more importantly, safer transportation alternative.

Overview

This paper first briefly touches on driver aggression both in general and towards cyclists in particular. The relationship between cyclists and motorists is then discussed within the framework of the Theory of Planned Behavior (Ajzen, 1991). Highlighted are

the negative experiences of cyclists on the road, and the negative attitudes motorists hold towards cyclists. An empirical study was then carried out in the form of an experimental intervention designed to improve attitudes and intentions to behave, two crucial components of the Theory of Planned Behavior.

Chapter 2

Literature Review

Why Are Drivers Aggressive?

Anger and aggressive behavior is all too common: Underwood, Chapman, Wright, and Crundall (1999) found that 85% of their young-adult to adult sample reported at least one instance of anger during a two-week period. This anger can turn into mild aggressive gestures such as yelling or flashing lights, or more severe acts of prolonged honking and tailgating. Often times, these actions are in response to offenses such as driving slowly in the passing lane, cutting another driver off, and refusing to yield, among others. In all cases, there is a number of contributing factors that can lead to an aggressive response, relating to the driver themselves as well as the driving situation.

Driver characteristics.

Younger males have been found to exhibit the most aggressive driving behaviors, with males more likely than females to engage in aggression, and younger drivers more likely than older drivers to engage in aggression (Shinar & Compton, 2004). Furthermore, “macho” males who exaggerate the masculine stereotype (violence, danger, sex; see Mosher & Sirkin, 1984) or have high-performance cars reported more aggressive driving behavior, and preferred speed and sportiness over safety when buying a new car (Krahé & Fenske, 2002). Jovanović, Lipovac, Stanojević, and Stanojević (2011) used the Five-Factor Model (Costa & McCrae, 1992) and found that lower levels of agreeableness and conscientiousness were significant predictors of higher self-reported aggression. Schreer (2002) found a relationship between narcissism and aggressive driving, suggesting that those with inflated self-views tend to take transgressions more personally.

Driving situation.

Even though demographic and personality variables are able to explain some of the underlying mechanisms behind driver aggression, many of them are simply unobservable in everyday situations. Because of this, situational influences on driver aggression should also be investigated. The power of certain situations may be strong enough to elicit aggressive behavior across all driver types.

Congestion, which is often found during rush hours, has been found to be associated with increased driver aggression, and contributes to increased driver stress. Hennessy and Wiesenthal (1999) measured driver trait stress, and subsequently interviewed participants during a typical morning commute in low-congestion and high-congestion areas. The authors found that in both areas, drivers' reports of time urgency and trait stress were significant predictors of state driving stress. Shinar and Compton (2004) sought to differentiate the effects of congestion vs. time urgency by observing unsuspecting drivers during weekday rush hours, weekday non-rush, and during the weekend. When controlling for level of congestion, the authors found an increased likelihood of observed aggressive behavior during weekday rush hours as compared to weekends, and argued that time urgency during rush hours is the determining factor for aggression.

Aggression Towards Cyclists

The correlates of driver aggression described above are useful in examining the overall picture of on-road conflict, but there may be additional factors that help explain why cyclists are often at the receiving end. Conflicts and aggression between cyclists and motorists happen on a daily basis, and one potential cause may stem from the concept of

territory, which is belief of ownership over a physical space. Altman (1975) defined three types of territory: primary territories that are perceived to be owned and exclusive (such as one's house, office, or car), secondary territories that are not owned, but still somewhat exclusive (a shared locker, classroom, or workspace), and public territories to which everyone has an equal and legitimate claim (a public park, seats in a coffee shop).

Defense of a territory varies with the kind of territory that is being encroached upon, with more extreme defense for primary, and little to none for public territory. These different types are usually adjacent, such that a public territory is next to a secondary (e.g., roads and sidewalks leading to a college campus), and a secondary is next to a primary territory (e.g., navigating the college campus to get to your office). This helps lessen conflict by minimizing the confusion between boundaries.

Fraine, Smith, Zinkiewicz, Chapman, and Sheehan (2007) and Szlemko, Benfield, Bell, Defenbacher, and Troup (2008) extended this theory to attempt to explain aggressive driving. Cars are primary territories that owners personalize and decorate with bumper stickers, customized license plates, and other accessories. In addition, roads are public territories to which all road users have an equal claim. However, boundary confusion often happens as motorists are occupying both a primary and a public territory simultaneously (i.e., their vehicle and the road), and will defend encroachment of the public space with aggressive behavior as if it were an encroachment on their primary territory. Fraine et al. (2007) found that drivers tend to respond to tailgating and cutting-in as “invasions of personal space”, and thus respond with defense of primary territory. Furthermore, Szlemko et al. (2008) found that those with more territorial markings, which were measured by both the driver in self-report as well as by the experimenter,

reported higher attachment to their vehicle, and that both territorial markings and attachment were significant predictors of more aggressive driving behaviors in general. In addition, drivers with territorial markings reported they were more likely to use their car to express anger. This notion of territory and boundary confusion may be a central aspect of the motorist vs. cyclist conflict. Because cyclists are often required by law to ride on the road in many situations, they are often on the receiving end of motorist aggression and harassment (O'Connor & Brown, 2010).

In addition to the correlates of aggression, it is also important to explore the underlying motivations of aggressive actions. Lennon and Watson (2011) used semi-structured interviews concerning road conflicts, and found that the first motivation of on-road aggression is to “teach them a lesson” and convey criticism or correct wrongful behavior. More mild forms of aggression (e.g., flashing lights) were meant to inform the offending driver that a transgression has occurred or to bring attention to an otherwise unaware offending driver, while more intense aggression (e.g., prolonged honking, tailgating) was meant to display varying levels of criticism or to correct another person's poor driving behavior. In many of the cases, participants reported engaging in the aggressive behavior even when they believed it to go unnoticed or be ineffective in actually changing the other driver's habits. At the extreme, tailgating was one form of behavior for which participants often reported remorse, indicating that even though they were very angry at the time, they realize now that risking both themselves and the other driver's safety was not the most prudent response. The second motivation Lennon and Watson (2011) explored was the notion of “justified retaliation,” or aggression that is in direct response to an intentional aggressive act perpetrated by another individual. This

type of aggression was often more rude than dangerous, and included the same types of behavior as noted above: physical gestures, verbal aggression, lights and/or horn-honking, as well as refusing to allow another driver to pass or merge by not speeding up or slowing down. Both of these motivations, correcting another person's behavior and giving a justified aggressive response, influence motorist aggression towards cyclists. For example, if a cyclist is taking up the middle of the roadway due to road hazards or unsafe conditions, and prohibits a following motorist from passing, the motorist may become aggressive, and begin revving their engine or honking the horn.

A Need to Change: The Theory of Planned Behavior

It is clear that the current state of affairs leaves much to be desired if roads are to be a safe environment for all users. Many improvements could potentially be made; however, they must be structured in such a way that effectively taps into the psychological constructs at work. The Theory of Planned Behavior (Ajzen, 1991) is a useful framework for targeting the specific areas that need to be modified in order to successfully change motorist behavior towards cyclists. According to Ajzen's (1991) theory, there are three primary components that directly influence the intention to behave, which in turn influences the actual behavior that is observed. The first component is the attitude towards the behavior, also known as behavioral beliefs. This attitude may either be positive or negative, and can range from very strong to very weak. The second component is social norms, or normative beliefs. Social norms dictate what is socially acceptable in terms of public and private beliefs as well as resulting behavior. The third component is perceived behavioral control, or control beliefs. If a person has high perceived control, their intentions to change their behavior will be greatly enhanced,

relative to someone with low perceived behavioral control. While all of these components contribute to the intention to behave, this proposal will only briefly touch on social norms and perceived behavioral control, and focus more so on the first component, attitudes, as well as the intention to behave.

Social norms.

Two social norms are at the heart of the conflict between motorists and cyclists. One, that driving is a vastly more popular form of transportation, and two, that it is commonplace to be angry and verbally or physically aggressive to others on the road (Underwood, Chapman, Wright, & Crundall, 1999). Both of these norms combine to place cyclists below motorists on the road user hierarchy.

In order to modify these, driver education could be improved so as to emphasize cyclists' place on the road, safe behaviors around cyclists, and how to take extra precautions to prevent any conflicts from occurring. This could also be done through bike-specific legislation and the addition of bicycle lanes and other facilities, which would be both concrete and abstract reminders to "share the road". Harsher penalties for reckless driving would also make being careful and giving due care to others the norm (which is also intertwined with attitudes of respect).

Perceived behavioral control.

Everyone not only chooses how to get themselves from point A to point B, but they can also choose how to act during that trip. Yes, there are situations that have been outlined above in which aggression can be elicited easily, but all road users could be reminded that they are in control of their tempers, as well as their vehicles. In addition, because motor vehicles pose a bigger danger to cyclists than to other motorists, it must be

emphasized that drivers exercise extreme caution when dealing with cyclists on the road.

Whereas tailgating an offending driver may do little more than annoy them, tailgating, honking, or passing a cyclist too close could have disastrous consequences.

Attitudes Towards Active Transport

Even though people might have positive attitudes towards cycling and other forms of active transport, those attitudes may not transfer over to affect behavior towards actual cyclists in everyday interactions. Attitudes towards cycling could be improved by reminding motorists of the benefits of cycling, so that they may consider cycling themselves as a viable means of transportation or recreation. Panter, Jones, van Sluijjs, and Griffin (2010) surveyed children and their parents about attitudes towards active transport, and found that parental attitudes (e.g., convenience of cars) coupled with social norms for the child (encouragement by friends or parents to cycle or walk to school) were heavily influential in the child's actual transportation patterns. By convincing adults that there are other methods of travel besides the car, this could trickle down to younger generations, who would grow up with their bicycles instead of growing out of them. The college demographic is just as important: Bamberg, Ajzen, and Schmidt (2003) conducted a field study to examine the influence of a prepaid bus ticket program on student attitudes and transportation choice on a college campus. Discussed within the context of the Theory of Planned Behavior, introducing the bus ticket program resulted in improved attitudes towards the bus and other forms of public transportation, altered social norms that made it more common and acceptable to travel by bus, and increased perceived behavioral control, such that students felt that taking the bus was something they were able to accomplish with relative ease.

Attitudes Towards Cyclists

Perhaps more important than attitudes towards active transport and cycling are the attitudes towards cyclists themselves. It is the cyclists that motorists directly interact with on the road, and conflicts between the groups may be rooted in attitudes towards one another.

Rissel, Campbell, Ashely, and Jackson (2002) found that many drivers have contradictory views towards cyclists. Even though 75% of the participants agreed with the statement that “Cyclists have just as much right to use the road as motorists,” over half of the participants also agreed that cyclists should not be allowed on main roads during peak hours, and that it is frustrating sharing the road with cyclists. Furthermore, when these participants were asked to imagine themselves riding a bicycle on a main road, 76% believed it would be likely that they would be hit by a motorist, illuminating the opinion of motorists that cycling is inherently dangerous.

In a multi-step extensive study that included surveys, focus groups, and interviews, Basford, Reid, Lester, Thomson, and Tolmie (2002) found that drivers have generally negative impressions of cyclists, seeing them as irresponsible, dangerous, arrogant, and inconvenient, among other things. Motorists tended to exaggerate minor transgressions by cyclists and minimize wrongdoings by other drivers, and were mainly annoyed by unpredictable behavior, a lack of signaling, and generally “getting in the way”. Motorists believed that cyclist education on road rules, and not driver education on how to interact with cyclists, would be the most useful in improving driver-cyclist relations. Additionally, in a virtual reality simulator, motorists judged a cyclist who was forced to ride more in the center of a narrow road (due to pedestrian refuge islands) as

less courteous, even though the virtual cyclist rode a consistent distance away from the side of the road across all situations. A video intervention segment was also included in this study, but will be discussed further below.

These negative attitudes may fuel the conflict between these two groups, and cyclists will continue to endure aggression and abuse until motorist attitudes are changed for the better. Empathy may be an effective tool in changing these attitudes.

Situational Awareness – The Role of Empathy

Empathy plays an important part in regulating social behavior, including prosocial as well as aggressive behavior (Eisenberg & Miller, 1987; Miller & Eisenberg, 1988). Generally, empathy is negatively correlated with aggression, although the magnitude of the relationship depends on a variety of factors such as sample characteristics and methodology of the research study (see Miller & Eisenberg, 1988, for a review). Ohbuchi (1988) outlined that providing pain cues, increasing similarity, and self-disclosure of the victim was effective in reducing aggression, but only when that aggression is instrumental, and not hostile, in nature. When the aggression has hostile, harmful intentions, the pain cues, similarity, and self-disclosure may actually bring about increased aggression as a result due to a sadistic or cathartic emotional reaction.

A more effective way of eliciting empathy is to encourage perspective-taking. Batson et al. (1997) used perspective-taking to improve attitudes towards stigmatized groups. Participants listened to a fictional radio broadcast that depicted the plight, experiences and personal life of a young woman with AIDS or a homeless man. Participants in the high-empathy (perspective-taking) condition reported higher levels of empathy towards the subject, and more positive attitudes towards the stigmatized group

as a whole (i.e. all AIDS victims; all homeless people) immediately after listening. However, even those participants who listened objectively (low-empathy) reported generally high empathy and attitudes towards these groups, suggesting possible demand characteristics effects. To further test this, as well as to examine a more longitudinal effect of inducing empathy, the authors utilized the same design with a more stigmatized group: convicted murderers. Participants listened to the story of a man serving life without parole for killing his neighbor, and completed similar empathy and attitudes measures as in the previous experiments. Whereas the empathy manipulation was effective in eliciting empathy towards the convict, it was not effective in improving attitudes towards convicted murders as a whole. However, attitudes were measured 1-2 weeks later as part of an 'unrelated experiment' on political issues and prison reform, and the authors found that those in the high-empathy condition reported more positive attitudes towards murderers than those in the low-empathy condition. These findings suggest an empathetic intervention may have a more permanent, lasting effect, even if the immediate manipulation produces a non-significant effect during the laboratory session.

In the video intervention component of their study, Basford, Reid, Lester, Thomson, and Tolmie (2002) showed participants four video clips of various driver-cyclist interactions. Before the videos, participants were instructed to take the perspective of the cyclist (empathy intervention), read a "Drive Safe, Cycle Safe" informational pamphlet (education intervention), or simply watch the videos (control condition). The videos depicted a cyclist weaving around a car blocking a bike lane; a driver passing a cyclist near a construction area, with the cyclist forced into the coned-off area; a cyclist almost getting "right hooked" by a van making a right turn across the path of a cyclist

traveling straight; and cyclists swerving around a car which is sticking too far into an intersection. Participants described what they saw, assigned/attributed fault to either party and/or the situation, and offered explanations as to why the driver and cyclist behaved as they did in the video. The authors found that the education intervention had no effect on perceptions of the situation, blame, or rationale relative to the control condition. The empathy intervention was only effective in increasing awareness of the cyclist perspective in one of the clips, with the other clips resulting in similar responses from the control group. These results suggest that the empathy and education interventions used here may have not been effective in making motorists more sensitive towards cyclists, possibly due to the videos being shown from a third person view, and the educational pamphlet not being informative enough.

Another relevant perspective-taking study was conducted by Shahar, Clarke, and Crundall (2011), with the purpose of finding an effective intervention that would improve attitudes of drivers towards motorcyclists. Participants first completed baseline attitude measures towards motorcyclists and other road users. Following a 2-week interval, participants came into the lab and were then randomly assigned to undergo a session in a motorcycle or car simulator. Once participants had adequate practice in a city environment with no traffic, they completed another segment with traffic, this time encountering nine hazardous situations. After the motorcycle or car simulator, participants were again randomly assigned to watch 3-minute videos of near accidents taken from either a motorcycle-mounted camera or a car dashboard camera. Finally, participants completed the attitude measure once more. The authors found that participants who watched the motorcycle hazard videos and also had the motorcycle

simulator training showed the largest improvements in attitudes towards motorcyclists, with those having more negative views at first experiencing the biggest increase after the empathy interventions. Watching the motorcycle hazard videos was also found to be a more effective method of changing attitudes than the motorcycle simulator, which the authors argue may possibly be due to the more realistic look of the videos.

The Present Study

Even though there is plenty of literature on driver aggression, the negative experiences of cyclists at the hands of motorists, and the generally negative attitudes that drivers hold of cyclists, no studies have been conducted to improve motorist attitudes or behavior towards this stigmatized group. The present study borrowed methodology from Shahar, Clarke, and Crundall (2011), interventions from Basford, Reid, Lester, Thomson, and Tolmie (2002), and design from Batson et al. (1997) with the aim of finding successful and more permanent ways to improve driver attitudes and behavior towards cyclists.

In this study, participants completed a pre-test measure of attitudes towards cyclists, underwent a laboratory intervention, completed a post-test measure of attitudes and intentions, and then another follow-up attitudes and intentions measure. The intervention was designed to either induce empathy (watching crashes and near-misses taken from a helmet or bike-cam; Basford et al., 2002; Shahar et al., 2011), educate motorists about appropriate behavior (reading a list of facts and laws regarding proper bicycle and motorist on-road behavior; modified from Basford et al, 2002), both, or neither. It was hypothesized that undergoing both education and empathy interventions would lead to the highest significant increase in attitudes and intentions relative to

control, especially for the final measure (consistent with Batson et al., 1997), and that there would be a significant longitudinal effect of the interventions. Furthermore (consistent with Basford et al., 2002), it was expected that the empathy intervention, when presented alone, would have a more significant effect than the education intervention alone.

Chapter 3

Method

Participants

Forty-five Towson University students participated in this study. The sample was 63.9% female, 34.1% male, and 73.2% white. Participants were recruited from the online Researchpool Psychology website, and their participation was compensated with course credit. Participants were prescreened to ensure that only those who commute to school by car on a regular basis would be permitted to participate in this study. Only those participants who successfully completed the prescreen, laboratory session, and follow-up measure were included in the analysis, leaving a final *n* of 31.

Materials

The following measures, stimuli, and equipment were utilized in this study. The full questionnaires can be found in the Appendix.

- a 21-item prescreen Attitudes Questionnaire (Appendix A), which asked the participants about their commuting habits, and to respond to various statements about cycling, cyclists, and motorist-cyclist relations. Two such statements were "It is very frustrating sharing the road with cyclists," and "Drivers are not trained to look out for cyclists." Participants responded from 1 (strongly disagree) to 7 (strongly agree). Items were borrowed from Rissel, Campbell, Ashley, and Jackson (2002), and borrowed and modified from Shahar, Clarke, and Crundall (2011). This measure was only administered during the prescreen. The information provided through this questionnaire was used to screen for qualified participants and assess their baseline attitudes.

- a brief Education page (Appendices B & C) that either contained several laws and regulations concerning cyclists (experimental), or commercial vehicle drivers (control). This was modified from Basford et al. (2002).
- a short (~2 minute) Empathy compilation video (see Appendix D). The experimental video was made up of various helmet or bicycle-mounted camera clips that either depicted a cyclist ahead or the filmer themselves colliding or nearly colliding with a motor vehicle or other road hazard. The videos themselves were pulled from the Internet video website YouTube. This was modified from Shahar et al. (2011). Control condition participants watched a 2-minute traffic camera compilation video.
- a pair of road bicycle drop handlebars, complete with brake levers and bar tape. Participants who were assigned to watch the experimental empathy video held the handlebars during the video to help enhance the first-person perspective depicted in the video, and to ensure that participants were in the proper mindset for the intervention. This was borrowed and modified from the motorcycle simulator utilized by Shahar et al. (2011).
- A 37-item Attitudes and Intentions questionnaire (Appendix E), which asked the participants their opinions of pedestrians, cyclists, taxi drivers, bus drivers, and commercial vehicle drivers. The five cyclist attitude items were taken from the initial 21-item prescreen; items concerning other road groups were used as filler to disguise the true nature of the study. Ten of the 37 items were questions assessing the participant's intentions for future driving behavior; two such statements were "I intend to check my side-view mirrors more often before

exiting my vehicle,” and “I intend to be more patient when driving behind or near a slower-moving vehicle.” Participants responded from 1 (strongly disagree) to 7 (strongly agree). This measure was administered twice, first immediately after the laboratory manipulation, and again in the two week follow-up measure.

- a 4-item Manipulation Check questionnaire (Appendix F), which asked “The video depicted traveling by _____,” and “How engaged did you feel with the events depicted in the video?” to check that participants were aware of the first-person perspective of the bicycle empathy video, and to check that the bicycle video was more engaging than the control video. Two education-specific quiz questions assessed whether or not participants processed and retained the control or bicycle information from the Education intervention.

Procedure

Participants who indicated they commute via car to campus and had completed the prescreen 21-item Attitudes Questionnaire were eligible to participate in the study. These qualified participants were then scheduled for a two part laboratory study. The first part comprised of a 30-minute laboratory experimental session. After giving Informed Consent (Appendix G), participants were randomly assigned to one of the four experimental intervention groups in a 2 (Education; bike or control) x 2 (Empathy; bike or control) factorial design. The Education manipulation was either a one-page bulleted list of laws and legislation concerning cyclists and proper on-road behavior for cyclists/motorists (experimental), or a list of laws and legislation governing commercial vehicle drivers (control). The Empathy manipulation consisted of viewing a 2-minute compilation video of first-person bicycle accidents and near-misses, as recorded through

helmet or bicycle-mounted cameras (experimental), or a 2-minute compilation video of highway traffic camera footage. While viewing the bicycle video, participants held a pair of bicycle handlebars situated on the desk in front of the monitor. After these manipulations, participants completed the 37-item Attitudes and Intentions measure and the manipulation check. This concluded the laboratory session, and participants were instructed that they would receive a follow-up email in approximately two weeks.

After the two-week period, participants received emails containing a link to 37-item Attitudes and Intentions measure that they had completed during the lab session. Following submission of their responses, participants were fully debriefed as to the nature of the study, and were given the opportunity to examine all of the experimental materials used in all of the conditions of the study. Thus, those in the control conditions were able to read the bicycle education information and watch the bicycle empathy video, and those in the experimental conditions were able to view the control education and empathy materials. The participants had the opportunity to ask any questions or address any concerns they may have had via a free response box, and were finally thanked and fully credited for their participation.

Chapter 4

Results

Preliminary Analyses

Answers on the 21-item prescreen Attitudes Questionnaire were averaged after necessary items were reverse-coded. Higher scores indicated more positive attitudes towards cycling/cyclists. This Time 1 Attitudes measure was used as a covariate for the primary analyses. A scale reliability revealed a Cronbach's alpha = 0.775 for the measure, which had a mean = 4.25 and standard deviation = 0.71 on a 1 – 7 scale.

The five bicycle-specific attitudes questions embedded within the 37-item Attitudes and Intentions Questionnaire were reverse-coded and totaled to create composite attitudes scores. Because this measure was administered twice, once during the laboratory session and again in the two-week follow up email, each participant had Time 2 Attitudes and Time 3 Attitudes dependent measures. For Time 2 Attitudes, the Cronbach's alpha = 0.781, mean = 3.85, standard deviation = 1.18 on a 1 – 7 scale. For Time 3 Attitudes, the Cronbach's alpha = 0.761, mean = 3.89, standard deviation = 1.15.

The five bicycle-relevant intentions questions embedded within the 37-item Attitudes and Intentions Questionnaire were averaged to create composite intentions scores. Again, because this questionnaire was administered twice, each participant had Time 2 Intentions and Time 3 Intentions dependent measures. For Time 2 Intentions, the Cronbach's alpha = 0.74, mean = 5.36, standard deviation = 1.15 on a 1 – 7 scale. For Time 3 Intentions, the Cronbach's alpha = 0.858, mean = 5.45, standard deviation = 1.26. Table 1 below depicts the means and standard deviations for the dependent measures separated by experimental condition.

Condition	Time 1 - Attitudes	Time 2 - Attitudes	Time 2 - Intentions	Time 3 - Attitudes	Time 3 - Intentions
Control Education	$m = 4.375$ $SD = 0.736$	$m = 3.911$ $SD = 0.861$	$m = 4.956$ $SD = 1.203$	$m = 4.178$ $SD = 1.160$	$m = 5.000$ $SD = 1.367$
Control Empathy ($n = 9$)	$m = 4.396$ $SD = 0.741$	$m = 4.200$ $SD = 1.173$	$m = 5.267$ $SD = 0.943$	$m = 3.689$ $SD = 1.157$	$m = 5.867$ $SD = 1.078$
Bicycle Education	$m = 3.813$ $SD = 0.876$	$m = 2.933$ $SD = 1.527$	$m = 6.067$ $SD = 1.063$	$m = 3.233$ $SD = 1.422$	$m = 6.167$ $SD = 1.076$
Control Empathy ($n = 6$)	$m = 4.285$ $SD = 0.583$	$m = 4.120$ $SD = 1.084$	$m = 5.360$ $SD = 1.214$	$m = 4.140$ $SD = 0.924$	$m = 5.180$ $SD = 1.259$
Bicycle Empathy ($n = 10$)					

Table 1. Means and standard deviations of the dependent measures, separated by experimental condition.

The manipulation check questionnaire asked, “How engaged did you feel with the events depicted in the video?” on a 1 – 7 scale as a check of the Empathy manipulation, as well as two Education-specific quiz questions. For the engagement ratings, the Control Empathy video mean was 4.40 and the standard deviation was 1.88; for the Bike Empathy video, the mean was 5.375, standard deviation 1.628. This difference was not significant, $t(29) = -1.546, p = ns$. For the quiz questions, 26.7% of those who read the Control Education information (4 out of 15) answered both questions correctly. 43.8% of those who read the Bike Education information (7 out of 16) answered both questions correctly. The mean correct (out of 2) was 1.0 for Control Education, and 1.313 for Bike Education; this difference was not significant, $t(29) = -1.011, p = ns$.

Main Analyses

To test the effectiveness of the laboratory interventions immediately after the experimental session, a 2 (Education; between) x 2 (Empathy; between) x 2 (measure; within) mixed MANCOVA was computed, with Time 2 Attitudes and Time 2 Intentions as the dependent measures, and Time 1 Attitudes as a covariate. The main effects of Education and Empathy and the Education X Empathy interaction were not significant for either Time 2 dependent measure; neither intervention led to significantly more positive attitudes or improved intentions to behave relative to control. The Time 1 Attitudes covariate was a significant predictor of the Time 2 Attitudes dependent measure, $F(1, 26) = 5.069, p < 0.05$, partial eta squared = 0.163, power = 0.582, suggesting that previously held attitudes at Time 1 accounted for a significant proportion (16.3%) of the variance found in the Time 2 Attitudes measure.

To test the effectiveness of the laboratory interventions two weeks after the

experimental session, another 2 (Education; between) x 2 (Empathy; between) x 2 (measure; within) mixed MANCOVA was computed, with Time 3 Attitudes and Time 3 Intentions as the dependent measures, and Time 1 Attitudes as a covariate. The main effects of Education and Empathy were not significant for either Time 3 dependent measure; neither intervention led to significantly more positive attitudes or improved intentions to behave relative to control. The Time 1 Attitudes covariate was again a significant predictor for the Time 3 Attitudes dependent measure, $F(1, 26) = 14.076, p < 0.05$, partial eta squared = 0.351, power = .951, further supporting that previously held attitudes at Time 1 accounted for a significant proportion (35.1%) of the variance found in the Time 3 Attitudes measure.

The Education X Empathy interaction for Time 3 Intentions was marginally significant, $F(1, 26) = 3.711, p = 0.064$, partial eta squared = 0.126, power = 0.462. The interaction plot in Figure 1 shows that those in the mixed conditions (bike education + control empathy; control education + bike empathy) during the laboratory session reported the highest intentions to behave at Time 3.

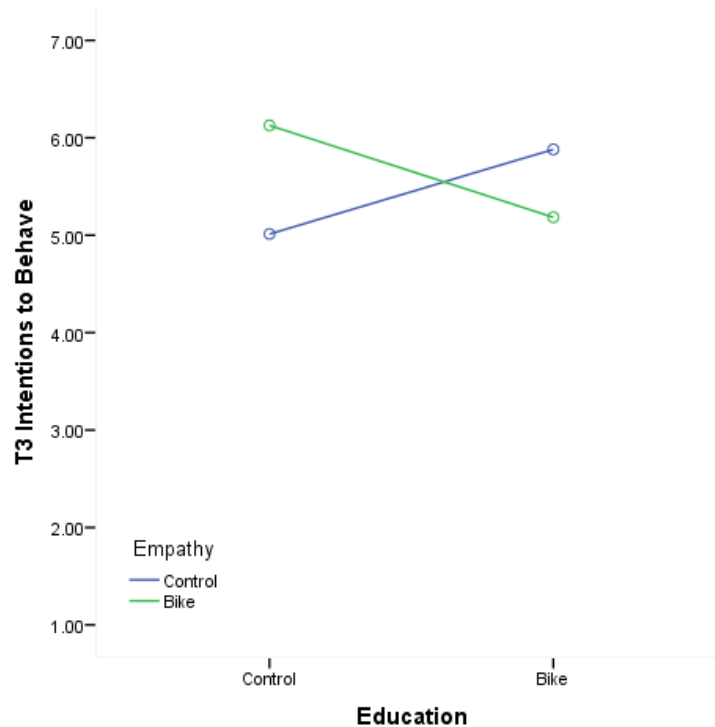


Figure 1. Time 3 Intentions to Behave for the 4 experimental intervention groups.

To test the longitudinal change in attitudes over the course of the study for those groups which underwent an intervention, a repeated measures ANOVA was computed on the Time 1, Time 2, and Time 3 Attitudes dependent measures. The data file was split into the 4 experimental conditions for the study, so that an individual analysis was run for each condition. For the 3 conditions which received bike information only, watched the bike video only, or both, there was no significant effect of time; no significant change in attitudes over the course of the study was found. Figures 2, 3, and 4 below depict attitudes as a function of time for each of the intervention experimental groups.

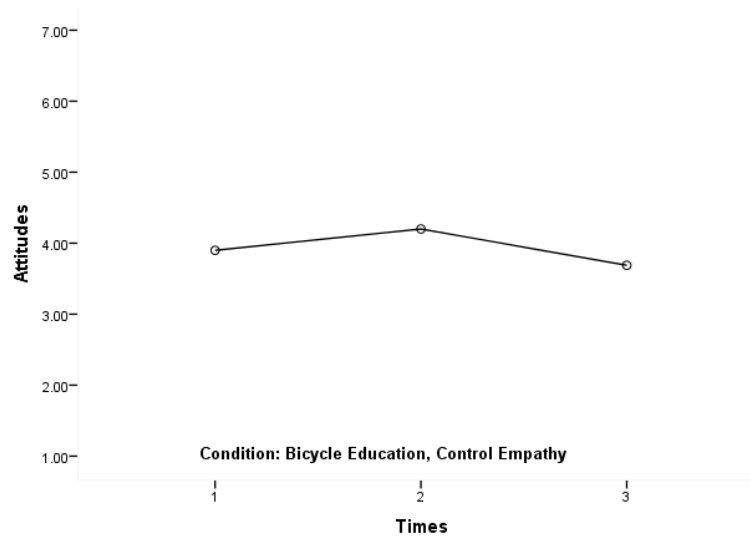


Figure 2. Line graph showing attitudes as a function of time for the Bike Education, Control Empathy condition.

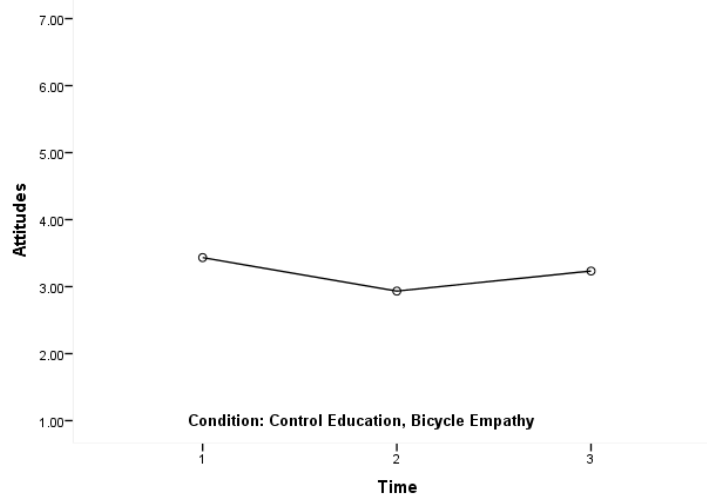


Figure 3. Line graph showing attitudes as a function of time for the Control Education, Bicycle Empathy condition.

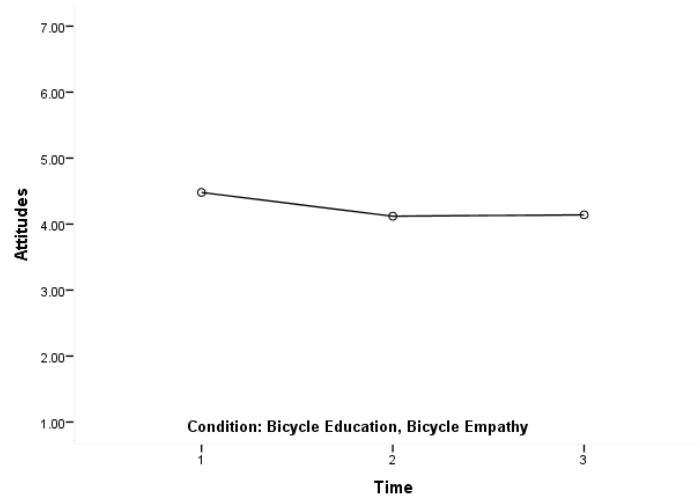


Figure 4. Line graph showing attitudes as a function of time for the Bicycle Education, Bicycle Empathy condition.

In order to test the hypothesis that the empathy intervention alone would be more effective than the education intervention alone, two-sample *t*-tests were computed for the Bicycle Education, Control Empathy condition vs. the Control Education, Bicycle Empathy for the Time 2 and Time 3 Attitudes and Intentions dependent measures. The *t*-tests revealed no significant differences between the two conditions for Time 2 attitudes, $t(10) = 1.612, p = ns$, Time 2 Intentions, $t(10) = -1.378, p = ns$, Time 3 Attitudes, $t(10) = 0.609, p = ns$, or Time 3 Intentions, $t(10) = -0.482, p = ns$. The empathy-alone condition did not show significantly more positive attitudes or improved intentions to behave than the education-alone condition at either Time 2 or Time 3.

Chapter 5

Discussion

It was expected that those who received both the education and empathy bicycle interventions would show the most positive attitudes and intentions to behave at Times 2 and 3 relative to control. Attitudes at Time 3 were expected to be more positive than at Time 2, such that there would be an observed increase over time between time measures. Furthermore, it was expected that the empathy intervention would result in more positive attitudes and improved intentions when presented alone than when the education intervention was presented alone. However, the results did not support the original hypotheses of this study. For Time 2, no main effect was found for either education or empathy, suggesting that the laboratory manipulation was not effective in improving attitudes immediately after the experimental session. For Time 3, no main effects were found, although a trending Education X Empathy interaction on intentions to behave suggest the two mixed conditions (bike education + control empathy; control education + bike empathy) were best in improving intentions relative to the all-control condition, or the all-bike condition. Time 1 Attitudes' significance in the analysis for Times 2 and 3 imply that participants' initial attitudes towards cyclists had a significant effect on their observed attitudes at Time 2 as well as Time 3.

Although the lab manipulations did not have a significant effect on the dependent measures, the manipulation check provided some evidence that the bicycle empathy video was rated as more engaging than the control video, and that participants gave more attention to the bicycle education information than the control education information. Statistically, these differences between groups were not significant, but the means were in

the correct direction. It is possible that a larger sample size would have found significant differences. Alternatively, a more robust manipulation of education and empathy may have shown significant differences between experimental and control even with a small sample.

Shahar, Clarke, and Crundall's (2011) study on motorcyclists provided strong evidence that perspective-taking is effective in improving attitudes towards a specific road user group. However, similar methods were not able to replicate the results for bicyclists in this present study. This may be due to the lab setting differences between the two. Shahar, Clarke, and Crundall's (2011) study was conducted in a UK Accident Research laboratory, which has much of its research supported by the UK Department of Transport. The research conducted within this laboratory may be more transparent than research done in a typical social psychology laboratory. Participants in the motorcyclists study may have been more susceptible to demand characteristics due to the more overt nature of the laboratory and experiment, whereas participants in this bicyclists study may have been more resilient and resistant to the deception that is commonplace in social psychology. This would help explain why, for Time 3 Intentions, only undergoing one bicycle intervention was more effective than two, or no interventions. Reading both bicycle education information as well as watching the bicycle empathy video may have been too strong of a manipulation for it to have the desired effect on participants, and so only one or the other was subtle enough to be effective.

Another possible reason why Shahar, Clarke, and Crundall (2011) may have been successful in improving attitudes towards motorcyclists may lie in the fundamental differences between motorcyclists and bicyclists. Motorcyclists may fall much closer to a

typical motorist on a road user hierarchy, because motorcyclists typically need to obtain licenses, pay taxes, and carry titles, registration, inspection, and insurance. Even though attitudes towards motorcyclists may be more negative relative to motorists, the improvement may have been possible since the two groups are similar enough in terms of responsibility and liability. Bicyclists, who are the second most vulnerable only to pedestrians in the road user hierarchy, and who currently face much less regulation, may be in a secondary class of road users altogether, because of the lack of rules that govern their use. Although many people find themselves on a bicycle, especially at younger ages, they often hang them up in the garage in favor of a motor vehicle in young adulthood. In a way, bicycles are relegated to a perceived lower tier, used by children and adults who cannot or choose not to drive, whereas car drivers and motorcycle drivers occupy the upper echelon and wield the power that comes with legal and financial responsibility. This disparity may explain the absence of a significant change in attitudes towards cyclists over the course of the study, as well as the significant role of the Time 1 Attitudes measure at Time 2 and Time 3; Attitudes may be steadfast and reluctant to change if cyclists are perceived to be too dissimilar.

Evolving social norms and differences in perceived behavioral control, which are the other two aspects of the Theory of Planned Behavior that were not of focus in this study, may also play important roles in the non-significant results of this study. Basford, Reid, Lester, Thomson, and Tolmie (2002) used a fairly representative sample for their focus groups and experimental studies, whereas the sample used in this study was mainly comprised of young college undergraduates. It may be the case that social norms have changed significantly over the ten years since Basford et al. (2002), especially within

younger generations, where economic downturns have changed ideas towards car ownership. Furthermore, Basford et al. (2002) suggested that the problem between motorists and cyclist may not lie in explicitly negative motorist attitudes towards cyclists, but instead the lack of perceived behavioral control when interacting with cyclists. Motorists believe the pressure to not inconvenience other motorists leads them to inconvenience cyclists instead; the presence of cyclists as well as other cars forces drivers to do things that they would not do if alone, such as passing a cyclist too closely in order to not be responsible for slowing down the flow of traffic.

Evidence in the current study lends support for the overlooked role of social norms and perceived behavioral control. Attitudes at each time measure were normally distributed and fairly neutral: The mean of all participants was close to 4 on a scale from 1 – 7 for Time 1, 2 and 3. This suggests that the attitudes themselves may not have been the only component of TPB that should have been studied. Measuring and controlling for changing social norms as well as evaluating and targeting each participant's perceived behavioral control may have been a more effective route to pursue.

Conclusions and Future Directions

The purpose of the present study was to test interventions designed to improve attitudes and intentions to behave, so as to change actual on-road behavior of motorists towards cyclists, and reduce the likelihood of aggressive actions. However, the results showed little support for the efficacy of the experimental interventions in changing either attitudes or intentions to behave. The small and non-representative sample may be partially to blame, but the other components of the Theory of Planned Behavior, namely social norms and perceived behavioral control, were overlooked in this experiment, and

may explain why the manipulations in this study did not work as planned. Future refinements of this design should take into account social norms as well as perceived behavioral control, and perhaps take a more multifaceted approach in improving behavior within the Theory of Planned Behavior framework. This experiment can be seen as the first of many studies which may be specifically designed to make motorists more aware of problems cyclists face every day.

Appendix

Appendix A

Prescreen Questions:

1. Which of the following best describes how you get to campus?

_____ I drive to campus

_____ Public transportation (bus, train, etc.)

_____ Bicycle

_____ Walking

_____ Other

2. I encounter cyclists on the roads during a typical week of day-to-day activities.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

3. It is very frustrating sharing the road with cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

4. Cyclists should not be able to ride on main roads (that do not have bike lanes) during peak hours.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

5. Many cyclists take no notice of road rules.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

6. Cyclists have just as much right to use the road as motorists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

7. Most cyclists are aware of other road users and keep out of their way.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

8. It is safer for cyclists to keep to the right of the lane.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

9. Drivers are not trained to look out for cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

10. Cyclists are courteous on the road to motorists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

11. Many cyclists on the road have not learned to ride properly.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

12. Motorists need to be educated to give cyclists respect on the road.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

13. If cyclists want equal rights on the road, they should pay registration fees or road taxes.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

14. Drivers should change lanes when overtaking cyclists rather than veering around them.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

15. Drivers generally do not pay enough attention to traffic signs.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

16. Motorists should take extra care to look for cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

17. When a car and a bicycle collide, it is typically the fault of the cyclist.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

18. I have similar personal characteristics to the average cyclist.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

19. Car drivers are typically more law-abiding than cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

20. Drivers often fail to check their mirrors and blind spots.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

21. Cyclists should be given more priority on the roads, even if it sometimes causes inconvenience for drivers.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Appendix B

Education Intervention - Experimental:

Here is some information you may or may not know:

- Bicycles, as vehicles, have all of the same rights on the road as motor vehicles, and unless there are specific laws dictating bicycle operation in certain situations, bicyclists must follow all of the same rules that motor vehicles do. For instance, in many city centers and more populated areas, if you are over the age of 12, riding a bicycle on the sidewalk is illegal.
- Bicycles are permitted on virtually all roadways, except for controlled-access highways (e.g., interstate highways).
- Bicycles are to be ridden as far right as safely possible, but in cases of hazardous road conditions (e.g., potholes, glass and other debris), bicyclists can take the lane when necessary.
- When bicycle lanes are provided, cyclists are generally expected to keep within their lane, unless they are preparing to make a turn, or a road hazard prevents them from riding within the lane safely.
- More and more states are putting into place specific legislation that dictates the minimum distance required when overtaking a cyclist. In Maryland, as of October, 2010, this distance is 3 feet, and in Pennsylvania, as of April, 2012, this distance is 4 feet.
- Motorists are allowed to cross double yellow lines when passing cyclists, but should wait until the opposing roadway is clear before attempting to pass.

The next time you encounter a cyclist on the roadway, keep these points in mind.

Appendix C

Education Intervention - Control:

Here is some information you may or may not know:

- The commercial motor vehicle groups are as follows: (1) Combination vehicle (Group A)—Any combination of vehicles with a gross combination weight rating of 26,001 pounds or more, (2) Heavy Straight Vehicle (Group B)—Any single vehicle with a GVWR of 26,001 pounds or more, (3) Small Vehicle (Group C)—Any single vehicle, or combination of vehicles, that meets neither the definition of Group A nor B but that either is designed to transport 16 or more passengers including the driver, or is used in the transportation of materials found to be hazardous.
- The driver of a commercial motor vehicle shall not cross a railroad track or tracks unless he/she first: Stops the commercial motor vehicle within 50 feet of, and not closer than 15 feet to, the tracks; thereafter listens and looks in each direction for an approaching train; and ascertains that no train is approaching. When it is safe to do so, the driver may drive the commercial motor vehicle across the tracks in a gear that permits the commercial motor vehicle to complete the crossing without a change of gears. The driver must not shift gears while crossing the tracks.
- Drivers must reexamine the commercial motor vehicle's cargo and its load securement devices during the course of transportation and make any necessary adjustment to the cargo or load securement devices, including adding more securement devices, to ensure that cargo cannot shift on or within, or fall from, the commercial motor vehicle. Reexamination and any necessary adjustments

must be made whenever—(i) The driver makes a change of his/her duty status;
or(ii) The commercial motor vehicle has been driven for 3 hours; or(iii) The
commercial motor vehicle has been driven for 150 miles, whichever occurs first.

Appendix D

Weblinks for Empathy Videos

Experimental - <http://www.youtube.com/watch?v=eEwZcWUtjzk>

Control - <http://www.youtube.com/watch?v=0BO0c8TQGkI>

Appendix E**Attitudes/Intentions Measure****INSTRUCTIONS:**

The statements below concern how you feel about various road users that you may encounter during your regular experiences as a motorist, and how you feel about your own driving. Respond to each statement by **circling a number from 1 (*strongly disagree*) to 7 (*strongly agree*)** to indicate how much you agree or disagree with the statement.

1. Pedestrians often step up onto zebra crossings without looking for approaching traffic.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

2. Most car drivers do not know their stopping distances at different speeds.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

3. Taxi drivers rarely wear seatbelts.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

4. Taxi drivers are more likely to speed than the average car driver.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

5. Taxi drivers change lanes without checking their mirrors more often than other drivers.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

6. Taxi drivers have fewer accidents than average car drivers when their (taxi drivers') higher millage is taken into consideration.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

7. It is very frustrating sharing the road with cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

8. Cyclists should not be able to ride on main roads (that do not have bike lanes) during peak hours.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

9. Many cyclists take no notice of road rules.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

10. Many cyclists on the road have not learned to ride properly.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

11. When a car and a bicycle collide, it is typically the fault of the cyclist.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

12. Bus drivers often pull away from bus stops without waiting for an adequate gap.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

13. Bus drivers are more careful than other drivers.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

14. Bus drivers are typically more law-abiding than car drivers.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

15. Many people who have passed their car driving test would find it relatively easy to pass the bus driving test.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

16. Most commercial truck drivers will tailgate the car ahead.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

17. Commercial truck drivers tend to have headlights on more often than car drivers in the daytime to increase visibility.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

18. When a car and a truck collide it is typically the fault of the truck.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

19. Many people who have passed their car driving test would find it relatively easy to pass the commercial vehicle driving test.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

20. I am concerned about the well-being of the average pedestrian.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

21. I am concerned about the well-being of the average taxi driver.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

22. I am concerned about the well-being of the average cyclist.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

23. I am concerned about the well-being of the average commercial bus/truck driver.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

24. I encounter pedestrians on the roads during a typical week of day-to-day activities.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

25. I encounter taxis on the roads during a typical week of day-to-day activities.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

26. I encounter cyclists on the roads during a typical week of day-to-day activities.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

27. I encounter buses and trucks on the roads during a typical week of day-to-day activities.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

28. I intend to check my blind spots more often when changing lanes or making turns.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

29. I intend to check my side-view mirrors more often before exiting my vehicle.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

30. I intend to use my headlights more during the day to increase visibility.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

31. I intend to take extra care to look for cyclists.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

32. I intend to take extra care to look for pedestrians.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

33. I intend to use my turn signals more often to alert other road users of my actions.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

34. I intend to not follow buses and trucks too closely, and to give adequate space should something happen.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

35. I intend to be more patient when driving behind or near a slower-moving vehicle.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

36. I intend to be more careful about how fast I am going in school zones.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

37. I intend to pay more attention to road and traffic signs.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Appendix F**Manipulation Check**

For Experimental condition:

1. The video depicted traveling by _____(Fill in the blank).

2. How engaged did you feel with the events depicted in the video?

Very Removed 1 2 3 4 5 6 7 Very Engaged

3. How many feet are required when overtaking a cyclist in Maryland? _____

- A) 1
- B) 2
- C) 3
- D) 4

4. After what age is it illegal to ride on the sidewalk in many cities? _____

- A) 11
- B) 12
- C) 16
- D) 18

For Control condition:

1. The video depicted traveling by _____(Fill in the blank).

2. How engaged did you feel with the events depicted in the video?

Very Removed 1 2 3 4 5 6 7 Very Engaged

3. When is it necessary for a commercial vehicle driver to reinspect his/her cargo? _____

- A) after a change in duty status
- B) after 2 hours or 100 miles, whichever comes first
- C) after 3 hours or 150 miles, whichever comes first
- D) Both A and B
- E) Both A and C

4. How many feet are required when stopping a commercial vehicle in front of a railroad crossing, minimum? _____

- A) 10
- B) 15
- C) 25
- D) 50

Appendix G

Informed Consent

Principal Investigator: Charles J. Arayata, Department of Psychology, Towson University

In this experiment, we are assessing participants' experiences with and opinions about other road users. You will be asked to watch a short video clip, read a short informational page, and fill out a questionnaire packet which contains items about who you typically encounter on the road, and how you feel about these groups. Approximately 2 weeks after this laboratory session, you will be contacted via email to complete the questionnaire once more. You are allowed to skip any items that you would rather not answer.

There are no known risks associated with participating in this study. Should you become distressed or uncomfortable, we will terminate the lab session immediately. Although there are no direct benefits to you, we hope that the the study will reveal something about human behavior. The lab portion of this study combined with the email questionnaire portion should take no longer than 30 minutes to complete.

Participants must be at least 18 years old.

Your participation is entirely voluntary. You do not have to participate in the study. If you choose to participate, you may discontinue your participation at any time. Your decision to participate or not to participate will not influence your grade or class standing.

All information about your responses will remain confidential. We will not show your information to anyone outside of our research team unless you give us written permission. Your responses will never be linked to your name. If you have any questions, you may ask them now or at any time during the study. If you should have questions after today, you can call the Principal Investigator, Charles Arayata, at (610) 999-0071, call (410) 704-3214 and ask for Dr. Justin Buckingham, the faculty sponsor, or call (410) 704-2236 and ask for Dr. Debi Gartland, Chairperson of the Institutional Review Board for the Protection of Human Participants at Towson University.

I, _____ affirm that I have read and understand the above statements and have had all of my questions answered.

Date: _____

Signature: _____

THIS PROJECT HAS BEEN REVIEWED BY THE INSTITUTIONAL REVIEW BOARD

FOR THE PROTECTION OF HUMAN PARTICIPANTS AT TOWSON UNIVERSITY.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Altman, I. (1975). *The environment and social behavior*. Monterey, CA: Brooks/Cole.
- Bamberg, S., Ajzen, I., & Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. *Basic and Applied Social Psychology*, 25, 175-187.
- Basford, L., Reid, S., Lester, T., Thomson, J., & Tolmie, A. (2002). *Drivers' perceptions of cyclists*. (TRL 549). Prepared by the Transport Research Laboratory for the Department of Transport, UK.
- Batson, C. D., Polycarpou, M. P., Harmon-Jones, E., Imhoff, H. J., Mitchener, E. C., Bednar, L. L., Klein, T. R., & Highberger, L. (1997). Empathy and attitudes: Can feeling for a member of a stigmatized group improve feelings toward the group? *Journal of Personality and Social Psychology*, 72, 105-118.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five factor inventory (NEO-FF-I) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Eisenberg, N. & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*, 101, 91-119.
- Fraine, G., Smith, S. G., Zinkiewicz, L., Chapman, R., & Sheehan, M. (2007). At home on the road? Can drivers' relationships with their cars be associated with territoriality? *Journal of Environmental Psychology*, 27, 204-214.

- Heesch, K. C., Sahlqvist, S., & Garrard, J. (2011). Cyclists' experiences of harassment from motorists: Findings from a survey of cyclists in Queensland, Australia. *Preventative Medicine, 53*, 417-420.
- Hennessy, D. A., & Wiesenthal, D. L. (1999). Traffic congestion, driver stress, and driver aggression. *Aggressive Behavior, 25*, 403-423.
- Jovanović, D., Lipovac, K., Stanojević, P., & Stanojević, D. (2011). The effects of personality traits on driving-related anger and aggressive behavior in traffic among Serbian drivers. *Transportation Research Part F, 14*, 43-53.
- Krahé, B., & Fenske, I. (2002). Predicting aggressive driving behavior: The role of macho personality, age, and power of car. *Aggressive Behavior, 28*, 21-29.
- Lennon, A., & Watson, B. (2011). "Teaching them a lesson?" A qualitative exploration of underlying motivations for driver aggression. *Accident Analysis and Prevention, 43*, 2200-2208.
- Miller, P. A., & Eisenberg, N. (1988). The relation of empathy to aggressive and externalizing/antisocial behavior. *Psychological Bulletin, 103*, 324-344.
- Mosher, D. L., & Sirkin, M. (1984). Measuring a macho personality constellation. *Journal of Research in Personality, 18*, 150-163.
- O'Connor, J. P., & Brown, T. D. (2010). Riding with the sharks: Serious leisure cyclist's perceptions of sharing the road with motorists. *Journal of Science and Medicine in Sport, 13*, 53-58.
- Ohbuchi, K. (1988). Arousal of empathy and aggression. *Psychologia, 31*, 177-186.
- Panter, J. R., Jones, A. P., van Sluijjs, E. M., & Griffin, S. J. (2010). Attitudes, social support and environmental perceptions as predictors of active commuting

- behavior in school children. *Journal of Epidemiology and Community Health*, 64, 41-48.
- Pucher, J., Buehler, R., & Seinen, M. (2011). Bicycling renaissance in North America? An update and re-appraisal of cycling trends and policies. *Transportation Research Part A*, 45, 451-475.
- Rissel, C., Campbell, F., Ashley, B., & Jackson, L. (2002). Driver road rule knowledge and attitudes towards cyclists. *Australian Journal of Primary Health*, 8, 66-69.
- Schreer, G. E. (2002). Narcissism and aggression: Is inflated self-esteem related to aggressive driving? *North American Journal of Psychology*, 4, 333-342.
- Shahar, A., Clarke, D., & Crundall, D. (2011). Applying the motorcyclist's perspective to improve attitudes towards motorcyclists. *Accident Analysis and Prevention*, 43, 1743-1750.
- Shinar, D., & Compton R. (2004). Aggressive driving: An observational study of driver, vehicle, and situational variables. *Accident Analysis and Prevention*, 36, 429-437.
- Szlemko, W. J., Benfield, J. A., Bell, P. A., Deffenbacher, J. L., & Troup, L. (2008). Territorial markings as a predictor of driver aggression and road rage. *Journal of Applied Social Psychology*, 38, 1664-1688.
- Underwood, G., Chapman, P., Wright, S., & Crundall, D. (1999). Anger while driving. *Transportation Research Part F*, 2, 55-58.

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EDUCATION

Towson University, Towson, MD

Master of Arts, Experimental Psychology, expected May 2013.

Franklin & Marshall College, Lancaster, PA

Bachelor of Arts, *Magna Cum Laude*, with Departmental Honors, May 2009.

Major: Psychology Minor: Economics

RESEARCH EXPERIENCE

Bicycle Coalition of Greater Philadelphia, Philadelphia, PA

Research Intern, Policy, Budget, and Education

Winter 2012 – Present

Towson University, Towson, MD

Master's Thesis

Fall 2012 – Spring 2013

Advanced Biological Psychology

Fall 2012

Proseminar/Research Methods

Fall 2011– Spring 2012

Virginia Tech Transportation Institute, Blacksburg, VA

Research Assistant, Center for Infrastructure-Based Safety Systems

Summer 2011

University of Pennsylvania, Philadelphia, PA

Research Assistant, Dept. of Philosophy, Politics, and Economics

Winter 2009 – Spring 2010

Franklin & Marshall College, Lancaster, PA

Senior Independent Study in Psychology

Fall 2008 – Spring 2009

Collaborative Research in Human Perception & Action

Fall 2008

Hackman Scholar & Independent Study in Psychology

Summer 2007 – Fall 2007

Collaborative Research in Social Psychology

Spring 2007

TEACHING EXPERIENCE

Graduate Teaching Assistant, Psychology Department

Towson University, 2011 - 2013

Laboratory Teaching Assistant, Psychology Department

Franklin & Marshall College, 2007 - 2009

RESEARCH PRESENTATIONS

Arayata, C. J., & Wilson, C. L. (2013). *Acute pain, attachment anxiety, and social support*. Poster presented at the annual meeting of the Society for Personality and Social Psychology, New Orleans, LA.

Arayata, C. J. (2012). *Determinants of college satisfaction*. Poster presented at the Towson University Research Expo, Towson, MD.

Arayata, C. J. (2009). *Examining decision-making in couples using attachment theory and game theory: An experimental approach*. Poster presented at the Franklin & Marshall College "A Closer Look" Research Fair, Lancaster, PA.

Wilson, C. L., Rholes, W. S., Simpson, J. A., Westmoreland, M., Arayata, C. J., Krummeyer, G. E., Main, J., & Ruben, M. (2009). *Adult attachment in the nursery: An observational study of mom-dad-baby triads*. Poster presented at the annual meeting of the Society for Personality and Social Psychology, Tampa, FL.

Arayata, C. J. & Weast, B. (2008). *Does videogame experience enhance visual function?* Poster presented at the 2nd Psychology Collaborative Research Conference, Franklin & Marshall College, Lancaster, PA.

Wilson, C. L., Arayata, C. J., Krummeyer, G. E., & Marshall, E. R. (2008). *A pain in the arm: Attachment, social support, and the tourniquet procedure*. Poster presented at the biennial meeting of the International Association for Relationship Research, Providence, RI.

Krummeyer, G., Arayata, C. J., & Wilson, C. L. (2008). *The tourniquet procedure: A gendered analysis of pain experience*. Poster presented at the Franklin & Marshall Spring Research Fair, Lancaster, PA.

Arayata, C. J., Wilson, C. L., & Krummeyer, G. (2007). *Attachment and perceptions of acute pain using the tourniquet procedure*. Poster presented at the Franklin & Marshall Autumn Research Fair, Lancaster, PA.

AWARDS**Franklin & Marshall College**

Kenneth A. Brookshire Memorial Prize – awarded for most distinguished Senior research, 2009

John Marshall Research Grant – awarded in recognition of project potential, 2008

Hackman Research Grant - selected and awarded in recognition of project potential, 2007

Honors List – awarded for a semester GPA of 3.7 or higher – Fall 2007; Fall 2008; Spring 2009

John Marshall Scholarship - awarded for outstanding GPA and activities, 2005-2009

