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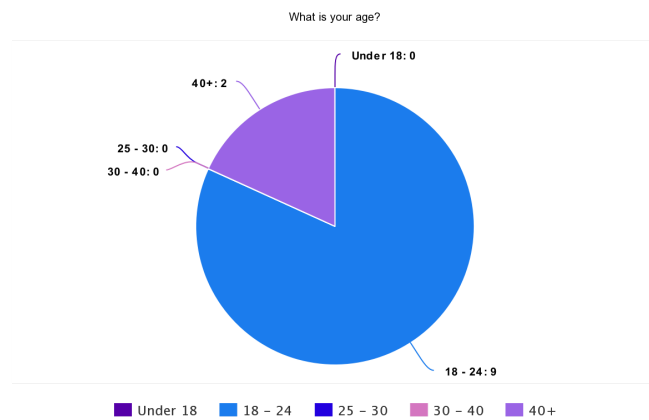
January 31, 2022

Empathy Research of Mental Wellbeing and Behaviors while Driving

The topic of this report is focused around understanding drivers' mental wellbeing while driving and behaviors used to lessen anxiety and stress felt while driving. Our focal points consist of understanding how drivers react to other drivers and pedestrians specifically in parking lots and garages, intersections, and at stop lights, and how these interactions may lead to an increase in driving stress and anxiety.

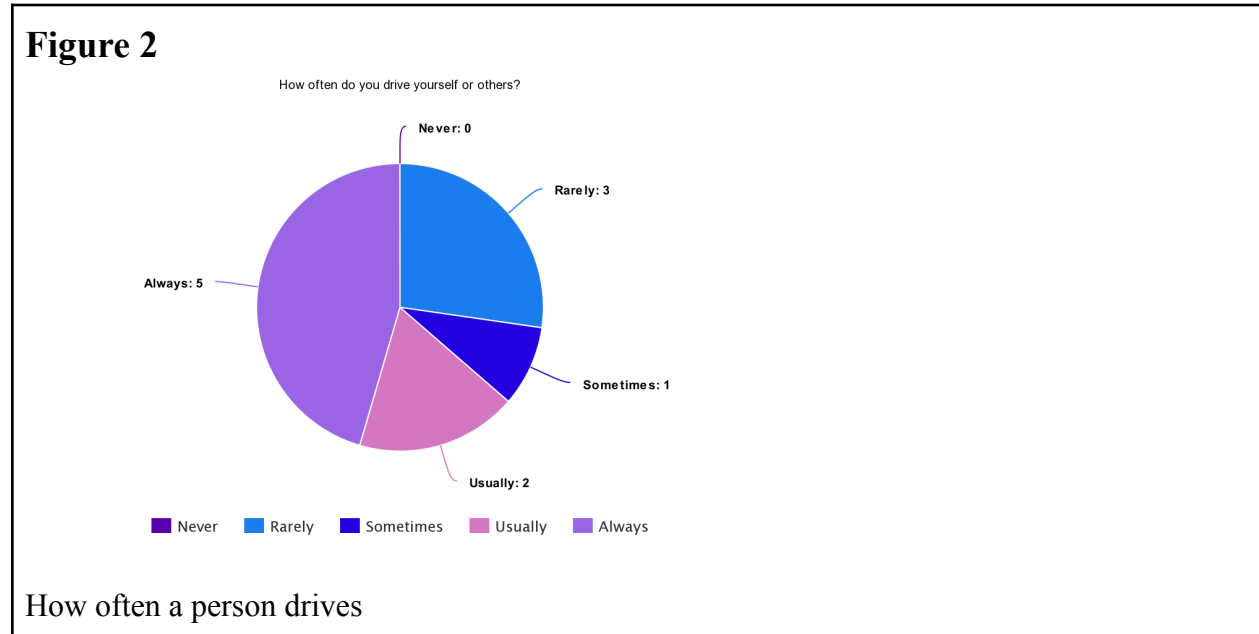
For the first part of our research, we created a questionnaire that was sent out to mainly students that go to Georgia Tech Institute of Technology.

Figure 1

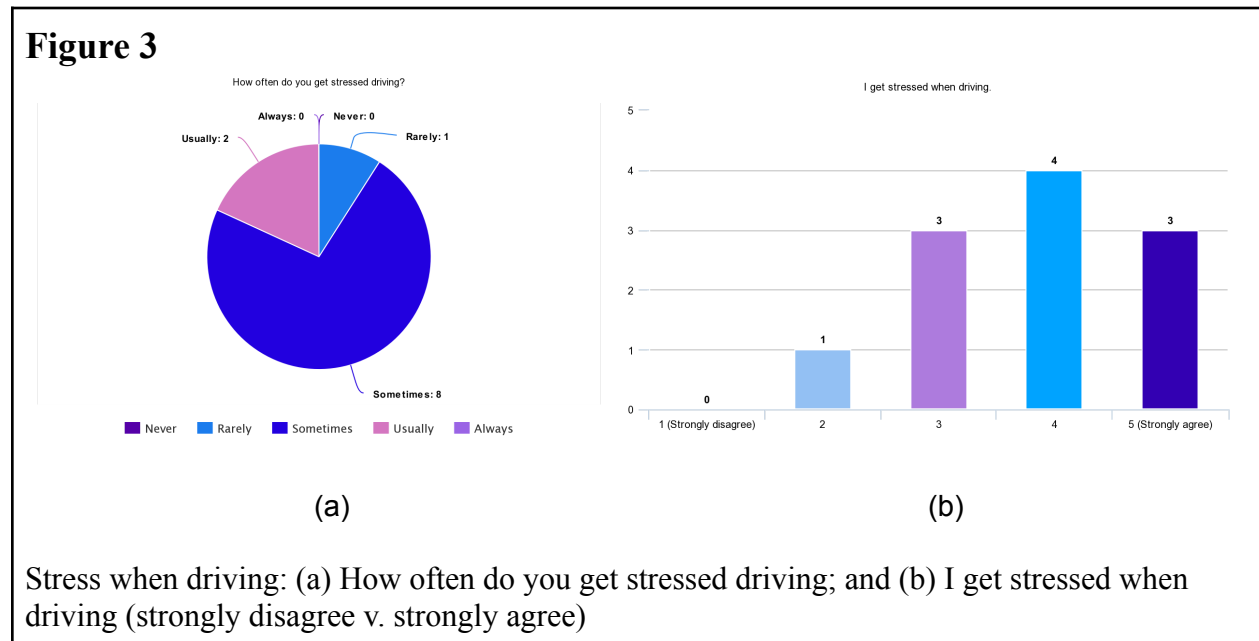


Ages of the questionnaire participants

The first few questions used the Likert Scale (e.g. “Never,” “Rarely,” “Sometimes,” “Often,” and “Rarely”), asking participants to respond to questions concerning how often they drive and the stress levels they experience when driving.

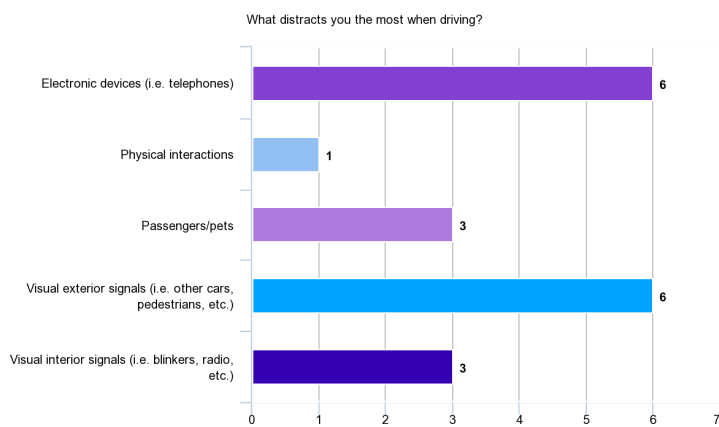


Participants then noted whether or not they could relate to the phrase “I get stressed when driving” on a 5 point scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”).



The next questions will inquire why respondents chose the answers above examining what triggers stress and how they deal with it. For example, after having filled out their answers, participants who answered with a score of 3 or higher would receive the questions of “If you answered 3 or above, what specifically makes you stressed when driving?” and “If you answered 3 or above in question 4, how do you handle stress when driving?”

Figure 4



What distracts you the most when driving?

When researching, we also interviewed 4 separate participants who were mainly college students that either were currently attending or had just graduated from Georgia Institute of Technology.

Table 1

Participants interviewed

Name	Occupation	Years of Driving Experience	Age	Gender
Caroline	Student	5	21	F

Chitrita	Student/Digital Technology Co-Op	5	21	F
Jackson	Financial Analyst	8	23	M
Troy	Student	6	22	M

From our research, we found that 64% of survey participants said their stress is caused by other drivers and they are unsure of how to cope with the stress. In question 6 of the questionnaire, one person responded that “I don’t [handle stress],” and another wrote “[I] hope it goes away on its own.” In an interview with Chitrita, she mentions how “I don’t handle stress, I just panic,” demonstrating how not everyone knows proper coping methods to deal with stress. Due to this finding, in our design solution, we hope to implement scientifically proven stress reducing methods that can be specific to a driver. A key finding that was found in the interviews was that while most participants may attempt to de-stress, they are unsure of whether or not the methods they used worked. For instance, in the interview with Caroline, she mentions that she tries “hard not to get stressed” but in doing so, she believes it “might stress me out more, but I don’t really know,” showing that she is unclear of whether or not her methods to deal with stress actually help. Because not many people can tell whether or not they’re stressed, our design will incorporate sensors and detection devices that will help users monitor and decrease their stress levels. Another finding was that people noticed their stress go up when they were driving in busier and louder areas as opposed to quieter and more stable environments. In the questionnaire, when answering what specifically made them stressed, one respondent said “sensory overload (audio),” mentioning that “the actual driving part doesn’t stress me out at all.” In her interview,

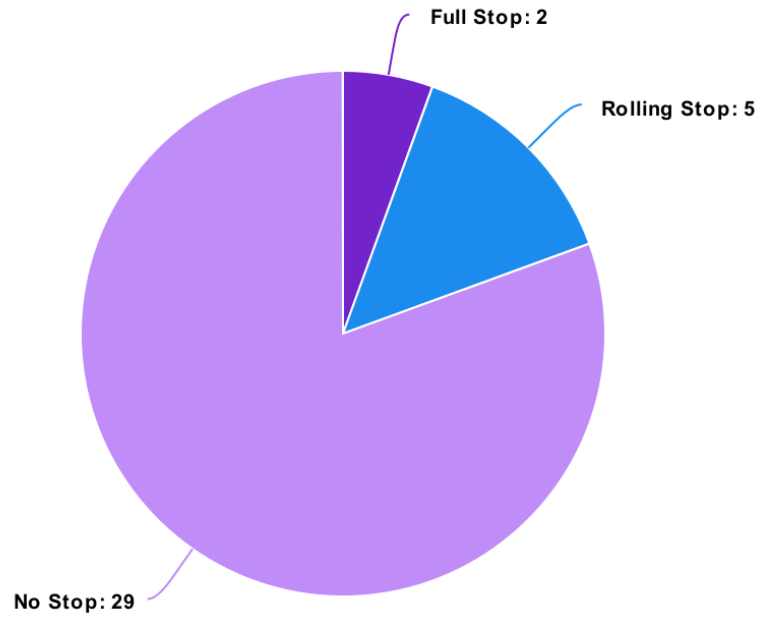
Chitrita mentioned that the location she's located, Atlanta, stresses her out in general as "it's so crowded" and "there are so many cars." Having learned this, we decided that the design must provide a stable environment for the user, allowing them a "safe space" inside their own car when driving. Lastly, we found that secondary electronic devices, such as phones, cause the most distractions when driving. 60% of questionnaire participants answered that their electronic devices distracted them the most when driving. For instance, in the interview done with Jackson, he mentioned that "I have to put my phone on Do Not Disturb Mode in order to not get distracted" or he will "be tempted to pick it up and look at it." In order to keep drivers from becoming more distracted and "tempted" by their secondary devices, the solution must rely on the interfaces already built into the vehicle and must be easy to install into all different kinds of vehicle models and makes.

Each team member contributed equally. Ashton and Abigail both worked on the creation of the questionnaire and the interview questions together. Both team members reached out to students to fill out the questionnaire and both interviewed 2 participants separately. The team members individually transcribed the interviews they had done separately. Ashton then went on to analyze and create graphs for the questionnaire while Abigail went back and quantified the observations done into graphs. Abigail and Ashton together coded the transcripts, highlighting important quotes and understanding the main themes that appeared in each interview. Both then discussed their more in-depth findings from the questionnaire responses and interviews, coming to above key findings, which would affect the implications for the future design.

Appendix

Observation Data

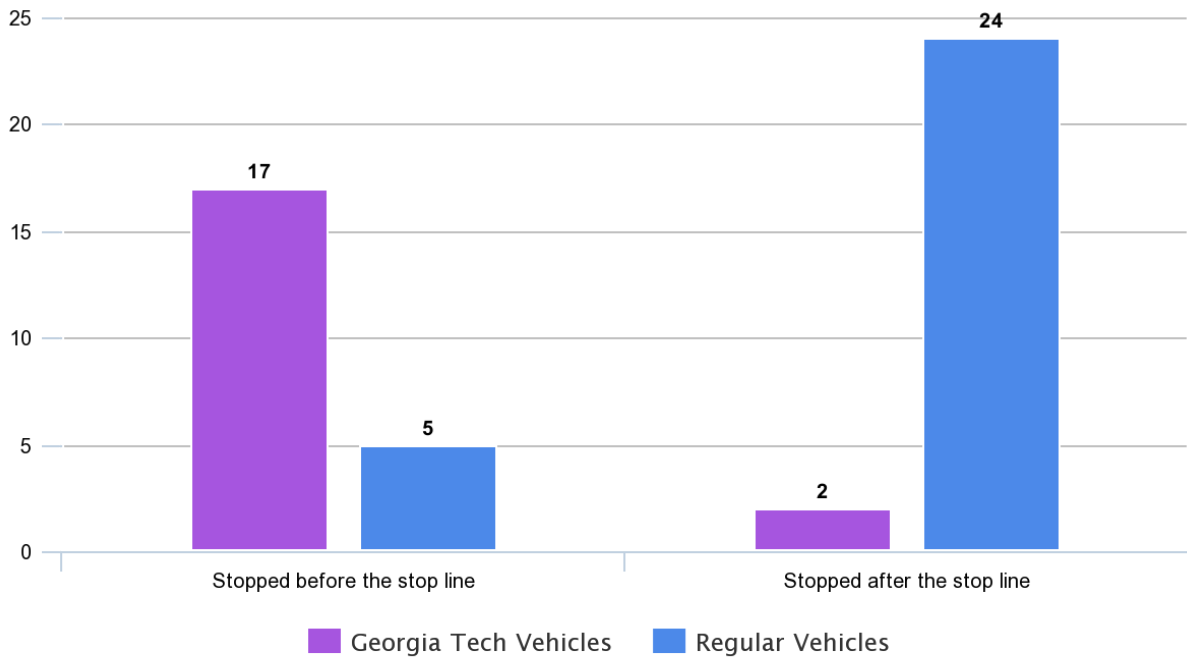
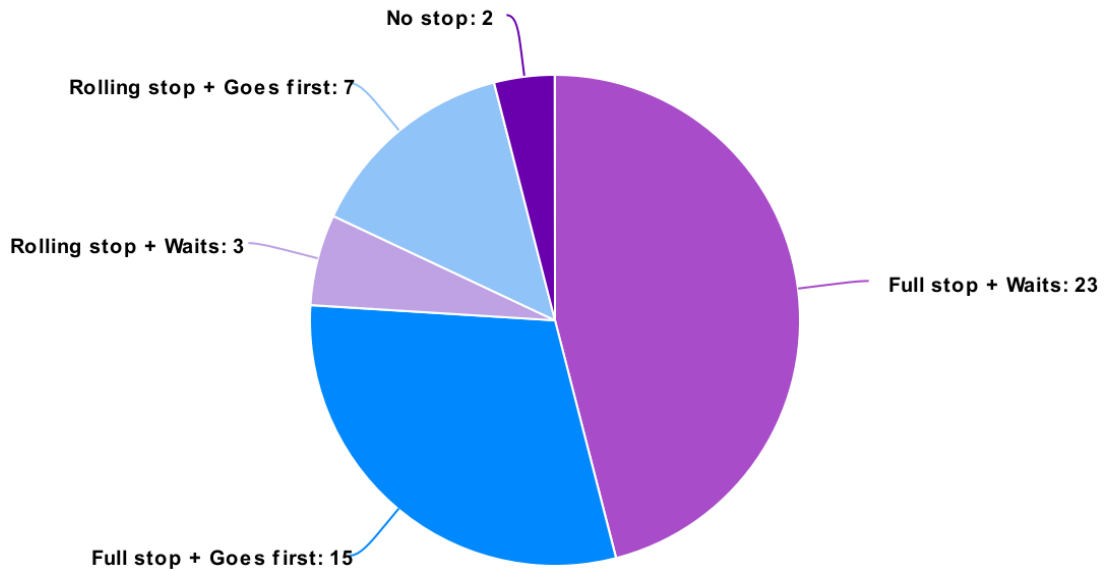
Car interactions with pedestrians in parking lots



Speed before and during passing pedestrians

> 35 mph		2
30 - 35 mph		5
< 35 mph		24

Driver interactions with other cars at intersections



Questionnaire

1. What is your age?

- Under 18
- 18 - 24
- 25 - 30
- 31 - 40
- 40+

2. How often do you drive yourself or others?

- Never
- Rarely
- Sometimes
- Usually
- Often

3. How often do you get stressed when driving?

- Never
- Rarely
- Sometimes
- Usually
- Often

4. I get stressed when driving.

Strongly disagree 1 2 3 4 5 Strongly Agree
○ ○ ○ ○ ○

5. If you answered 3 or above, what specifically makes you stressed when driving?

6. If you answered 3 or above in question 4, how do you handle stress when driving?

7. What distracts you most when driving? (You may choose more than one)

- Electronic devices (i.e. telephones)
- Physical interactions
- Passengers/pets
- Visual exterior signals (i.e. other cars, pedestrians, etc.)
- Visual interior signals (i.e. blinkers, radio, etc.)

Interview Script:

Hi [insert name], thank you so much for agreeing to meet with me. Before we begin, let me give you a brief overview of what we're doing. We're currently working on a project focused around mental wellbeing, which is an individual's thoughts and feelings and how they can cope with the ups and downs of everyday life. Specifically, we're working to help young adults adopt mental wellbeing behaviors (i.e. meditation, self-reflection, etc.) to deal with anxiety and stress caused by driving. We will be recording this interview for research purposes only. After a transcript of the recording is done, the recording will be deleted promptly after. Will this be okay with you? Our first few questions will focus on getting to know more about you. How old are you and how long have you been driving? When did you originally begin driving? Why did you start driving? How often do you actually find yourself driving? When you are driving, where are you typically driving to and what areas are you driving in? What would you consider distractions? How do these distractions affect your driving? When was the last time you felt stressed when driving? How do you react when {a stressor} appears when driving? How do you handle stress in day-to-day life? When was the last time you enjoyed driving?

Transcript 1- Caroline

Interviewer: Hi Caroline, thank you so much for agreeing to meet with me. Before we begin, let me give you a brief overview of what we're doing. We're currently working on a project focused around mental wellbeing, which is an individual's thoughts and feelings and how they can cope with the ups and downs of everyday life. Specifically, we're working to help young adults adopt mental wellbeing behaviors (i.e. meditation, self-reflection, etc.) to deal with anxiety and stress caused by driving. We will be recording this interview for research purposes only. After a transcript of the recording is done, the recording will be deleted promptly after. Will this be okay with you?

Interviewee: Yep

Interviewer: Our first few questions will focus on getting to know more about you. How old are you and how long have you been driving?

Interviewee: I am 21 years old and I have been driving since I was 16..

Interviewer: When did you originally begin driving?

Interviewee: I started practicing driving around 14/15 with my parents but I really started driving around 16 and the most driving I've ever done is now around 2021.

Interviewer: Is there a particular reason as to why you began driving?

Interviewee: I had to drive to school. My parents wanted me to start driving to high school so I started driving and my parents luckily for me bought me a car so I was like okay I guess I have to drive now but I was always really nervous to drive.

Interviewer: How often do you actually find yourself driving?

Interviewee: Barely ever. I only drive when I have to, like to go to CVS, the doctor's office but if I don't have to, I usually get my friends to drive for me.

Interviewer: How come you get your friends to drive for you?

Interviewee: I just get so anxious. Even when I was practicing driving for the first time, I still never liked it. People are always like "oh all the freedom you're gonna get" but I always get so nervous because of my anxiety.

Interviewer: How often do you get anxious and stressed when driving?

Interviewee: Right before I drive, I usually get anxious. Literally every single time I drive I get anxious. I'm not sure why but I think it's just so overwhelming to be surrounded by so many people and having to focus and it's hard to do for me.

Interviewer: How do you deal with that stress and what do you do to help you destress?

Interviewee: I usually take deep breaths and I turn on my music but I try to play calming music like lofi or music with soft voices. Or I turn on a podcast or try to just listen to the directions because people's voices tend to be soothing to me. And I try to forget the fact that I'm in a moving car and I stop thinking about where I'm going to go and focus on the road in front of me. But even if I try it doesn't work all the time. Like I'll be trying hard not to get stressed and I think that might stress me out more, but I don't know really.

Interviewer: What would you consider distractions as you drive?

Interviewee: I turn my phone on “Do Not Disturb” mode so I don’t look at my phone but probably the music. If my music isn’t on the right song I really try to change it. So it’s really more of auditory distractions because sometimes I’ll get so into the podcast that I zone out for a second and that makes me even more stressed. I like to begin overthinking and I have to force myself to take deep breaths and look straight ahead instead of worrying too much.

Interviewer: When was the last time you felt stressed when driving?

Interviewee: Last time I drove and that was to a CVS

Interviewer: Can you tell us when, if ever, you last enjoyed driving?

Interviewee: Never. Not even once.

Transcript 2- Chitrita

Interviewer: Hi! So just as an overview for what this is for, I’m doing a studio project that deals with helping drivers adopt mental wellbeing behaviors when driving and it’s going to be recorded. Are you okay with being recorded?

Interviewee: Yes, of course.

Interviewer: Okay, first of all, when did you start driving?

Interviewee: I started driving when I was 16 and when I got my license so I could take myself to school. Before that I practiced a little bit with my parents when I had my learners’ permit.

Interviewer: How often do you drive now?

Interviewee: I drive about a few times a week. Like 2-3 days a week, depending on how often I’m going to work in person, but usually a few times a week.

Interviewer: Where do you typically drive other than work?

Interviewee: Honestly usually just to work and back. When I'm in Franklin [hometown] I'll drive to the store and to see friends.

Interviewer: How often do you get stressed when driving?

Interviewee: (laughs) ALL the time in Atlanta. Every single time I drive.

Interviewer: In day to day life, how do you handle stress? And how do you handle stress when driving?

Interviewee: I handle stress by taking naps and watching Netflix. Or I'll light all my candles and just chill with blankets or just hang out and listen to music. When driving, I don't handle stress, I just panic.

Interviewer: What kind of interface do you have in your car and how does it affect your driving? Do you think it's useful?

Interviewee: I don't have an interface in my car, but I use Google maps a lot but I don't think it really affects my driving. I look down at it a lot when I'm driving. It's useful because it gives me a sense of direction and where I'm going.

Interviewer: Can you tell me when you last felt stressed when driving?

Interviewee: Literally every time I drive in Atlanta because everyone is so impatient and aggressive. Everyone drives so fast too while I'm over here trying to be cautious.

Interviewer: Can you tell me when you last enjoyed driving?

Interviewee: Probably in Franklin [hometown]. The roads are like twice as wide as they are here so it's not as crammed, and it makes it less stressful. So the last time I enjoyed driving it was there.

Interviewer: How do you usually react when {a stressor} appears when driving?

Interviewee: Like if someone speeds around me or cuts me off? Or like if somebody jaywalks in front of me? I freak out and get scared and slam on the brakes usually, and after that I usually slow down and drive more carefully.

Interviewer: What specifically stresses you out when driving?

Interviewee: Just Atlanta stresses me out in general. It's so crowded, there are so many cars, and everyone is so aggressive and rude and has no patience.

Transcript 3- Jackson

Interviewer: Hi! So just as an overview for what this is for, I'm doing a studio project that deals with helping drivers adopt mental wellbeing behaviors when driving and it's going to be recorded. Are you okay with being recorded?

Interviewee: Yep.

Interviewer: First question: when did you start driving and why?

Interviewee: When I was 15 because that's when I got my learner's permit. I got my license when I was 16, so I've been driving since then.

Interviewer: How often do you drive now?

Interviewee: Every day.

Interviewer: Where do you typically drive?

Interviewee: Well, I usually come to Atlanta to see you, and also to work and to see friends.

Interviewer: How often do you get stressed when driving?

Interviewee: Hmm... maybe like every other time I drive? A couple times a week? It doesn't happen very often.

Interviewer: So how would you say you handle stress when driving that's caused by other drivers? So for example, if another driver moves into your lane or cuts you off, how would you react to that?

Interviewee: I guess I usually get angry, not stressed. If another driver does something like move into my lane or pull out in front of me or something like that, I get mad.

Interviewer: Do you have an interface that you interact with when driving and how does it affect your driving?

Interviewee: My phone distracts me a lot. I usually will change podcasts or a song on Spotify while I'm driving. I'm sure it does affect my driving, but I mean I've never gotten into a wreck from it. I try to use my phone at a stop light but I don't always, even though I shouldn't.

Interviewer: Can you tell me when you last felt stressed, or angry, when driving?

Interviewee: The other day. I was getting on the highway, merging, and this Beetle almost ran into me.

Interviewer: Can you tell me when you last enjoyed driving?

Interviewee: I can't think of a specific time because I generally really enjoy it. I usually just listen to music and it's peaceful.

Interviewer: What specifically stresses you out, or makes you angry, when driving?

Interviewee: Other drivers when they don't follow simple traffic rules, or if they change lanes in front of me without signaling, or if they're tailgating, getting too close, things like that.

Transcript 4- Troy

Interviewer: Hi Troy, thank you so much for agreeing to meet with me. Before we begin, let me give you a brief overview of what we're doing. We're currently working on a project focused around mental wellbeing, which is an individual's thoughts and feelings and how they can cope with the ups and downs of everyday life. Specifically, we're working to help young adults adopt mental wellbeing behaviors (i.e. meditation, self-reflection, etc.) to deal with anxiety and stress caused by driving. We will be recording this interview for research purposes only. After a transcript of the recording is done, the recording will be deleted promptly after. Will this be okay with you?

Interviewee: Yes

Interviewer: Our first few questions will focus on getting to know more about you. How old are you and how long have you been driving?

Interviewee: I am 22 and I have been driving for the past 6 years.

Interviewer: When did you originally begin driving?

Interviewee: I began driving when I was 16. I did a little bit with my parents before I got my learners permit in New Jersey but yeah not too much before that.

Interviewer: Is there a particular reason as to why you began driving?

Interviewee: It's very efficient especially when you're not in the city especially when needing to get place to place because not many things are walkable

Interviewer: How often do you actually find yourself driving?

Interviewee: When I'm here at school I drive pretty infrequently like once every two weeks because I don't have a car down here but when I'm at home, I drive once every one or two days I'd say.

Interviewer: So when you are driving, where are you typically driving to and what areas are you in?

Interviewee: Down here I'm pretty much driving in the city exclusively to go buy groceries or go get food. But when I'm at home, I'm driving in the suburbs to friends houses and to run errands like having to go stop by the bank or go shopping but basically everything I need to do at home is in a drivable distance so I take the car.

Interviewer: Oh interesting, what's the biggest difference you've seen when driving in the city as opposed to the suburbs?

Interviewee: For the most part, I've noticed that Atlanta makes me more stressed out when I'm driving like I'm more attentive and all.

Interviewer: What's making you stressed when you've been driving? And why?

Interviewee: Well driving in Atlanta is usually stressful especially because I'm normally in other people's cars because it's not mine. So with such active roads and with people I drive safely but I don't trust other people to do so. So it's stressful just trying to be aware of everything constantly happening around you and trying to make sure that you're doing your best.

Interviewer: When was the last time that you enjoyed driving?

Interviewee: Probably at home when it's a completely empty road when you can have the windows down blasting music all of that. That's pretty fun.

Interviewer: What about that do you enjoy?

Interviewee: It's pretty relaxing especially with no one around. It's so many less stressors in the environment with less cars and distractions. Here there are more cars to take in and a lot more external factors to take into account around you.

Interviewer: How do you react when there are stressors that appear?

Interviewee: I don't get road rage or anything like that so whenever a stressor happens whether it's a car close I just react as quickly as possible to it in the most logical manner taking into account other factors. I try not to let it affect how I'm driving. I think that's what happened and I need to do what I need to do. Sometimes I feel like it works but other times I'm not sure if it does.

Interviewer: Awesome. Is there a particular way you make sure you have quick reactions?

Interviewee: I find that I try to keep away from distractions especially when I'm driving with others.

Interviewer: What would you consider distractions?

Interviewee: Like when my phone is buzzing or if I want to change the music. There's a lot of internal distractions that can happen as well as external. There's things where people will slow down to look at accidents on the other side of the road or you're looking at billboards off in the distance or things that don't really matter to your driving. There can definitely be many distractions.

Interviewer: How do these distractions affect your driving?

Interviewee: Other than making my reaction time slower, I would say it doesn't affect me too much. I would say basically my level of distraction predictability is parallel to stressors. If there are some outside distractions like how it's not my car and there are a lot of people around, I'm not going to consider looking at my phone or changing the music for internal distractions. But if I know there is no one around, then I'm okay looking at my phone real quick to hit the next button.

Affinity Diagram

What causes you to become stressed when driving?

