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Formative Research on Promoting Car-Free Youth Transportation

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Abstract

Car accidents are the leading cause of death among U.S. 10- to 24-year-olds (CDC, 2018). Motivating youth to drive less by choosing car-free mobility may reduce fatalities and contribute to positive environmental impact. Yet, little is known about how youth perceive car-free transportation or what may motivate them to choose it more often. Results from focus groups analyzed through the lens of the theory of planned behavior explore youth perceptions and experiences about car-free transportation. Perceived effectiveness of car-free messages also is presented. This study contributes to understandings of the theoretical underpinnings of an understudied area of public interest communications. Practical recommendations for strategic communication with youth about car-free transportation include appealing to their agency and autonomy and reinforcing their safety.

Introduction

Car accidents are the leading cause of death and a top cause of non-fatal injury among 10- to 24-year-olds in the United States (Centers for Disease Control and Prevention, 2018). The United States has the highest traffic fatality rates per capita among 19 other high-income and populated peer countries[1] (Sauber-Schatz et al., 2016). High fatality rates persist despite declining crash rates per mile because Americans, especially youth, drive more than their peers in other countries

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[1]Peer countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Japan, the Netherlands, New Zealand, Norway, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

(Litman, 2016). The United States is predicted to continue to experience depressed gains in reducing traffic fatalities unless more is done to get high-risk drivers, such as youth, to choose mobility or transportation options, such as walking, biking, or riding public transit, that do not involve a car (car-free mobility). Yet, few studies have investigated how to motivate youth to engage in car-free mobility.

Research shows transit ridership is associated with decreased fatality rates among youth and the total population (Litman, 2016). Research also has found that U.S. cities with more transit-focused access and supportive policies have about half the average youth and total traffic fatality rates as cities with more automobile-focused policies and access (Litman, 2016). Promoting youth use of car-free mobility is likely to lower the fatality and injury rates among youth, but also among the general population, since most fatal car crashes involve multiple vehicles (Litman, 2016). There also may be a safety benefit to increasing walking and biking. Analyses of communities of varying size and in multiple countries have found that the presence of more walkers and bikers in and of itself is associated with less pedestrian traffic fatalities, although these studies were not done with youth specifically, and many scholars have correctly pointed out the importance of increasing traffic safety systems in conjunction with promoting these forms of car-free mobility (Bhatia & Wier, 2011; Elvik & Bjornskau, 2017; Jacobsen, 2003). The U.S. government also has invested in improving youth access to safe car-free mobility through the Safe Routes to School program, which has allocated more than a billion dollars of local school district support with an emphasis on infrastructure improvements (McDonald et al., 2013).

In addition to serving the public interest through the significant potential reductions in death and injury, understanding the current attitudes, beliefs, and behaviors of youth in relation to car-free mobility contributes to the sustainability of a long-term environmentally conscious transportation system. Promoting support for and use of a planned transportation system (e.g., transit, bike and walk paths) among youth helps contribute to a safe, healthy, and sustainable transportation system and fosters livable communities by providing secure mobility to a segment of the public typically restricted in their transportation choices (i.e., may not be old enough to drive or cannot afford a car).

Increasing youth car-free mobility is also a strategic investment in our future to help grow and sustain long-term use of car-free transportation options because the transportation system related beliefs and behaviors of youth are likely to influence their willingness to access transportation services, such as transit, as adults (Cain, 2006). Encouraging youth to understand and engage with car-free transportation options also may increase their interest in transportation systems, which could translate into future transportation system support through voting, citizen engagement, and interest in a transportation-related career (Cain, 2006). Thus, it is important for transportation communities to actively communicate with youth who are or could be future transit riders or who have access to other car-free options. However, communicating what young audiences may see as complex or dry information in a way that is motivating and engaging

requires specialized age-appropriate communication strategies and tactics that must be developed and tested prior to implementation.

This study seeks to build on the sparse car-free mobility-related research with youth to create and evaluate communication messaging that fosters more positive attitudes, intentions, and behaviors related to transit and other car-free transportation options among youth. The theory of planned behavior was applied to the interpretation of focus group data among youth. This research also analyzed youth feedback on test messages aimed at encouraging car-free mobility. Three focus groups were conducted with participants (N = 28) who were entering the seventh, eighth, and ninth grades. This study used a systematic theory-based approach that consists of two stages of formative research consistent with best practices in strategic message development (Berkowitz et al., 2008; Noar, 2006). The first stage is preproduction, which sources an audience's attitudes and beliefs to develop strategic messaging for a representative population. The second stage is production testing, where an audience reacts to specific messages to test the appeal and perceived or actual effectiveness of those messages. This study tested 15 text messages that were grouped under three themes: appeals to FOMO (fear-of-missing-out), Generation Z empowerment, and Autonomy. The results contribute to our understanding of the theoretical underpinnings of an understudied area relevant to health and environmental communication that is important and potentially life-saving—how to communicate with youth to increase their support and use of car-free mobility.

Literature review

This example of public interest communications focuses on formative research for a strategic campaign. Public interest communications applies strategic communication theories and practices to support positive behavioral changes that are in the public's interest (Fessmann, 2017). In this case the positive behavioral change of engaging youth in car-free mobility has the potential to benefit both individuals and society across the domains of health, safety, environment, and civic engagement. Formative research fits well within public interest communications as it is a strategic communication best practice and also aligns with the public interest communications priority to do no harm (Fessmann, 2017) because formative research seeks to understand a public, its experiences, needs, and preferences to shape the social change strategic campaign rather than imposing the beliefs of an organization onto a public.

Promoting car-free mobility among youth

A gap in the literature exists among studies about effective transportation messaging targeting youth. Taylor and Fink (2003) identified two types of transit studies: descriptive (i.e., related to rider attitudes and perceptions) and causal (i.e., related to systems or institutions impacting ridership). Neither category finds much representation in peer-reviewed articles about promoting

car-free mobility among youth, although some descriptive studies about youth attitudes and perceptions of public transit use do exist at the national level (Brown et al., 2016; Clifton, 2003; Davis & Dutzik, 2012) and within regional data sets (Cain, 2006; Grimsrud & El-Geneidy, 2014; Thomas, 2007). Important lessons from youth-targeted transportation studies have concluded that youth use of public transit increased in the 2000s (Brown et. al, 2016; Davis & Dutzik, 2012) from the mid-1990s (Clifton, 2003). Clifton (2003) analyzed a 1995 national survey to argue that as adolescence progresses and the social lives of teens increase, greater reliance on cars follows: "Teenagers appear to abandon walking and [public] transit use as soon as the automobile becomes an option" (p. 11). Research has shown there may be racial and economic underpinnings to youth mobility, with Black, Hispanic, and low-income children being more likely to walk or ride a bike to school compared to White or higher income children (McDonald, 2008).

By contrast, Brown et al. (2016) and Davis and Dutzik (2012) analyzed 2001 and 2009 National Household Travel Survey data to argue an increase in youth use of public transit. Brown et al. (2016) suggested this shift may not only be economic due to high costs associated with automobiles, but also a factor of youth moving closer to urban areas. Brown et al. (2016) posited that youth find urban areas more attractive, resulting in favorable impressions of transportation modes found in those areas. Davis and Dutzik (2012) suggested the shift in the 2000s may be techno-social due to the popularizing of bike- and ride-share programs. These programs reduce social stigma in not owning and operating a vehicle for personal transit. The assessments of Brown et al. (2016) and Davis and Dutzik (2012) also suggested that characteristics of New Urbanism (promoting environmentally sustainable habits through urban design) may share a relationship with youth use of public transit in growing urban areas. Wolcha et al., 2014) argued that increases in green space and active transport in urban areas are both issues of environmental justice and public health. Improvement of ecosystems and opportunities to engage with them can improve the public health of urban populations when implemented appropriately.

Few studies, however, have focused on connecting the transportation-related attitudes and behaviors of youth to developing messages that promote car-free mobility. One exception is a study that conducted extensive formative research on the types of transit messaging that might work with teenagers (Cain, 2006; Cain et al., 2005). The Cain study recommended three potential communication strategies that could be successful with teenagers: (1) highlight how transit allows teens to be more independent and less reliant on their parents for transportation; (2) highlight the safety benefits of using transit compared to the responsibility of driving; and (3) highlight the high cost of car travel and the better uses of their money to save for things teens care about (e.g., clothes). The Cain study's messaging recommendations were based on five mobility themes related to teen use of public transit: safety, cost, access-availability, reliability, and image. Via focus groups, Cain (2006) found that teens associated public transit such as buses with a negative self-image (e.g., colloquially "uncool"). Teens also reported public transit to be less reliable than personal transit; however, teens reported public transit to be more economical.

In synthesizing qualitative data from teens with a survey of transit agencies, Cain (2006) found that agencies viewed their social image as an obstacle to increasing youth ridership (e.g., stereotypes among teens about public transit). Both agencies and individuals express cultural frames as communication barriers in relation to increasing ridership. It is important to note that findings from Cain (2006) may reflect specific regional factors (e.g., favorable weather), which support the need for more research in different geographic locations to understand how findings may be comparable across geographies and to reflect that more than a decade has passed since the last study.

At least two transportation reports discussed the implementation of youth-target transit campaigns in terms of the development and materials created, but only process (distribution) data were available rather than formative evaluation data on the perceived or actual effectiveness of the materials (Cain et al., 2005; Lindsey et al., 2003). As an outcome of his research in Florida, Cain (2006) suggested strategic approaches to public transit agencies to increase youth ridership; however, the study did not make claims about the effectiveness of those strategies and encouraged future research on this issue.

Applying the theory of planned behavior

The theory of planned behavior was applied to the interpretation of the focus group data among youth collected for this study. The theory of planned behavior has been used successfully to predict and explain car-free mobility by adults (Heath & Gifford, 2002; Lo et al., 2016; Lois et al., 2015). Thus, the current study seeks to apply this theory to youth transportation behaviors and reactions to promotional messaging.

The theory of planned behavior is a model of behavioral determinants (Ajzen, 1991). Within the theory of planned behavior, behavior-relevant attitudes, normative beliefs, and perceived behavioral control come together to predict an individual's intention to perform the behavior, which then affects behavior (Ajzen, 1991). Attitudes related to car-free mobility are observed when an individual attaches positive or negative value to the behavior or its attributes or outcomes. For example, a young person may express a positive attitude about how much he/she enjoys the feeling of wind on his/her face when riding his/her bike or a negative attitude about how slow he/she thinks the bus is compared to driving. Normative beliefs within the theory of planned behavior are subjective beliefs about whether other people, typically other people an individual is motivated to comply with, approve or disapprove of the behavior (Fishbein & Ajzen, 1975). For example, youth may discuss how much their parents want them to ride the bus. Perceived behavioral control describes an individual's sense of perceived ability to perform the behavior. A young person's perception of how easy or difficult it is for him/her to ride light rail or walk to his/her destination are examples of perceived behavioral control beliefs. Personal agency or control over the ease or difficulty is often associated with perceived behavioral control (Ajzen, 1991). Lastly, intention to perform the behavior is seen as a crucial predictor of the actual behavior in the theory of planned behavior (Fishbein & Ajzen, 1975). A young person

may express his/her plans to walk more or, conversely, to drive less as an example of car-free mobility intentions.

Formative research for channel selection

Secondary outcomes of this study involved investigating the potential of delivering car-free mobility promotion messaging to youth via text and graphics sent to their mobile phones. Using mobile phones to deliver campaign messages is likely to be less costly than print materials, which are commonly used, and when automated, require minimal staff oversight. The use of mobile phones as marketing outreach tools is increasing as teen access to mobile phones increases. Among U.S. 13- to 14-year-olds, 68% own a smart phone, 14% own a basic phone, and only 18% do not have their own phones (Lenhart, 2015). The mobile phone ownership numbers are expected to increase over time, as teens get older, and are higher among Black teens and teens living in urban areas (Lenhart, 2015).

Participants and research questions

This study focused on middle school students transitioning to high school within the next few months or years in anticipation of increased opportunity to access transit services, increased independence in making transportation decisions, increased opportunities to drive with peers or alone in the coming years. Findings were analyzed using a combination of qualitative coding and quantitative content analysis. Findings addressed the following research questions:

RQ1: What are the car-free mobility relevant attitudes, norms, perceived behavioral control beliefs, intentions, and behaviors of study youth?

RQ2: Which communication channels and settings may be effective with study youth in regards to transportation system information and promotion?

RQ3: How is each of the communication strategy themes promoting car-free mobility perceived by study youth?

Method

This study used a systematic theory-based approach that consists of two stages of research[2] consistent with best practices in strategic message development (Atkin & Freimuth, 2013;

[2]This project was funded by the National Institute for Transportation and Communities (NITC-SS-1077), a U.S. DOT University Transportation Center.

Berkowitz et al., 2008; Shafer et al., 2011). The first stage is preproduction, which sources an audience's attitudes and beliefs to develop strategic messaging for a representative population. The second stage is production testing, where an audience reacts to specific messages to test the appeal and perceived or actual effectiveness of those messages (Hennink-Kaminski et al., 2014). The approach in this study focused on ascertaining youths' perceived message effectiveness, which documents participants' reactions to tested messages in terms of perceptions about the message that may impact its effectiveness (e.g., relevance, authenticity, likability) (Dillard et al., 2007). As scholars have suggested, understanding perceived message effectiveness may be a necessary but not sufficient determination of a message's actual effectiveness at producing behavior change (Dillard et al., 2007; Fishbein et al., 2002). Since this study's topic is relatively unexplored in communication campaign literature, a strategic decision was made to first investigate perceived message effectiveness using qualitative methods that allow for participants to provide open-ended responses with the recommendation that future studies build on this initial work and test actual message effectiveness through field trials and experimental research.

Preproduction and production testing in this study consisted of three focus groups moderated by the Principal Investigator (PI) and a graduate researcher. Focus groups have long been a staple in formative research because of their flexible design and the value of group discussions that help participants build off each other's ideas and perceptions (Atkin & Freimuth, 2001). In each focus group, the preproduction research was conducted first and was followed by the production testing with the same participants, which has been shown to be a useful way to utilize hard to reach participants, such as adolescents or their parents (Shafer et al., 2011; Patel et al., 2014). Moderators used the same discussion guide in each focus group that included questions about participants' transportation habits, barriers to and motivations for car-free transportation, communication and information seeking habits and preferences, and perceived effectiveness of sample messages. All procedures were approved by the researchers' university institutional review board (IRB).

Participants and recruitment

Focus group participants in this study ($N = 28$) were teenagers on summer break who were entering the seventh, eighth, and ninth grades who lived within the boundary of Portland, OR. This demographic (i.e., middle school students) in this geographic location are eligible to receive a free transit pass to use public transit upon entering a local public high school. Of the 28 participants, 16 were male and 12 were female. Of the 28 participants, 22 identified their race or ethnicity as African American, three as Hispanic, and three as White.

Thirteen teenagers were recruited from a youth-focused community program whose mission is to provide enrichment activities for local youth. Researchers recruited these participants following in-person visits with program administrators and the strategic placement of promotional fliers advertising the study within the program's public spaces. The remaining 15

teenagers (Focus group (FG) two: 7 teens; FG three: 8 teens) were recruited by an informational website that the researchers created to communicate the study's objectives. The researchers called and emailed more than 30 youth-focused community programs in the study area representing a variety of program types, such as sports, science, outdoor recreation, spiritual, summer camps, and community clubs, requesting that they direct parents and youth to the website via organizational newsletters, emails, or conversations. The informational website explained the study's objectives to parents and teens alike, allowing teenagers to register online to participate in one of two focus groups. The graduate researcher called teens who registered online via the information website to speak with youth and parents to confirm eligibility and participation in the youth's preferred focus group time slot. Other than grade-level and geography, no demographic targeting or screening was used during recruitment and all youth who produced a signed consent form and assented to the study participated. Thus, the authors are unsure why the demographic representation of volunteers was skewed toward African-American and male youth.

Focus group procedures

Three focus groups were conducted. No parents or guardians participated in any focus group following signature of parental consent forms authorizing youth to participate in the study. Youth participants also provided assent to participate. The PI conducted the first two focus groups, while the graduate researcher conducted the third under the supervision of the PI. Both researchers applied a semi-structured approach to focus group moderation to allow for probing questions based on participant responses to the initial query.

The average time of all three focus groups was 1:02:55 minutes (FG one: 54:30 minutes; FG two: 1:01:30 minutes; FG three: 1:12:07 minutes). The average duration of each focus group in the preproduction stage was 37:24 minutes [based on FG one: 35:40 minutes; FG two: 28:11 minutes; FG three: 47:00 minutes). Production testing immediately followed preproduction, such that moderators presented each focus group participant with a printed copy of the text messaging prompts (see Table 1) after preproduction questions were finished. Printed copies had three pages—one page per theme. Each page featured five text messages within iPhone skins and room underneath each phone to write reaction comments. Moderators requested that participants write their thoughts, feelings, and impressions on each text message as a reaction to how effective it would be at getting them to use transportation options other than driving or riding in a car. Participants completed this as individuals and were free to write any thoughts about their reactions to the messages. There were no reaction prompts other than the instructions mentioned. Production testing lasted an average of 25:59 minutes (FG one: 18:50 minutes; FG two: 33:19 minutes; FG three: 25:07 minutes). Focus groups were audio recorded with the permission of participants and their parents. Audio files were de-identified and transcribed for qualitative coding. After each focus group, participants received cash or a Visa gift card in exchange for their participation.

Production testing message development

Six undergraduate students under the direction of the PI and graduate researcher developed the messages for production testing. Undergraduate students reported to the development team about relevant peer-reviewed articles. From discussions with undergraduate students, production-testing concepts were developed. By way of discussion with the PI and graduate researcher, production testing concepts became themes that acted as frameworks to craft strategic messaging. Three themes were selected as potentially relevant for the development of strategic car-free mobility messaging targeting youth: FOMO (fear-of-missing-out), Autonomy, and Generation Z. Once themes were identified and defined, the research team developed sets of visual text messages to represent the frameworks as actual text messages. After several rounds of ideation and editing among the research team, five text messages that incorporated a mix of text and static images were developed for each of the three themes. A total of 15 individual text message prompts were developed and presented to focus group participants in the form of mock-up mobile smart phones (e.g., Apple iPhone skins with the text and images inside).

Message themes

FOMO. Fear-of-missing-out

The FOMO theme appeals to teens' desire for social connection and to be seen as operating within the social norms of the group. This theme presents an idea to an audience member as contagious (e.g., popular, trending). This strategy may not be as effective at changing strongly held opinions but can sway the undecided and serve as a useful reminder for message supporters (Austin & Pinkleton, 2006). Crafted messages may attempt to demonstrate that a behavior must be normal because so many people like the audience member do it or think it. Messages within this theme attempt to show or discuss other teens practicing car-free mobility and enjoying it (e.g., having unique or fun experiences with public transit). Messages within this theme may suggest or hint at how teens make comparisons between themselves and others. Messages within this theme may highlight things that can be seen or done solely via car-free mobility. Message appeals within the FOMO theme may hint at anticipated regret teens may feel if they do not engage in car-free mobility. Other studies have found associations between FOMO in youth, mobile phone or social media use, and risky communication, such as distracted driving (Hefner et al., 2018; Przybylski et al., 2013). The current study sought feedback on the potential for applying FOMO in messaging that promotes positive communication and behaviors.

Autonomy

The Autonomy theme appeals to teens' desire for independence from their parents. Messages within this theme may suggest that by teens choosing their own car-free transportation they attain greater freedom, which reduces reliance on others to meet transport needs. Messages with an

autonomy appeal may try to get teens to recall a moment when they felt frustrated by their reliance on others. Autonomy appeals are likely to associate teen selection of car-free transportation with supporting teens' goals of autonomy, achievement, and competence. Messages within this theme are likely to encourage teens to explore their environment and decide for themselves where they want to go, when, and how they will get there. The autonomy theme follows Cain's (2006) strategic recommendation to reach teenagers through messaging that highlights increased independence and decreased reliance on parents for transportation. In research on mobile media, Ling (2005) concluded that teens use mobile devices to increase integration with peer groups as well as increase emancipation from their parents.

Generation Z

The Generation Z theme appeals to teens' desire to be valued and seen as having important needs and wants. Messages within this theme validate teens' experiences and needs by communicating their importance (i.e., empowerment messaging). Messages with a Gen Z appeal are likely to impress upon teens that public transit authorities consider the needs and wants of teens when authorities design services. Gen Z messages may employ a form of personalization and/or help teens to feel like they have ownership of their public transit choices (e.g., "make it yours" messaging). Within this theme teens are encouraged to share their opinions and feelings because they would be heard by the transit authorities. Although a dearth exists in academic research on what motivates the Gen Z population, there is considerable speculation among popular and marketing industry media about how best to communicate with the Gen Z population that we drew from for this study (e.g., Kantar Millward Brown, 2017; Wegert, 2016).

Table 1

Production text message prompts by category

FOMO. Fear-of-missing-out	Generation Z	Autonomy
People around Portland are giving us a behind the scene look into how they are getting around town and what they see along the way. Join the fun! Check out http://howweroll.trimet.org.[a]	Be the power behind your transportation! Personalize your trip at Trimet.	Tired of waiting for a ride from your parents? Set your own schedule by walking, biking, or riding the bus.[a]
Spend quality time with your friends by experiencing new things – walk, bike, or ride public transportation together![b]	It's your transportation; go wherever, whenever. Show us where you go in PDX @ridetrimet.	Portland is your city – own it! Step up your navigation skills by finding a new route to your favorite destination.

Do you feel like you miss out from the passenger seat of a car? Try a different mode of transportation like walking or biking.[b]	Find a new hangout spot with TriMet's help, visit http://bit.ly/2pMYwhn and go explore!	Here in Portland, we are Trail Blazers. Try blazing your own trail by biking, walking or bussing around town. Find your route here: https://trimet.org/ride/planner_form.html
Meanwhile in Portland.	Show us what makes your trips with TriMet unique @ridetrimet.	Portland is packed with cool places, but did you know you can get to most of them without relying on your parents for a ride?[a]
Stumble upon Portland's weird culture. Share it. Impress your friends.	Let your voice be heard! Please take a minute and fill out this survey.[b]	Car = commitment & expenses. No car = freedom. Walk, bike, and ride toward independence.[b]

Note. This table shows text of sample messages, which were shown to participants within iPhone skins and included some complimentary images (e.g., group of friends, map of city).

[a] Most positively reviewed messages. [b] Most negatively reviewed messages.

Findings

Preproduction

Focus groups were first transcribed. Then, the three focus group transcripts were uploaded into Transana, a qualitative research analysis software program. The PI then manually coded each transcript with the unit of analysis as an individual's response to a moderator's question. Codes were organized by theory of planned behavior constructs (attitudes, norms, perceived behavioral control, and intentions) and discussion guide themes (i.e., transportation use habits and contexts, car-free mobility barriers and motivations, and communication habits and preferences). Coding was analyzed across the three focus groups with the overall goal being to contextualize, such that more weight was given to responses that occurred more frequently; included words that connoted intensity of feeling (e.g., a strongly held opinion or deeply emotional response); were specific and based on personal experiences (vs. vague or impersonal responses); and received agreement (vs. disagreement) from other participants. Analysis also looked for patterns of co-occurrence among topics (e.g., biking and walking often were discussed simultaneously) (Krueger, 1998). This phase of research sought to answer RQ1 and RQ2.[3]

[3] The quotes presented in the study were edited to remove vocal utterances such as "um."

Attitudes relevant to car-free mobility

Participants generally expressed positive attitudes about walking and biking, although most stated they did not do either regularly. Participants were quick to indicate that walking can be fun and that it was cheaper than any other mobility method. Some participants also mentioned the exercise benefit of walking or biking. Riding light rail (locally referred to as "the Max") also was discussed with a positive attitude by several participants, mostly because it was faster than waiting for their parents to give them a ride. For example, a participant in the first focus group stated, "I like taking the Max because it's faster—cause by the time you get there my momma would probably just be walking out the house." Parents taking a long time or not wanting to give their children rides was a common experience among the participants. For example, a participant in Focus group one stated, "When I try to ask them [his parents] to take me somewhere, they wanna be slow about (it). Then I'm just gonna catch the Max."

Participants expressed negative attitudes about riding the bus or light rail that were steeped in their personal experiences. These negative attitudes often were centered on feelings of uncertainty, anxiety, safety concerns, and sexual harassment that they have personally experienced when riding public transit. Here is a sample of some of the experiences:

> "Men, when they come up to you and they approach you and they're like, and you're grown and you're like, I'm a little girl, or you're just not interested at all. And they don't take no for an answer. That's really scary cause I've been groped and grabbed and it's because I said no. They just don't listen." Focus group one participant

> "Somebody yelling and yelling at other people or a guy with a knife was on the bus once standing right next to the bus driver and he wouldn't go sit down. He'd just stay next to the bus driver, so we had to get off the bus." Focus group three participant.

> "You, if you're on the Max, sometimes you see drunk people." Focus group two participant

> "So I remember when me and my brother…we were getting on the Max from the Lloyd Center and it was super dark cause we had been everywhere that day. Right? And there was this guy, it was I'm telling you. It was three people—me, my brother, some guy. It was just weird. He was looking down at this phone he was like this, and my brother was sitting like this on the other side, and the guy came up to my brother like, 'You got a cigarette?' My brother was like, 'no'…and he came to me…, 'Do you have a cigarette?' I'm 12 years old; why I got a cigarette? Anyways, …where would I have a cigarette, and then he was like, 'I was just asking.' And then he keep trying to talk to me, 'You know you're very pretty.' I was like, I know but I don't need to hear it from you." Focus group one participant

Nearly every participant expressed some negative attitudes about public transit. The main negative associations with walking or biking were that they can be boring or tiring; however, some participants disagreed, maintaining the opposite. A minority of participants said they disliked walking at night due to safety concerns.

Normative beliefs relevant to car-free mobility

Normative beliefs came up less often than attitudes throughout the discussion, although there was some overlap as demonstrated by this string of participant responses from Focus group three:

> Participant 1: "Yeah people only really talk about the bus if it's…
> Participant 2: Bad
> Participant 3: Terrible
> Participant 4: Something weird happens."

The most common normative belief among participants was related to their parents' support or lack of support for them riding transit. It seems like most participants' parents encouraged or mandated that participants ride transit, but sometimes parents also were described as having safety concerns related to transit. For example, one said:

> "My dad—he doesn't like giving me the rides, but like I said before he's really over-protective so he's confusing sometimes cause I ask him for a ride and he's like, 'No, you have to go on the bus' and then when I don't want to go on the bus, no when I want to go on the bus, he's like, 'No, I'm going to give you a ride.'" Focus group two participant

Normative beliefs associated with walking or biking were mostly non-existent from the conversation other than when participants agreed that their friends have similar car-free mobility habits as they do.

Perceived behavioral control beliefs relevant to car-free mobility

Participants had a high degree of confidence in their ability to navigate the transportation system by walking, biking, or riding public transportation. Participants felt they knew most of the information they needed to know to get around without a car and could easily find any information they did not know using their smart phones. For example, a participant in Focus group two stated, "I know where I'm going cause I've been here all my life so…isn't no worry for me." Another participant in Focus group two expressed a similar sentiment, "I use the app sometimes to check when my bus and my Max come but I know where everything takes me now."

The main issue connected to perceived behavioral control was not about being able to travel without a car, but more about being unable to control or predict the type of experience they would have once they choose to ride transit. Participants discussed the measures they take to achieve some degree of control over their safety and experience riding transit. Many of these personal agency concerns co-occurred with negative attitudes expressed about riding transit. For example, a participant in Focus group one stated, "I [try to] block off so nobody sit by me, sit next to me (laughs). I put my foot up and I put my backpack up there. I like no one to sit next to me if I don't know you."

Another issue related to control that came up in two of the focus groups was that a few participants lacked access to a bicycle despite wanting to use that mode of transportation. For the participants who mentioned this issue, their bike was either broken and they did not know how to repair it or it had been stolen.

Intentions relevant to car-free mobility

Nearly every participant stated that they intend to drive rather than use some form of car-free mobility as soon as they are old enough and/or have the money to get a car. For example, a participant in Focus group one stated, "Driving is the best. If I get a car, I'll never ride again." Another participant in Focus group three stated, "I'm fine with doing it now, but when I turn 16, I plan on getting a car; it's just faster." Although still expressing their preference for driving when they are able, several participants cited financial constraints as a reason they may still use car-free mobility in the future. For example, a participant in Focus group one stated, "It depends [on] the distance. Maybe you have [a] little bit of gas; you don't got enough money, so." Participants were asked if they ever thought about walking, biking, or riding transit more than they already do and nearly every participant said "no," with some expressing that they wished they practiced less car-free mobility. For example, a participant in Focus group three stated, "If I can ride it less, I would definitely ride it less."

Channels and settings for car-free mobility messages

Channels and setting commonly used by participants included: smart phones, the TriMet transit tracker app, Snapchat, Instagram, YouTube, broadcast news (usually because their parents are watching it), local radio, and peer-to-peer in-person or texting conversations. When probed about whether they follow any local personalities, government, or organizations on the social media channels they use, the universal answer was "no." There was a wide variety of well-known celebrities or national figures who participants followed, but no local figures.

Participants were asked if they would follow a transit agency on any social media or if they would want to receive text messages from or about local public transportation (including walking and biking paths) and most participants said "no" or provided a lukewarm reception to the idea if any text or alert was relevant to them at the time they received it and if these texts were not frequent. For example, a participant in Focus group two stated, "It depends on how frequently

they text like my phone. If these text messages come like every day, I'm going to start getting irritated and delete the number or something. If it's not that often I'll probably do the text thing." Some participants suggested sending text messages no more often than once per week. Of the minority of participants who said they would even consider opting into text messages from TriMet or another public transportation agency, they only would consider it if they were incentivized by the possibility of winning prizes, such as a free bus pass. The majority of participants said that their parents were the preferred source from whom to get transportation-related communication messages.

Production testing

Written comments from participants associated with each of the 15 sample messages were transcribed into a document that was organized by participant and sample message, resulting in 325 individual reactions with an additional 95 non-reactions (meaning a participant left the reaction space to a message blank). The approach to analyzing the perceived effectiveness reactions involved a quantitative categorization of the reactions because we were looking for specific categories of reactions common to perceived effectiveness measures (e.g., reaction valence, perceived relevance, intentions) (Noar et al., 2018) and from patterns noticed within the reactions. Analysis included several rounds to refine the development of the codebook and attain inter-coder reliability.

The production testing reaction codebook contained five sections. Each section contained two columns. One with terms and their definitions followed by examples of responses related to those terms taken directly from the data. The first section assessed message valence (positive, neutral, and negative). Positive appraisal included enthusiastic and warm/lukewarm responses. Neutral appraisal included non-sequitur, conditional or qualifying, and clarifying responses. Negative appraisal included rejection, criticism, counterarguments, and critical reactions to the persuasive intent. The second section assessed message humor as either funny or not funny. Both appraisals counted explicit statements made by participants. The third section was follow-through assessed as a participant's ability to likely follow through on a message's solicitation or non-likelihood to do so. Intent to complete the request made by the message was the focus of the third section. The fourth section considered whether the content in the message was helpful to participants. Helpfulness provided participants with new and useful information. The fifth section was authenticity/realism in which participants' responses to messages were assessed as either true to their lives (i.e., authentic and realistic) or false/not true to their lives (i.e., not authentic and not realistic).

Each researcher independently coded all reactions in the final coding round. Strong inter-coder reliability was achieved on all but one code (conditionality), which was removed from analysis. Cohen's kappa averaged .90 with all codes above .79. The PI's coding then was used for analysis and reporting. Since coding options were categorical (present/not present), cross-tabulations were used to compare text message reactions for each coding category. Significant

chi-square findings are organized by coding category below. This phase of the research sought to answer RQ3.

Positive reactions

Autonomy messages received the most positive reactions with 55.9% of reactions coded as positive compared to 50.9% of FOMO and 30.1% of Gen Z message reactions being positive, $\chi_2(2, N = 325) = 11.08$, $p < 0.005$. No significant differences emerged among the themes for the type of positive reaction each received. Enthusiastic was the most common positive reaction among all of the themes, which was defined in the codebook as "emphatic approval or general approval." Between 53-67% of all positive reactions were coded as enthusiastic.

Negative reaction

Gen Z messages received the most negative reactions with 63.7% of reactions coded as negative compared to 44.5% of FOMO and 44.1% of Autonomy message reactions being negative, $\chi_2(2, N = 325) = 16.56$, $p < 0.001$. No significant differences emerged among the themes for the type of negative reaction each received. Rejection was the most common negative reaction among all of the themes, which was defined in the codebook as "non-acceptance of message or refusal of message." About 70% of all negative reactions were coded as a rejection, regardless of the theme. Counterargument was the next most common reaction across themes, with 40.0% of Autonomy's, 33.3% of Gen Z's, and 20.4% of FOMO's negative reactions coded as counterarguments (note: there was not a significant chi-square among the counterargument findings). Counterargument was defined in the codebook as "user pushes back on message's points with his/her own counter point. User has a point."

Humor reactions

The messages were intended to be engaging and entertaining to young audiences, which may include being humorous. Autonomy messages (14.7%) were seen as funny more often than Gen Z messages (0.9%) and FOMO messages (11.8%), $\chi_2(2, N = 325) = 14.32$, $p < 0.005$.

Helpfulness reactions

There were no significant differences among the themes for whether a message reaction included comments about helpfulness or unhelpfulness. Very few message reactions discussed helpfulness, with just 29 of the 325 reactions (8.9%) being coded for explicitly referring to the message as helpful or unhelpful.

Likelihood of following through reactions

There were no significant differences among the themes for whether a message reaction included comments about likelihood of following through with the message. Very few message reactions discussed likelihood with only 23 of the 325 reactions (7.1%) coded for indicating any degree of likelihood or unlikelihood of following through with the message request or recommendations.

Personal relevance reaction

Autonomy theme message reactions included the most discussion of personal relevance with 18.6% of messages seen as personally relevant, whereas only 10.9% of FOMO and 3.5% of Gen Z messages elicited relevance reactions, $\chi_2(2, N = 325) = 14.32$, $p < 0.005$. There was no significant difference among the themes about reactions that indicated a message was not relevant or inauthentic with between 10-13% of all messages eliciting a comment that indicated the message seemed inauthentic or not personally relevant to a participant.

Individual message reactions

Although message reactions were primarily analyzed by theme because it is more helpful to understand our target public's reaction to a theme on which future message iterations may vary, reactions also were analyzed by individual message in the hope of gaining additional insights about the types of pro-transportation system messages that connect with youth.

Overall, the three messages from the 15 total messages that received a consistent amount of positive feedback are featured in Table 1. These messages were likely to elicit comments that described them in positive terms, indicated that they were in some way personally relevant or authentic to the participant, and funny. Four messages of the 15 total messages featured in Table 1 stood out as receiving consistent negative feedback, such as comments that rejected and counterargued with the message and indicated that the message was not helpful or relevant to their lives.

Discussion

In a systematic review of 63 North American studies on youth's active (e.g., walking, biking) modes of getting to and from school the authors noted that only 16% of these studies included youth voices and called for more youth mobility research to include youth participants (Rothman et al., 2018). The current study answers this call and encourages more public interest communications research with youth in service of promoting car-fee mobility.

Results from the preproduction and production testing research provided several key insights and recommendations for car-free mobility message development and dissemination targeting youth. In comparing this study's findings with one of the only other studies looking at teen

transit messaging (Cain, 2006), there are important areas of similarities and dissimilarities among the findings. For example, both this study and Cain's study found that parents are a key influencer among this target public on this issue. Similar to Cain's study, this research found support for autonomy appeals that encourage teens to be less reliant on their parents for transportation. Another similarity among the studies' findings was teens' beliefs that public transit is more economical, even if it is slower or less reliable. One notable difference in the current research findings from the findings in Cain's Florida study of teens was that teens rarely, if ever, expressed concerns about negative self-image associated with transit. Teens in our study did not seem to feel stigmatized when using transit and expressed that it was normative behavior among their peer groups. Cain's finding that recommended highlighting the safety benefits of transit compared to the responsibility of driving are likely to be seen as untrue and inauthentic to youth in this study; one of the main and deeply engrained narratives around their transit experiences is how unsafe and unpredictable it is. Related to Cain's third messaging recommendation about highlighting the high cost of car travel and the better uses of their money to save for things teens care about (e.g., clothes), may ring true with youth, but based on our participants—it is a reluctant truth that is unlikely to change youth driving. Participants clearly stated that money was a barrier to car use, but they still felt driving was worth it.

Theory-based perceptions and messaging recommendations

In applying the theory of planned behavior, it is important to understand youth attitudes, norms, perceived behavioral control, and intentions related to car-free mobility. As strategic campaign planners, public interest communicators benefit from knowing which theoretical constructs may be hindering compliance and which may be already well aligned with strategic goals. The current study found that youth held both positive and negative attitudes about car-free mobility that largely were based on their personal prior experiences. This finding suggests that public interest communications in this area may need to work with transportation system planners to improve youth experiences to improve future attitudes. Youth expressed that although there was little stigma associated with car-free mobility, normative beliefs were nonetheless focused on sharing negative experiences or stories. Public interest communicators should consider ways to encourage positive normative experience sharing, which should be more likely if the recommendation to work with transportation system planners to improve experiences is enacted.

One theory of planned behavior construct that was already well-aligned with car-free mobility behaviors was that youth mostly felt capable of understanding how to access car-free mobility. On the other hand, youth felt less control over the experience they might have when engaging in car-free mobility and this feeling appeared to be associated with less desire to do so. Increasing youth agency toward car-free mobility also may be improved with system experience improvements. This study found that youth without the ability to drive themselves had positive car-free mobility intentions, but also had future intentions to eliminate car-free mobility as part of their transportation mix as soon as they are able to drive themselves. More research is needed

with youth in transition to driving age to determine what may inoculate youth against the intention to abandon car-free mobility or at least create an expectation that car-free mobility would continue to be part of their mobility mix once they are able to drive.

Messages promoting car-free mobility may consider different themes or appeals based on the type of car-free mobility being promoted. For example, teens are more likely to see messages associating walking or biking with leisure or friendship as authentic to their own attitudes and experiences with those forms of car-free mobility than their experiences with riding the bus or light rail. Communicators promoting light rail may want to tap into existing positive associations about how light rail is easy to use, fast, and allows for independence from their parents in their messages. Due to strongly held negative associations with the bus and light rail, when considering safety and negative interactions with adult passengers, transportation officials should consider system changes and related messages that provide teens with more agency to avoid and report those negative experiences. Messages touting the safety of the transit system are likely to be seen as inauthentic to the teens' experiences, and thus rejected. These safety-focused messages are likely to need to demonstrate that tangible changes have been made to the transit system and/or new information about what to do in situations where teens feel uncomfortable is seen as relevant and useful to participants.

Normative beliefs predict behavior and this research found that most of the youth participants had normative beliefs that encouraged current car-free mobility practices. Messages could reliably feature normative messaging to further entrench this belief, especially in regard to parental support for car-free mobility. Unfortunately, nearly all the youth in our study had future intentions of not practicing car-free mobility once they were able to drive. Communicators should consider including people who are 16-18 years old and actively choose car-free mobility in messages. These older referents should be people with whom youth are likely to identify and want to be like. The idea is to establish choosing to take the bus (or other forms of car-free mobility) as a continued norm past the age of 15 years old. Further research should explore the viability of incorporating the positive parental norms related to car-free mobility for older teens.

Similar to the Cain (2006) study, messaging highlighting teens' abilities to be autonomous and exercise independence from their parents by choosing car-free mobility instead of getting rides is likely to be well received by youth. Humor could be used to remind teens of a common experience of annoyance at waiting for their parents to give them rides.

Messaging that seemed to fail during production testing focused on Gen Z themes, such as empowerment and providing feedback to decision makers. Additionally, individual messages that highlighted negative aspects about driving, such as cost, were not well received, with the exception of highlighting the hassle of getting rides from parents being positively rated. Upbeat messages and those that featured local references or information were generally well received.

Distribution and source recommendations

Based on feedback from participants, parents seem to be the best source for distribution and endorsement of any car-free mobility messages. It seems unlikely that many teens would follow transportation organizations on social media or opt-in to receive text messages. Despite initial testing, this study does not recommend engaging in a text messaging campaign directly to teens. Any messaging aimed at teens is likely going to have to reach parents first, who would then pass the message to their children. Since parents were not part of this study's research participants, future studies should test the kinds of messages that are effective with parents, how to best motivate parents to pass messages on, and where to reach parents. However, one channel was mentioned as often attended to by parents and teens together: local broadcast news.

Outside of distribution through parents, teens are likely to be reached through their use of local transit apps, billboards or posters near car-free mobility area (e.g., bus stops), and advertisements on youth-oriented YouTube channels, youth-oriented local radio, and Instagram. Although this study ultimately recommended abandoning the initial idea to target through text messaging, the results of the production testing still provide important information about the content of youth-targeted messages that could be distributed on other channels (e.g., posters, social media advertisements). Since production testing in this study was conducted with the assumption that text messaging could be the distribution channel, further production testing is needed to adapt the results and recommendations to other channels (e.g., social media advertisements, billboards) that may target youth directly to promote car-free mobility.

Limitations

An important limitation of this study is that the results may not be generalizable to all youth as non-probability sampling was used and focused only on one city. Teens who volunteered to participate may have been those who have more of a personal stake in transportation issues. The sample racial and ethnic demographics are not consistent with the Portland's demographics, such that this sample is 79% African American compared to census data that indicates the site's population is 70% White and 6% African American (U.S. Census Bureau, 2018). Future research should expand to more youth and parents in more locations. Another limitation is that all study participants were from a large city with supportive transit policies and access. For example, the study city offers a free transit pass to all public high school students. More research is needed to understand how findings may generalize to other geographies, such as those that are rural or lack sufficient transportation infrastructure.

An important limitation is that because the preproduction and production testing research was conducted within the same focus groups, the research team was unable to adapt the distribution channel (text messaging) during the production testing stage. However, the reactions to content framed with a photo of a phone are likely to apply to other delivery modes (e.g.,

posters, social media advertisements) as none of the reactions specifically mentioned delivery mode as a factor. What participants found personally relevant, for example, did not seem predicated on delivery mode (text messaging), but rather was connected to the message graphics and wording, which could be adapted to other channels.

Conclusion

Key insights found mixed attitudes related to car-free mobility that were especially dependent on type of mobility and often based on the youth's first-hand experiences. Youth mostly held normative and perceived behavioral control beliefs supportive of car-free mobility, such as the belief that most of their friends and parents support car-free mobility and the belief that it is easy to ride transit. A dominant non-supportive belief was youth's lack of agency related to safety on public transit. Youth reported positive intentions to practice car-free mobility until they were old enough and could afford to drive. A variety of channels and settings, such as YouTube advertisements, may be effective at reaching teens, but this study concluded that teens are unlikely to subscribe and engage with text messages sent to their mobile devices. Youth responded positively to appeals to autonomy and generally disliked most of the Generation Z targeted messaging. This research also contributes to the growing field of public interest communications by demonstrating an example of formative research in service to public interest communications.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Atkin, C. K., & Freimuth, V. (2013). Guidelines for formative evaluation research in campaign design. In R. E. Rice & C. K. Atkin (Eds.), *Public communication campaigns* (4th ed.) (pp. 53-68). Sage.

Atkin, C. K., & Freimuth, V. (2001). Formative evaluation research in campaign design. In R. E. Rice & C. K. Atkin (Eds.), *Public communication campaigns* (pp. 125-145). Sage.

Austin, E. W., & Pinkleton, B. E. (2006). *Strategic public relations management: Planning and managing effective communication programs* (2nd ed.). Lawrence Erlbaum Associates.

Berkowitz, J. M., Huhman, M., Heitzler, C. D., Potter, L. D., Nolin, M. J., & Banspach, S. W. (2008). Overview of formative, process, and outcome evaluation methods used in the VERB™ campaign. *American Journal of Preventive Medicine*, *34*, S222-S229. https://doi.org/10.1016/j.amepre.2008.03.008

Bhatia, R., & Wier, M. (2011). "Safety in Numbers" re-examined: Can we make valid or practical inferences from available evidence? *Accident Analysis & Prevention, 43*, 235-240. https://doi.org/10.1016/j.aap.2010.08.015

Brown, A. E., Blumenber, E., Taylor, B. D., Ralph, K., & Voulgaris, C. T. (2016). A taste for transit? Analyzing public transit use trends among youth. *Journal of Public Transportation, 19*, 9-67. http://doi.org/10.5038/2375-0901.19.1.4

Cain, A. (2006). Teenage mobility in the United States: Issues and opportunities for promoting public transit. *Transportation Research Record: Journal of the Transportation Research Board, 1971*, 140-148. https://doi.org/10.1177/0361198106197100117

Cain, A., Hamer, P., & Sibley-Perone, J. (2005). *Teenage attitudes and perceptions regarding transit use*. Center for Urban Transportation Research. https://doi.org/10.5038/CUTR-NCTR-RR-2004-03

Centers for Disease Control and Prevention/National Center for Injury Prevention and Control/Division of Unintentional Injury Prevention. (2018). *Motor vehicle safety*.

Clifton, K. J. (2003). Independent mobility among teenagers: Exploration of travel to after-school activities. *Transportation Research Record, 1854*(1), 74-80. https://doi.org/10.3141/1854-08

Davis, B., & Dutzik, T. (2012). *Transportation and the new generation: Why young people are driving less and what it means for transportation policy*. Frontier Group.

Dillard, J. P., Weber, K. M., & Vail, R. G. (2007). The relationship between the perceived and actual effectiveness of persuasive messages: A meta-analysis with implications for formative campaign research. *Journal of Communication, 57*, 613-631. https://doi.org/10.1111/j.1460-2466.2007.00360.x

Elvik, R., & Bjornskau, T. (2017). Safety-in-numbers: A systematic review and meta-analysis of evidence. *Safety Science, 92*, 274-282. https://doi.org/10.1016/j.ssci.2015.07.017

Fessmann, J. (2017). Conceptual foundations of public interest communication. *Journal of Public Interest Communications, 1*(1), 16-30. https://doi.org/10.32473/jpic.v1.i1.p16

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.

Fishbein, M., Hall-Jamieson, K., Zimmer, E., von Haeften, I., & Nabi, R. (2002). Avoiding the boomerang: Testing the relative effectiveness of antidrug public service announcements before a national campaign. *American Journal of Public Health, 92*, 238-245. https://doi.org/10.2105/AJPH.92.2.238

Heath, Y., & Gifford, R. (2002). Extending the theory of planned behavior: Predicting the use of public transportation. *Journal of Applied Social Psychology, 32*, 2154-2189. https://doi.org/10.1111/j.1559-1816.2002.tb02068.x

Hefner, D., Knop, K., & Vorderer, P. (2018). "I wanna be in the loop!": The role of fear of missing out (FOMO) for the quantity and quality of young adolescents' mobile phone use. In R. Kuhne, S. E. Baumgartner, T. Koch, & M. Hofer (Eds.), *Youth and media: Current perspectives on media use and effects* (pp. 39-54). Nomos Verlag.

Grimsrud, M., & El-Geneidy, A. (2014). Transit to eternal youth: Lifecycle and generational trends in Greater Montreal public transport mode share. *Transportation, 41*, 1-19. https://doi.org/10.1007/s11116-013-9454-9

Hennink-Kaminski, H. J., Fitts Willoughby, J., & McMahan, D. (2014). Join the conquest: Developing a campaign to increase participation in clinical research in North Carolina. *Science Communication, 36*, 30-55. https://doi.org/10.1177/1075547013492434

Jacobsen, P. L. (2003). Safety in numbers: More walkers and bicyclists, safer walking and cycling. *Injury Prevention*, *9*, 205-209. http://dx.doi.org/10.1136/ip.9.3.205rep

Kantar Millward Brown (2017). *Ad reaction: Gen X, Y, and Z. Report from a global survey*. http://www.millwardbrown.com/adreaction/genxyz/

Krueger, R. (1998). *Analyzing and reporting focus group results*. Sage.

Lenhart, A. (2015). *Teens, social media & technology overview 2015: Smartphones facilitate shifts in communication landscape for teens*. PEW Research Center. https://www.pewresearch.org/internet/2015/04/09/teens-social-media-technology-2015/

Lindsey, K., Ratner, D., & Freeman, G. (2003, August 1). *Move it! Youth pilot project final report*. Kind County Department of Transportation.

Ling, R. (2005). Mobile communications vis-à-vis teen emancipation, peer group integration and deviance. In R. Harper, A. Taylor, & L. Palen (Eds.), *The inside text: Social perspectives on SMS in the mobile age* (pp. 175-189). Klewer.

Litman, T. (2016). *The hidden traffic safety solution: Public transportation*. American Public Transportation Association report.

Lo, S. H., van Breukelen, G. J. P., Peters, G-J., & Kok, G. (2016). Commuting travel mode choice among office workers: Comparing an extended theory of planned behavior model between regions and organizational sectors. *Travel Behaviour and Society, 4*, 1-10. https://doi.org/10.1016/j.tbs.2015.11.002

Lois, D., Moriano, J. A., & Rondinella, G. (2015). Cycle commuting intention: A model based on theory of planned behaviour and social identity. *Transportation Research Part F*, *32*, 101-113. https://doi.org/10.1016/j.trf.2015.05.003

McDonald, N. C. (2008). Critical factors for active transportation to school among low-income and minority students. *American Journal of Preventative Medicine*, *34*, 341-344. https://doi.org/10.1016/j.amepre.2008.01.004

McDonald, N. C., Barth, P. H., & Steiner, R. L. (2013). Assessing the distribution of Safe Routes to School program funds, 2005-2012. *American Journal of Preventative Medicine*, *45*, 401-406. https://doi.org/10.1016/j.amepre.2013.04.024

Noar, S. M. (2006). A 10-year retrospective of research in health mass media campaigns: Where do we go from here? *Journal of Health Communication*, *11*, 21-42. https://doi.org/10.1080/10810730500461059

Noar, S. M., Bell, T., Kelley, D., Barker, J., & Yzer, M. (2018). Perceived message effectiveness measures in tobacco education campaigns: A systematic review. *Communication Methods and Measures*, *12*(4), 295-313. https://doi.org/10.1080/19312458.2018.1483017

Patel, S., Shafer, A., Bulik, C. M., Brown, J. D., & Zucker, N. L. (2014). Parents of children with eating disorders: Developing theory-based health communication messages to promote caregiver wellbeing. *Journal of Health Communication*, *19*(5), 593-608. https://doi.org/10.1080/10810730.2013.821559

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*(4), 1841-1848. https://doi.org/10.1016/j.chb.2013.02.014

Rothman, L., Macpherson, A. K., Ross, T., & Buliung, R. N. (2018). The decline in active school transportation (AST): A systematic review of the factors related to AST and changes in school transport over time in North America. *Preventative Medicine*, *111*, 314-322. https://doi.org/10.1016/j.ypmed.2017.11.018

Sauber-Schatz, E. K., Ederer, D. J., Dellinger, A. M., Baldwin, G. T. (2016). Vital signs: Motor vehicle injury prevention—United States and 19 comparison countries. *Morbidity and Mortality Weekly Report, 65*. http://dx.doi.org/10.15585/mmwr.mm6526e1

Shafer, A., Cates, J. R., Diehl, S. J., & Hartmann, M. (2011). Asking mom: Formative research for an HPV vaccine campaign targeting mothers of adolescent girls. *Journal of Health Communication, 16*, 988-1005. https://doi.org/10.1080/10810730.2011.571343

Taylor, B. D., & Fink, C. N. Y. (2003). *The factors influencing transit ridership: A review and analysis of the ridership literature*. UCLA Institute of Transportation Studies. https://escholarship.org/uc/item/3xk9j8m2

Thomas, R. A. E. (2007). *The social travel patterns of youth and young adults.* [Master's thesis, University of British Columbia]. https://open.library.ubc.ca/cIRcle/collections/ubctheses/831/items/1.0101152

U.S. Census Bureau. (2018). *American community survey 1-year estimates*. http://censusreporter.org/profiles/16000US4159000-portland-or

Wegert, T. (2016, June 30). 5 things marketers need to know about Gen Z. *The Content Strategist.* https://contently.com/2016/06/30/5-things-marketers-need-to-know-gen-z/

Wolch, J. R., Byrne, J., & Newell, J. P. (2014). Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough.' *Landscape and Urban Planning*, *125*, 234-244. https://doi.org/10.1016/j.landurbplan.2014.01.017