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Microtransit Use in Rural Communities: Exploring Persuasive Messaging to Promote Prosocial Behaviour

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ABSTRACT

Microtransit is a rapidly growing transportation option being used by rural communities that lack traditional shared public transportation (e.g., buses, etc.). It offers a shared, technology-enabled solution with flexible, on-demand access to transit booked through a smartphone application at a low cost. In 2020, the City of Wilson, North Carolina implemented the RIDE microtransit system. As popularity and service demands grew higher, unserved trip requests increased. Treating the RIDE system as a computational sociotechnical system, this work seeks to leverage user-technology interaction to facilitate adaptive resource allocation thereby promoting system efficiency. Ten focus groups were conducted with 74 community-dwelling RIDE users to assess RIDE usage and user preferences. To explore how messaging might influence the likelihood of prosocial behaviour, participants were exposed to persuasive messaging designed to request voluntary changes to their travel plans (i.e., shifting pickup time or walking further to the pickup point) to assist other, more vulnerable users including elderly and disabled individuals. Over two iterations, focus group participants evaluated 32 persuasive message prototypes designed with combinations of persuasive principles popularized by Cialdini (2007) such as social proof, liking/similarity, commitment/consistency, and reciprocity. Results indicated that messages using the principle of reciprocity consistently resulted in a higher self-reported likelihood of altering travel plans. Likewise, messages that benefited vulnerable users consistently resulted in higher likelihood of altering travel plans. Discussion focuses on next steps in the research process and elaborates on how such human factors-related information will be useful during system algorithm development.

Keywords: Microtransit, Persuasion, Prosocial behaviour, Computational sociotechnical system

INTRODUCTION

Access to transportation is essential to life because it enables people to engage in fundamental tasks outside the home. Transportation has been linked to measures of personal well-being (Vella-Brodrick & Stanley, 2013). Specifically, public transportation provided through municipal services enables individuals

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to travel for work, obtain healthcare, and shop for needed supplies such as food (Sundaresan at al., 2025). Results from the 2020 United States Census found that nearly 39% of the population lives within a city with a population of fewer than 50,000 (Toukarbri & Medina, 2020). Within these small or medium-sized communities, individuals face significant barriers to accessible public transit because of inadequate transportation infrastructure (U.S. Department of Transportation, 2025). Lack of public transit options disadvantages impoverished, elderly, and disabled individuals, who often lack access or the ability to operate personal vehicles (Shaheen et al., 2020; Shaheen & Cohen, 2018). Thus, the need to optimize the use of limited resources is contingent on several factors including the acceptability of shared transportation. One approach to public transportation is microtransit, a shared service offering low-cost, flexible, on-demand rides booked through a smartphone application. The service provides communities with an alternative to traditional, fixed-route services such as buses (Bardaka et al., 2020; Shaheen et al., 2020; Shaheen & Cohen, 2018).

In 2020, a microtransit solution was implemented in the City of Wilson, North Carolina (NC) within the United States to replace the city's traditional fixed-route bus service (Bardaka et al., 2024). The service, named RIDE, consists of a fleet of 18 vans, offering on-demand transportation from Monday to Saturday for $2.50 per ride. With around 18,000 trips requested per month, RIDE services a higher number of passengers than the city's previous bus service. However, 1 in 4 of these requests are not served due to high demand, with unserved trip requests and high wait times being a common observation for microtransit solutions in small communities like Wilson (Bardaka et al., 2024; Ghimire et al., 2024).

As microtransit becomes more popular with the public, there is a critical need to improve the efficiency of these services to compensate for the increase in demand outpaced by current funding levels (Bardaka et al., 2024). Because RIDE is a public, non-profit driven service, traditional price signals are not a viable option for shifting demand, as this would exacerbate the financial barriers to transit that the service seeks to offset (Bardaka et al., 2024). Furthermore, price signal demand solutions would primarily disadvantage the city's most economically marginalized individuals. As such, an equitable solution for offsetting demand for microtransit services is needed. Thus, a new paradigm for microtransit should be implemented such that it is viewed as a computational sociotechnical system (STS) that seeks to leverage user-technology interaction to facilitate adaptive resource allocation (Bardaka et al., 2024; Singh, 2014). In this work, the benefits of promoting prosocial behaviour such as ride sharing by exposing microtransit users to prosocial messaging designed according to persuasive principles are explored (Cialdini, 2007; Petty & Cacioppo, 1986).

METHOD

Ten focus groups were conducted in Wilson, NC from September 2024 to January 2025. Seventy-four RIDE users in total were recruited from a contact list generated in a prior research survey. To encourage active participation and open discussion, we ensured there were no more than 12 participants per session. The sample was predominantly Black/African American (78.4%) and female (70.3%). Participants indicated that they used RIDE primarily for traveling for errands (63.5%), doctors' appointments (60.8%), and work (59.5%), and indicated having the most flexibility with trips for errands (63.5%). Overall, participants were satisfied with the RIDE system (3.85/5) but indicated there is room for improvement.

Design

A 2 x 4 x 4 factorial design examined how different persuasive message features affected riders' willingness to agree to engage in prosocial actions. Prototype messages were developed to vary across all possible combinations of our variables of interest: (1) intervention type (2: shift travel or walk), (2) persuasion principle (4: social proof, liking/similarity, commitment/consistency, or reciprocity), and (3) benefit type (4: individual, system, group, or self). The two interventions involved asking participants to shift their travel plans within two hours of booking the RIDE or asking participants to walk a short distance (2–3 minutes) to an alternate pickup location. The four persuasion principles derived from Cialdini (2007) included social proof, liking/similarity, commitment/consistency, and reciprocity. Social proof leverages the influence of social conformity pressures to change behaviours to align them with those of the group (Asch, 1955, Cialdini & Goldstein, 2004). Liking/similarity utilizes the similarity-attraction effect first described by Byrne (1971), to bolster perceived similarity between individuals to increase their sense of social connection and subsequently foster cooperation and willingness to help. The commitment/consistency persuasion principle relies on utilizing individuals' motivation in a consistent manner (Cialdini & Goldstein, 2004). Lastly, the reciprocity principle incorporates the motivation of individuals to reciprocate help they have received from others by referencing prior benefits conferred on the requestee by another's decision to help them. For the four benefit types, messages communicated the outcome in terms of who stands to gain and how, from the rider's agreement to the request. Individual benefit frames the outcome as beneficial to another rider. Group level benefits indicate that several individuals gain from the outcome of an agreed request, such as a group of queued riders having their wait time reduced. System level benefits indicate beneficial outcomes for the RIDE system more broadly and can range from lowering wait times (without reference to specific individuals), increasing on-time pickup likelihood by lowering delays, or to an increase in total volume of trips able to be serviced. Self-benefit framed the outcome in terms of the benefit to the requestee.

Instruments

Thirty-two prototypes were developed to account for every combination of intervention type, persuasion principle, and benefit type. These were counterbalanced and tested in eight focus group sessions. Insights from those results were then used to inform a second iteration of messages where four additional prototypes were tested in two focus group sessions. In total, ten focus group sessions allowed RIDE users to interact with 36 message prototypes. Message prototypes were designed to be concise and easily understood to match how they might appear in an in-app context, and in alignment with the peripheral processing route of persuasion described in the ELM model (Petty & Cacioppo, 1986). Messages provided the requested intervention type, followed by a persuasive principle element, and either intermixed with or preceded by an explained benefit providing a rationale for the request in accordance with Langer, Blank, & Chanowitz (1978). This design enabled direct comparison for the effectiveness of the persuasive principles relative to the interventions and benefits. In addition, the design allowed for maintaining a degree of ecological validity in terms of final app implementation where smart algorithms are envisioned to employ variable combinations of the design elements in a similar manner. A control message was also designed to assess participants' baseline willingness toward request agreement. The control message simply asked if the participants' travel plans could be altered, making no reference to either of our three variables of interest.

Procedure

Prior to beginning the focus group discussion, participants were asked to fill out a survey provided to them by the research team. The survey included measures of demographics, RIDE usage information, and the TEQ empathy scale (Spreng, McKinnon, Mar, & Levine, 2009). Participants spent between 15 and 20 minutes completing the survey. Once all participants had completed the survey, discussion began by presenting participants with the control message. All participants were administered the control message prior to presentation of four prototype messages counterbalanced across variable types (e.g. intervention, persuasion principle, and benefit types). A between-groups design, presenting the control and four unique prototype messages across eight groups, was decided to limit fatigue effects and time constraints. Presenting all 32 messages to every group would have been unfeasible, especially in a focus group context with open discussion and would have limited the quality and consistency of the feedback received. Based on the results of the first eight focus groups, four more prototype messages were developed for comparison in the final two groups. Altogether, each focus group session lasted approximately one and a half hours in total.

RESULTS

For the first iteration of messages (first 32 messages from first eight focus groups), results of the univariate ANOVA revealed a significant difference for the overall model ($p < 0.001$), with significant differences between persuasion ($p < 0.001$) and benefit types ($p = 0.002$), but not for intervention type ($p = 0.232$). This means participants' likelihood was no more or less influenced by requests to walk than requests for a two-hour shift in travel plans. However, different combinations of benefit and persuasion types used in the messages did significantly influence participants' likelihood of abiding by the message request.

In terms of persuasion type, messages utilizing the principle of reciprocity consistently resulted in a higher indicated likelihood of altering travel plans (M = 2.81) than the other three principles of persuasion (commitment/consistency, social proof, and liking/similarity). However, this difference was only significant between the reciprocity and liking/similarity ($p = 0.002$) and reciprocity and social proof ($p = 0.006$) principles. This suggests that messages utilizing the reciprocity principle are significantly more likely to result in request agreement than those utilizing the liking/similarity or social proof principles, but not necessarily for those utilizing the commitment/consistency principle.

For benefit type, those messages indicating benefit to another individual (M = 2.88) resulted in a consistently greater indicated likelihood of altering travel plans, followed by system-level (M = 2.67), environmental (M = 2.16), group (M = 2.12), and health benefits (M = 2.09). Individual benefits performed significantly better in terms of participants' self-indicated likelihood of altering travel plans than environmental ($p = 0.008$), group ($p < 0.001$) and health benefits ($p = 0.007$). Messages indicating a system-level benefit also resulted in a significantly higher likelihood of travel plan alteration than group ($p = 0.015$) and health ($p = 0.047$) benefits. While the difference between system-level and environmental benefits did not reach the level of statistical significance ($p = 0.058$), it was marginal, suggesting a potential trend toward greater persuasive impact for system-level benefits relative to environmental. Results suggest that, in terms of benefit type, messages highlighting benefits to an individual and to the overall system may result in greater likelihood of request agreement.

For the second iteration of messages, four additional messages were generated based on the results of the previous focus groups and tested in the two additional focus groups. As the persuasion principle of reciprocity consistently performed well, this persuasion principle was selected for use in each of the four new message prototypes. For benefit type, the two highest performing options from the previous iteration were selected: individual and system-level benefits (two of each type for the four additional prototypes). Lastly, two of each intervention type (shift travel, walk) were used. Based on qualitative feedback from iteration 1, we included specific options for pick up times for shift travel interventions.

A second univariate ANOVA revealed there were no significant differences in the use of the reciprocity principle across the two iterations ($p = 0.864$). No significant differences were found between the benefit types used in iteration one and two, with neither individual ($p = 0.621$) nor system-level ($p = 0.985$) performing better or worse than each other across the iterations. For the intervention type, there were again no significant differences in either walk ($p = 0.641$) or shift travel ($p = 0.968$) interventions.

DISCUSSION

Given the interaction between persuasion and benefit type, participants were most positively influenced by messages utilizing the reciprocity principle and referencing a benefit to a specific, single individual. This may suggest that individuals feel obligated to help a specific individual who has helped the requestee in the past by altering their travel plans. In other words, reciprocity-based persuasion may be most effective on an individual-to-individual basis, with individuals less obliged to reciprocate help to a group of individuals, in particular. Overall, the reciprocity principle performed well across both focus group iterations when combined with other benefits. Insights from this work will inform the development of microtransit algorithms to increase ridesharing and operational efficiency. Consistent with the Dijkstra (2008) model, future research efforts will examine how persuasive messaging can be tailored for individual recipients and implemented in real time with user studies that measure usability and technology acceptance and trust.

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