

# Identifying Parent Perspectives to Guide Active Travel Intervention with Small Populations

## Case Study in Denver, Colorado

Kelly Draper Zuniga

This paper investigates a strategy for guiding school-based active travel intervention. School-based active travel programs address the travel behaviors and perceptions of small target populations (i.e., at individual schools) so they can encourage people to walk or bike. Thus, planners need to know as much as possible about the behaviors and perceptions of their target populations. However, existing strategies for modeling travel behavior and segmenting audiences typically work with larger populations and may not capture the attitudinal diversity of smaller groups. This case study used Q technique to identify salient travel-related attitude types among parents at an elementary school in Denver, Colorado; 161 parents presented their perspectives about school travel by rank-ordering 36 statements from strongly disagree to strongly agree in a normalized distribution, single centered around no opinion. Thirty-nine respondents' cases were selected for case-wise cluster analysis in SPSS according to criteria that made them most likely to walk: proximity to school, grade, and bus service. Analysis revealed five core perspectives that were then correlated with the larger respondent pool: optimistic walkers, fair-weather walkers, drivers of necessity, determined drivers, and fence sitters. Core perspectives are presented—characterized by parents' opinions, personal characteristics, and reported travel behaviors—and recommendations are made for possible intervention approaches. The study concludes that Q technique provides a fine-grained assessment of travel behavior for small populations, which would benefit small-scale behavioral interventions.

Recent transportation policies, including bike shares, bikeways, and safe routes to school programs, highlight public efforts to increase the proportion of short trips made by walking or biking (1–3). Planners explain that these active travel modes offer a cleaner, greener, and healthier alternative to automobile dependence (3–8).

To design policies and programs that will make walking and biking more attractive options than driving, planners need to understand the extent to which various factors influence the travel behaviors and perceptions of their target populations. Traditional quantitative travel behavior research is well-suited for estimating behavioral tendencies of large populations. However, programs that work in individual schools and other organizations often deal with small, culturally

diverse populations. To guide small-scale programs, planners need a better grasp of the behaviors and perceptions of those target groups so they can encourage individuals to walk or bike.

The purpose of this study is to assess perceptions of travel alternatives with small populations that planners may target for behavioral intervention. This paper presents findings from a study that used a sorting exercise with case-wise cluster analysis to examine parents' perceptions of travel to and from an elementary school in Denver, Colorado. The study revealed five core perspectives: optimistic walkers, fair-weather walkers, drivers of necessity, determined drivers, and fence sitters. By aligning the perspectives with intervention approaches, findings from this study illustrate the capacity of the research approach to guide small-scale intervention.

### PREVIOUS RESEARCH

Planning research often describes travel behavior for school trips in terms of a perspective that emphasizes the students' opportunity to walk to school in terms of key environmental barriers. This interpretation suggests that parents share a positive opinion of walking to school but are unable to achieve that goal due to external constraints. For example, several studies (3, 9–15) found that distance between home and school was a key predictor of mode choice. The findings implied that because travel behavior was significantly influenced by distance, school districts would need to change their catchment areas or enrollment policies to encourage students to walk. As another example, several studies (3, 14, 16, 17) asked parents to pick from among several reasons why they drive to school. Some (12, 16, 18, 19) identified traffic danger and others (3, 14, 17, 19) identified stranger danger as key obstacles to walking. Those findings would focus intervention on one or the other problem, assuming that by removing the obstacle they could free people to walk who are otherwise forced to drive.

Another study (20) used a mapping exercise to locate specific environmental safety concerns and similarly concluded with recommendations that focused on traffic safety. By emphasizing opportunity-related, environmental barriers, much school travel research assumes that parents generally want to walk their children to school, neglecting other possible perspectives and attitudes that intervention might address.

Other active travel research calls attention to personal factors such as sociodemographic characteristics and attitudes (3, 4, 14, 18, 21) and recommends multiple intervention approaches in terms of

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Queensland University of Technology, 2 George Street, GPO Box 2434, Brisbane, Queensland 4001, Australia. kelly.zuniga@qut.edu.au.

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one or more segments of the target population. For example, Sener et al. (4) found that Texas bicyclists generally chose to ride for exercise reasons. However, some riders were concerned about safety, particularly older riders and riders who did not have appropriate signage or storage facilities along their routes. Akar and Clifton (22) used principal components analysis to incorporate attitudes into a choice model. Although their findings did not focus on segments of the audience, they included several focus areas for intervention, including traffic conditions, mechanical problems, way-finding, lighting, and security. Beirao and Cabral (23) used factor and cluster analysis on a Likert-scaled survey to identify seven broad perspectives about transportation, including need for control, status seeking, desire to change the form of transportation, pro public transportation, desire to help the environment, and sensitivity to travel stress. Although they did not make specific policy recommendations, they used the study to examine attitudinal differences between men and women with regard to transportation and suggested that behavioral policy should focus on attitudes that can induce change. By describing travel behavior and perspectives in terms of various segments of the population, research supports a tailored approach to intervention that may increase its impact.

Travel-related planning research often uses statistical methods and choice modeling to describe the travel behaviors and perceptions of large populations or of certain sociodemographic subgroups of large populations. For example, Sener et al. (4) used survey data from 1,605 bicyclists from 100 cities across Texas. Akar and Clifton (22) used data from an online survey with more than 1,500 people on the University of Maryland campus. Beirao and Cabral (23) used data from 3,009 telephone interviews with residents from the Porto region of Portugal. Although some planning problems relate to large populations better than others, statistical studies fundamentally require large respondent pools to make claims within certain confidence intervals.

Even studies focused on school travel, a seemingly small-scale planning problem, generally rely on large samples to ensure validity. For example, McDonald (11) used data from the National Household Transportation Surveys from 1969 to 2001. Martin and Carlson (12) analyzed data from the 2004 Consumer Styles Survey ( $n = 4,213$ ). Hillman et al.'s (16) study included surveys of students in five areas of England. DiGiuseppi (10) surveyed 31 schools and had 2,086 respondents. In contrast to those studies, Joshi and MacLean (17) interviewed only 378 students. However, their sample represented schools in several cities and shires around Oxford, United Kingdom, and was not intended to describe behavior at a single school. Of the examples described above, only Collins and Kearns (20) surveyed parents from a single primary school but had an impressive pool of 426 respondents because it was the largest school in Auckland, New Zealand. This is significant because it means the research often estimates the behavioral profiles of very broad populations but provides guidance to interventions that target small, specific subgroups of people. That practice raises the question of what types of behavioral profiles would be encountered with the smaller groups and how those profiles might direct behavioral intervention.

## RESEARCH METHODS

This study used Q technique to examine parents' perceptions of travel alternatives for trips to and from an elementary school in Denver. Q technique is a research method for systematically exploring

patterns and connections between people's perceptions (24–28). Similar to traditional attitude-based research, it combines psychometric and operational principles with correlation techniques. The method was introduced in 1935 by physicist–psychologist William Stephenson as an alternative to the traditional scientific method that would help him examine research subjects' points of view about a topic (25).

Q technique can be used for extensive studies that aim to identify a range of viewpoints in a population but is oriented toward intensive behavioral analysis of individuals or small groups of subjects (27, 28). In contrast to traditional survey methods, the purpose of Q technique is to establish the taxonomy of views rather than to weigh them against each other in occurrence or to generalize them beyond the scope of the study population. As a result, Q technique does not require a large randomized sample of respondents, which makes it ideal for small-scale research (27, 29). Brown (26) argued that even for extensive studies, the number of respondents should not exceed 40. Addams and Proops (29, p. 21) explained the scope of sampling for an extensive Q study:

As a consequence of the expectation of finite diversity, the number of participants does not have to be large. What is required is that these should be deliberately selected to reflect the widest range of potential types of opinions in order to identify all factors [perspectives] that exist in relation to the topic of research. (29)

Although Q technique has been used extensively in psychology, policy sciences, and numerous other research fields, it has had little exposure in transportation planning. Therefore, the next section of this paper describes the method used in this study in detail, including data collection and analysis procedures.

## Data Collection

### *Q Sort Exercise*

A Q sort exercise was the main tool used in this study to measure parents' perspectives of travel alternatives for school trips. The exercise asked them to rate 36 statements on a continuum from "I agree with these statements the most" to "I disagree with these statements the most." Each parent represented his or her complete perspective by organizing the statements in a normalized distribution single centered around a mean score of zero (see Figure 1). By imposing that distribution, the Q sort compelled parents to consider the statements in relation to each other, rather than rating them independently, and made it possible to evaluate each parent's perspective as a whole (26, 27, 29, 30).

### *Q Set*

Q sort findings are based on permutations of the set of statements (Q set) included in the sorting exercise. Therefore, Q methodologists recommend that the Q set represent a wide range of issues and policy angles commonly discussed about the topic of interest. Additionally, the Q set should use language familiar to respondents and should be small enough to be manageable for a short sorting activity (26, 27, 29).

The Q set for this study included statements obtained through content analysis of semistructured interviews with 65 parents from 11 Denver elementary schools that were part of a larger study. In

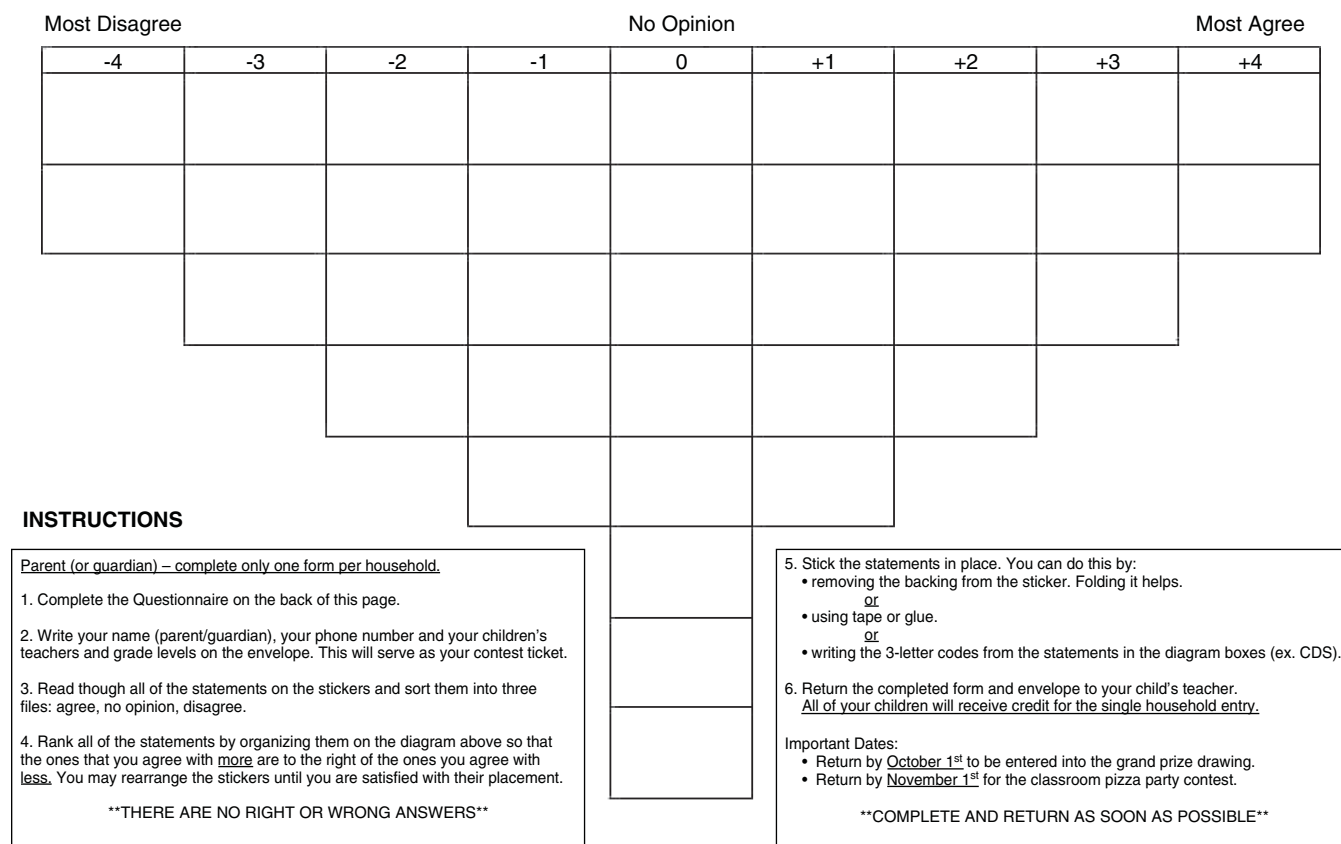


FIGURE 1 Q sort diagram and instructions.

agreement with school district policy, parents were approached during drop-off and pick-up times, potentially skewing findings in favor of the accompanying parents' viewpoints. However, findings indicated that parents often alternated between accompanying children and sending them alone or with friends, suggesting that the behavior, and its corresponding viewpoints, were not discrete. Parents were asked a series of open-ended questions about the journey to school, including who makes decisions about the trip to school, who accompanies children to school, what modes of travel they use to get to school, and conditions that might influence them to change their travel routine.

The interview transcripts were analyzed with Glaser and Strauss's (31) constant comparative technique of grounded theory, which resulted in a Q set of 36 statements reflecting local perspectives about travel alternatives for school trips (see Table 1). Although statements were drawn from the language of interview respondents, they reflected many of the environmental and personal issues identified in planning literature on the topic, including opportunity- and propensity-related facets of travel choice. These Q sets and instructions were prepared in English and Spanish, were tested with colleagues and bilingual school staff, and were adjusted for substantive clarity and accuracy in translation.

**TABLE 1** Revealed First and Second Preferences for Five Core Perspectives

| Core Perspective        | Respondents' Preferred Perspectives |            |        |            | Total Potential Policy Impact |            |
|-------------------------|-------------------------------------|------------|--------|------------|-------------------------------|------------|
|                         | First                               | Percentage | Second | Percentage | First Two Choices             | Percentage |
| A. Optimistic walkers   | 39                                  | 24.2       | 35     | 21.7       | 74.0                          | 46.0       |
| B. Fair-weather walkers | 47                                  | 29.2       | 54     | 33.5       | 101.0                         | 62.7       |
| C. Drivers of necessity | 21                                  | 13.0       | 26     | 16.1       | 47.0                          | 29.2       |
| D. Determined drivers   | 18                                  | 11.2       | 6      | 3.7        | 24.0                          | 14.9       |
| E. Fence sitters        | 28                                  | 17.4       | 16     | 9.9        | 44.0                          | 27.3       |
| Subtotal                | 153                                 | 95.0       | 137    | 85.1       | 290                           | 180.1      |
| No common perspective   | 8                                   | 5.0        | 24     | 14.9       | 32.0                          | 19.9       |
| Totals                  | 161                                 | 100.0      | 161    | 100.0      | 322.0                         | 200.0      |

### Site Selection

This paper focuses on findings from research conducted at Edison Elementary School, one of 11 study sites from a larger research project investigating school travel in Denver. Edison was selected as a research site based on its participation in Denver's 2007 through 2008 grant-funded Safe Routes to School noninfrastructure program, which indicated the school's interest in increasing the proportion of trips made by walking or biking. The school's participation in Safe Routes to School also facilitated access to key informants, which included school staff and parents.

The purpose of this research was to examine perceptions of travel alternatives with a small, culturally diverse population. At the time of study, Edison's student body was divided almost evenly between white and Latino students and had nearly one-half of enrolled students on a free and reduced price lunch program, indicating financial need. Edison's sociodemographic composition made it an appropriate study site to explore the use of Q technique as an alternative to traditional survey methods.

### Participant Selection

Q sorts were distributed to every household through Edison's take-home folder system and returned through its administrative office. In addition to the Q sorts, parents received a short questionnaire about personal and household sociodemographic and travel behavior characteristics and two open-format questions asking them to explain their perspectives. Each completed Q sort was coded to ensure anonymity and matched to a contact sheet with parents' and teachers' names, phone numbers, and classrooms to eliminate duplicate entries from families with multiple children.

At the time of the study, Edison had 461 enrolled students. A total of 161 respondents, representing 278 students, returned the Q sorts (minus 33 incomplete responses)—a net 60.3% response rate. While this number of respondents would suffice for a traditional statistical study, it was much larger than necessary for Q technique and required an additional sampling strategy to limit the total number of cases while reflecting the widest range of relevant perspectives.

Distributing the Q sort widely made it possible to purposefully select a small number of participant cases based on a series of characteristics relevant to travel behavior. From the overall respondent pool, 39 cases were selected for cluster analysis based on characteristics that made the parents theoretically more likely to walk or bike their children to school. For example, the study included parents who indicated that they lived less than 10 blocks from the school, that they were not assigned to a route in the school's bus system, and that they did not have children in early childhood education or kindergarten. On the basis of this sampling strategy, study results would guide policy to focus attention on the "low-hanging fruit"—perspectives of parents whose circumstances (opportunity-related conditions) favored walking or biking—and would thereby increase the potency of intervention by addressing propensity-related issues.

The resulting Q sample included the sociodemographic diversity of the larger school population in terms of race and income, although the numbers were not proportionally representative. The sample was intentionally weighted in favor of households living nearer to the school, which resulted in a greater proportion of white families with higher household incomes. Despite the shorter distance between home and school, a greater proportion of the selected cases drove at

least one way than in the larger respondent pool. This made it important in the final stage to correlate factors to the larger respondent pool to determine how well each of the perspectives resonated overall.

### Data Analysis and Interpretation

Several types of specialized freeware are available to collect and analyze Q sort data, including PQMethod, PCQ, FlashQ, and WebQ. Their procedures and advantages are described in detail elsewhere (32, 33). This study used the more conventional statistical software SPSS 17.0 but used case-wise analytical techniques, which extracted several core types of perspectives from the 39 selected Q sort cases and correlated them with the larger respondent pool. Brunner and Lyn (34) provide a detailed explanation of the advantages of case-wise versus factor-wise analysis. Procedures for this study's analysis are described in detail below.

### Identifying Factors

Q sort data were entered in table format with case numbers in the first column and sorting scores for each of the 36 statements (−4 to +4) in the remaining columns. They were analyzed in SPSS 17.0 using hierarchical clustering with Pearson's correlation coefficient and the complete linkage algorithm. (Hierarchical cluster analysis was possible without further normalization because respondents were instructed to complete the Q sort exercise using a normalized, single-centered diagram.) This step produced a table of correlation coefficients to indicate the degree of similarity (between 0 and  $\pm 1.00$ , with +1.00 indicating an exact match) when each new case joined a cluster. It also produced an icicle dendrogram, which graphically presented the clustering of cases, and rescaled the correlations to indicate the degree of difference between clusters (0 to 25, with 25 indicating the least similar). These initial results were instrumental in deciding the number of factors and in identifying their member cases (see Figure 2).

To identify factors, it was necessary to locate significant divisions between shared perspectives. As indicated by the dashed boxes on the dendrogram, the first clear division occurred at about Level 24 on the distance scale ( $r = -.344$ ), between the top 26 cases and the bottom 13 cases. The top group showed three additional divisions at Levels 22, 17, and 13, potentially indicating four meaningful factors or shared perspectives. However, because Cases 35 and 37 combine at  $r = .231$ , it was assumed that their shared perspective would be too weak to include as an independent factor. Further analysis verified that interpretation, as the two cases shared a strong opinion about only one statement. That meant the top group was divided into three factors (labeled A, B, and C) with clusters of nine, eight, and seven member cases each. The bottom group showed a clear division at about level 19 ( $r = -.084$ ), making two factors (D and E) with clusters of five and eight member cases each. Characterization of the five factors reinforced this structure as described below.

### Characterizing Factors

To characterize each of the five factors, scores for each of the 36 statements were calculated from the means of the scores of the factors' member cases (see Table 2). Each factor's profile was represented

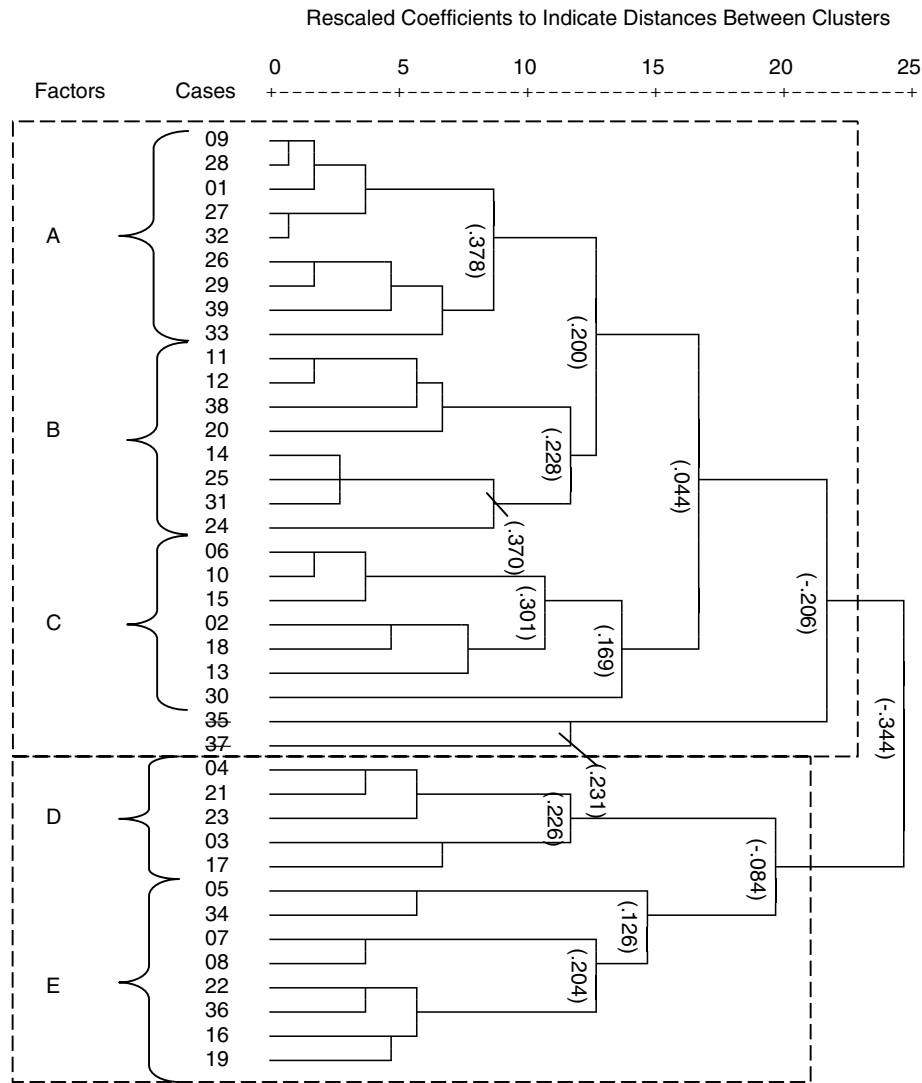


FIGURE 2 Hierarchical dendrogram.

by the mean scores for the 36 statements, just as each respondent case's profile was represented by the original scores to which the parent assigned each statement during the sort.

Each perspective was primarily characterized by the statements and topics that achieved mean scores  $\geq |2.00|$ . Statements and topics that achieved mean scores  $\geq |3.00|$  were interpreted as "emphases," while those between  $|2.00|$  and  $|3.00|$  were interpreted as "mentions." Negative scores indicated shared disagreement. For scores  $< |2.00|$ , nearing zero indicated either that members of the cluster did not share their strong opinion or that they did share a weak opinion. As indicated by shaded cells, each of the resulting factor profiles included between eight and 12 of the 36 original statements.

Core perspectives were further characterized by household demographic and travel behavior data that were collected with the Q sort. Sociodemographic factors that were collected include distance from school, race and ethnicity, and income. Parents were also invited to mark which of several travel characteristics applied but were not asked to rank or give numerical weight to the answers. Options included the following: carpool, walk or bike in nice weather, allow child to travel with siblings or friends, drop off on the way to work, take the bus, drive both ways, and walk one way and drive the other.

Additional Factor Analysis

Factors were further analyzed by correlating them with the larger group ( $n = 161$ ) of respondent cases. To that end, the original data table was transposed so that the 36 statements appeared in the left-hand column and the respondent cases occupied the remaining columns. The named factors (A, B, C, etc.) with their mean statement scores were entered as new cases.

Each respondent case was assigned a best-fit factor based on its highest correlation coefficient of the five. Only eight cases of 161 did not correlate to at least one of the factors at the  $p = .05$  threshold of significance, while 68% of respondents correlated to at least two of the core perspectives at  $p = .01$ , and many correlated to several perspectives at that level. This outcome suggests that several perspectives resonated well with that parent and could be used to influence travel decisions. Cross-tabulation of factors and the personal and household sociodemographic and travel characteristics of their best-fit cases provided additional insight into each of the factors' perspectives about travel alternatives.

Conversely, each of the five factors was assigned two or three best-specimen respondent cases that had the highest correlation



TABLE 2 Statements and Scores on Five Core Perspectives

| No. | Statement  | Mean Scores by Core Perspective |       |       |       |       |
|-----|--|---------------------------------|-------|-------|-------|-------|
|     |  | A                               | B     | C     | D     | E     |
| 1   | Families are in too much of a rush to walk to school.                        | 0.33                            | 0.00  | -1.29 | 2.80  | 1.75  |
| 2   | Families plan their schedules around their trips to school.                  | 0.22                            | 0.62  | -0.43 | -0.20 | 1.88  |
| 3   | Working parents can't take time to walk to school.                           | -0.78                           | -0.87 | -2.00 | 2.80  | 1.75  |
| 4   | Parents save time by combining school trips with errands.                    | 0.67                            | 0.62  | -0.57 | 1.00  | 1.50  |
| 5   | Driving to school is very convenient.  | 0.00                            | 2.12  | -0.71 | 0.60  | 2.25  |
| 6   | Walking to school is more enjoyable than driving.                            | 2.00                            | 1.75  | 1.29  | 1.20  | 2.25  |
| 7   | Parking at the school is a pain.   | -1.00                           | -0.50 | 1.57  | 1.00  | -0.25 |
| 8   | The trip to school is a special time when parents bond with their kids.      | 1.56                            | 1.50  | 1.14  | 1.20  | 1.12  |
| 9   | Children would be safe on the street if they traveled in groups.             | 0.67                            | -0.25 | -0.14 | -0.80 | 0.75  |
| 10  | There aren't many kids in our neighborhood.                                  | -1.67                           | -2.38 | -1.71 | -1.40 | -1.88 |
| 11  | If children yelled for help in our neighborhood, someone would protect them. | 1.33                            | -0.12 | 0.43  | -0.80 | 0.87  |
| 12  | I can't trust other adults to make sure my kids get to school okay.          | -2.89                           | -2.50 | -1.43 | -2.40 | -0.62 |
| 13  | Kids may get themselves into trouble if they go to school unsupervised.      | -1.11                           | 0.12  | 0.86  | 1.60  | 1.00  |
| 14  | It's fun for kids to go to school with their friends.                        | 1.67                            | 0.87  | 1.43  | 1.40  | 1.25  |
| 15  | Children can be safe on the street if they learn the right skills.           | 2.78                            | 0.75  | 0.57  | 0.80  | 0.25  |
| 16  | By third grade, kids should be able to go to school and back on their own.   | -0.11                           | -1.75 | -2.14 | -2.00 | -2.25 |
| 17  | We worry about our kids becoming obese.                                      | -2.22                           | -1.25 | 0.29  | -2.40 | -2.12 |
| 18  | Physical fitness is very important to our family.                            | 3.33                            | 3.12  | 2.57  | 1.40  | 2.75  |
| 19  | We want physical activity to be a part of our children's lives.              | 3.33                            | 3.00  | 2.86  | -0.20 | 1.50  |
| 20  | We try to sleep in as late as possible.                                      | -2.22                           | -0.38 | -0.71 | 0.80  | -2.62 |
| 21  | The location of the school influences where we choose to live.               | 0.22                            | -1.62 | 1.29  | -2.60 | -0.62 |
| 22  | Kids who are physically active do better in school.                          | 2.22                            | 3.50  | 2.71  | 0.20  | 1.38  |
| 23  | Kids' backpacks are too heavy for them to walk or bike to school.            | -1.11                           | -0.88 | -0.57 | 0.40  | -1.62 |
| 24  | Parents will walk to school with their kids when there are special events.   | -0.44                           | -0.38 | -0.71 | -1.60 | -1.00 |
| 25  | Walking to school is a good way to save money on gas.                        | 1.44                            | 0.88  | 3.43  | -1.00 | 0.38  |
| 26  | We should make an effort to reduce air pollution around schools.             | -0.33                           | -0.62 | -2.57 | -0.40 | -0.63 |
| 27  | There really aren't a lot of safe routes to our school.                      | -2.44                           | -1.50 | -2.14 | 0.60  | -2.62 |
| 28  | Colorado weather is ideal for walking and biking to school.                  | 2.78                            | 2.12  | 2.00  | 0.50  | 1.80  |
| 29  | There are dangerous roads and crossings in our neighborhood.                 | -0.67                           | 1.62  | 0.86  | 1.50  | 2.20  |
| 30  | There are no major roadways between our house and the school.                | -0.33                           | -0.12 | 1.14  | 1.00  | 1.40  |
| 31  | Drivers are too distracted with phones, kids, and other things.              | -1.44                           | -3.00 | -2.43 | -1.50 | -3.60 |
| 32  | Too many drivers blatantly disobey traffic rules and signals.                | -0.78                           | 0.75  | 0.71  | -4.00 | 2.20  |
| 33  | There are strangers out there waiting to steal your kids.                    | -2.22                           | -1.00 | -0.86 | 0.50  | 2.20  |
| 34  | People no longer know their neighbors like they once did.                    | -1.67                           | -1.00 | -0.14 | -0.50 | -0.20 |
| 35  | If you leave a bike outside it will get stolen or vandalized.                | 0.11                            | 0.12  | 0.71  | 1.00  | -0.80 |
| 36  | Kids need protection from other kids and youth.                              | -0.11                           | 0.00  | -0.71 | 3.50  | 2.20  |

coefficients. Qualitative data from best-specimens' questionnaires were used to confirm factor profiles.

## REVEALED PERSPECTIVES AND POLICY DIRECTIONS

The substantive purpose of this study was to examine perceptions of travel alternatives among small, culturally diverse populations that planners might target for behavioral intervention. The study assumes that several intervention approaches would be available to implement at the school and that some approaches would resonate better with the attitudes and perspectives commonly found at the school. Relationships between perspectives and intervention approaches were not mutually exclusive. Although it was not in the scope of this paper to

review every possible intervention approach, several suggestions are presented as examples.

On the basis of the analysis methods described above, this study revealed five core perspectives at Edison Elementary School about travel alternatives for school trips: optimistic walkers, fair-weather walkers, drivers of necessity, determined drivers, and fence sitters. Each perspective was preferred by 10% to 30% of respondents (see Table 1). Most respondents had one or more perspectives with which they identified at a secondary level. Thus, interventions tailored to individual perspectives would promise to overlap in influence.

The five core perspectives are characterized below in terms of shared opinions and common personal and household sociodemographic and travel characteristics. Intervention approaches are recommended based on those profiles.

### Perspective A. Optimistic Walkers

Optimistic walkers were enthusiastic about active travel. They emphasized their desire for physical activity (Statements 18 to 20). They mentioned psychological, health, and academic motivations for walking (Statements 6, 17, and 22). They also mentioned social environmental opportunities, such as trustworthy adults (Statements 12 and 33) and children (Statement 15) as well as physical environmental opportunities for active travel, such as safe walking routes and mild climate (Statements 27 and 28).

Shared by 24.2% of the larger body of respondents, this was by far the most common perspective for respondents living within six blocks of the school and was the second most favored for those living between seven and 10 blocks away. Close proximity to the school influenced its demographic profile to include a higher proportion of white families than all but one other subgroup (fair-weather walkers). This subgroup also ranked second after fair-weather walkers in terms of wealth, with 46.2% of the subgroup reporting annual household incomes greater than \$72,000.

This group practiced what it preached. A significant proportion (64.1%) of this subgroup reported walking on nice days, and it was most common for those who reported walking overall. It was also favored by respondents who reported their children traveled with siblings or friends. However, nearly one-quarter of respondents in this subgroup reported carpooling (23.1%), which may account for the higher companionship. Despite its emphasis on walking, about one-third (35.5%) of this subgroup reported driving both ways and nearly one-half (46.2%) reported dropping children off on the way to work, which may or may not indicate car travel. These statistics indicate that even within populations who walk, policy can aim to increase rates of active travel.

An appropriate intervention approach to address this perspective would be to monitor each student's trips made by walking or biking (either by self-report or by electronic tracking) and reward students each week or each month for the highest number or longest consecutive number of walking or biking trips to school. Rewards may include small consumer items, entries into contests, or schoolwide recognition.

### Perspective B. Fair-Weather Walkers

Fair-weather walkers were generally positive about active travel but recognized the convenience of car travel. They emphasized their desire for physical activity (Statements 18 and 19) as well as an academic motivation for active travel (Statement 22). They also emphasized the safety of parents driving with children (Statement 31), which might be interpreted to support walking or driving, in this context. They mentioned social opportunities, including neighborhood children and trustworthy adults (Statements 10 and 12) and the environmental opportunity presented by a mild climate (Statement 28). In contrast to their generally positive attitude toward active travel, they mentioned the convenience of car travel (Statement 5).

Shared by 29.2% of the larger body of respondents, this was the most common perspective for respondents living farther than 10 blocks from the school and the most preferred overall. The demographic composition of this perspective's subgroup was most remarkable in terms of wealth. Overall, it was the most common perspective for respondents who reported earning annual household incomes greater than \$72,000 and least common for those earning less than \$36,000. It had the second highest proportion of white respondents after the optimistic walkers.

Despite this perspective's positive attitude about active travel, it was most preferred for respondents who reported driving both direc-

tions or driving one way and walking the other. About one-quarter of this subgroup (25.5%) reported carpooling, and just over one-half (53.2%) dropped children off at school on the way to work. Although it ranked lower than the other perspectives for active travel, about one-third of this subgroup (34.0%) reported walking on nice days.

Biking instruction, storage facilities, and route maps would be appropriate to encourage students and parents with this perspective to use active travel modes and to become more familiar with safe paths between home and school. Emphasis on biking would make the trip less time-consuming than walking, addressing the greater travel distance common to the group.

### Perspective C. Drivers of Necessity

Drivers of necessity described walking or biking to school as a luxury that would proffer certain benefits but that was difficult to attain. They emphasized saving money (Statement 25) and mentioned academics (Statement 22) as well as environmental stewardship (Statement 26) as motivations for walking. They also mentioned their desire for physical activity (Statements 18 and 19) and environmental opportunities for walking, such as safe routes (Statement 27) and a mild climate (Statement 28). In contrast, they mentioned parents' time constraints (Statement 3), defended parents' ability to drive safely with children (Statement 31), and argued against children's ability to handle the trip alone (Statement 16).

The composition of this subgroup was not remarkable in terms of ethnicity or in distance from the school. However, shared by 13.0% of the larger body of respondents, this was the most common perspective for respondents reporting an annual combined household income less than \$12,000. Income levels were more evenly distributed within this subgroup than they were in the others, with about one-fifth (19.0%) reporting less than \$12,000 and about one-sixth (14.3%) reporting more than \$72,000.

Most travel behaviors for this subgroup were about average for the larger respondent population. About one-half (52.4%) of this subgroup reported driving both ways, about one-half (52.4%) reported walking on nice days, more than one-quarter (28.6%) reported walking one direction and driving the other, and more than one-third (38.1%) took children to school on the way to work. This subgroup was average in terms of children traveling with siblings or friends.

Walking school buses would be an appropriate intervention to address this perspective, because parents could alternate responsibility for traveling a short segment of each trip, rather than taking responsibility for the entire trip twice each day. Since this group emphasized environmental stewardship and saving money on gas, it may also be appropriate to focus marketing campaigns on these issues. For example, the school might count walking and biking trips each month, calculate fuel and emissions savings associated with those trips, and present the findings in newsletters or on a banner at the school.

### Perspective D. Determined Drivers

Determined drivers dismissed walking or biking to school as difficult and unnecessary travel alternatives. They emphasized dangerous drivers (Statement 32) and bullies in the neighborhood (Statement 36) and claimed that the location of the school did not influence where they chose to live (Statement 21). They also mentioned parents' time constraints (Statements 1 and 3) as well as children's

inability to negotiate the trip to school alone (Statement 16). Although this group mentioned a social environmental opportunity presented by trustworthy adults in the neighborhood (Statement 12), they appeared to introduce it as a support of carpooling rather than active travel. Their only expression supporting physical activity related to a concern about children's obesity (Statement 17).

This perspective was shared by 11.2% of the larger body of respondents and was least favored overall. Similar to the drivers of necessity, the demographic composition of this subgroup was not remarkable in terms of ethnicity or in distance from the school. The income distribution is roughly average for the larger population.

One-half of this subgroup (50.0%) reported driving both directions, and almost one-quarter (22.2%) reported walking on nice days, although this perspective was not the most common for either characteristic. In fact, it was the least preferred perspective for parents claiming to walk on nice days (6.3%). Also, a smaller than average proportion (33.3%) reported dropping children off on the way to work.

Intervention to address this core perspective should concentrate on overcoming negative attitudes about active travel, in particular distinguishing the benefits of walking and biking to school from other forms of physical activity (i.e., extracurricular sports and physical education programs). For example, active commuting offers an excellent source of cardiopulmonary and bone-strengthening exercise and can easily be incorporated or maintained during adult life.

### Perspective E. Fence Sitters

Fence sitters described benefits afforded by walking and by driving and did not commit to either travel mode. They mentioned their desire for physical activity (Statements 18 and 20) and expressed that walking is more enjoyable than driving (Statement 6). They mentioned an environmental opportunity for walking presented by safe routes in the neighborhood (Statement 27). However, they also mentioned concern for children's ability to negotiate the trip alone (Statement 16) and several social and environmental obstacles to active travel, such as unsafe drivers, strangers, and bullies (Statements 32, 33, and 36) and unsafe crossings (Statement 29). In further support of driving, they described it as convenient (Statement 5) and argued that parents drive children safely (Statement 31) and that they are not concerned about obesity (Statement 17).

Shared by 17.4% of the larger body of respondents, this was the most common perspective for Hispanic parents and for those who reported combined annual household incomes between \$12,000 and \$36,000. This perspective stands out because, unlike the larger population of respondents, it was evenly distributed among the four distances from the school and between the two dominant racial and ethnic groups.

This was among the least common perspectives for respondents who reported walking on nice days and for those who reported walking one way and driving the other. Proportions of this subgroup were also significantly lower than average for children traveling with siblings or friends (3.6%), for carpooling (3.6%), and for driving both directions (46.4%). It reported average proportions of parents dropping children off on the way to work (42.9%).

An appropriate intervention to address this perspective would be a walking buddy program to encourage students to travel with one or more friends in their neighborhood. Similar to a walking school bus, walking buddies would make students more visible to drivers at road crossings and would provide safety in numbers for students who

walk near adult strangers or other groups of young people. The walking buddy program should also provide defensive instruction to the students, helping them to first avoid but also respond appropriately to threatening social situations.

### SUMMARY AND CONCLUSIONS

Travel behavior research often uses statistical techniques that require large data sets and that aim to capture the central tendencies and behavioral influences of large populations or segments thereof. Those methods are effective for guiding large-scale interventions because they focus attention on the few key environmental factors that are strongly associated with travel behavioral trends and that might be manipulated through urban design or planning initiatives.

However, the same techniques may be less effective at guiding school-based active travel programs. Individual schools' enrollments are too diverse to narrowly focus intervention on central behavioral tendencies. Yet, they are too small to use traditional statistical methods of audience segmentation based on sociodemographic groupings. A research approach is needed that can target intervention to the diverse perceptions of the school commute that occur within individual schools.

The purpose of this study was to explore the use of Q technique for assessing perceptions of travel alternatives with small populations that planners might target for behavioral intervention. The main data collection tool for the study was a Q sort exercise composed of 36 statements about a wide range of issues relating to school travel. Q sorts completed by parents at Edison Elementary School were analyzed first by case-wise cluster analysis ( $n = 39$ ) and then by correlation with the larger respondent pool ( $n = 161$ ). Results indicated five core perspectives that guided the selection of several intervention approaches appropriate to the school's diverse community.

The intervention approaches recommended by this study primarily focus on improving perceptions of active school travel, with secondary attention to route safety. In that respect, the recommendations contrast with some active travel programs, which conflate intervention to encourage walking or biking with intervention to improve route safety. (For example, the Safe Routes to School programs emphasize improving route safety to encourage pedestrian activity.) This paper emphasizes that the two objectives (more active commuting and safer routes) are discrete while upholding the relevance of both types of intervention. The propensity-related focus of this study's recommendations reflects findings that in all but one core perspective parents agreed that there were already safe routes to walk or bike between their homes and the school. Despite the opportunity to walk safely, many parents chose to drive children one or both ways to school.

Similar to the traditional large-scale quantitative active travel research, this study describes travel behavior in terms of an assortment of environmental and personal correlates. For example, both approaches acknowledge the possible influence of dangerous street crossings, strangers, and time constraints in parents' decisions about travel mode. However, in contrast to traditional research, this study emphasizes differences in the ways parents experience and prioritize those correlates and targets intervention based on those differences.

The intervention approaches could be applied independently or as part of a multifaceted active travel program. They should be administered broadly (by grade level or schoolwide) rather than targeting sociodemographic or geographic subgroups of the population. While certain core perspectives were favored by respondents living a certain distance from the school or from a certain racial or ethnic background or income level, they were not defined by those factors



per se. The broader application has two main advantages: overlapping intervention and public awareness.

First, although parents were assigned to the core perspective with which they correlated most strongly, most parents also correlated with other perspectives to a lesser degree. That suggests that while a single perspective-based intervention approach might resonate most strongly with the 15% to 25% of parents included in its subgroup, it would still affect other parents, overlapping the spheres of influence for each intervention.

Second, the study assumed that parents largely determined their children's travel mode for school trips. Because the research identified parents' perspectives of travel alternatives (as opposed to students' perspectives), activities and outcomes related to interventions would need to be directly observable by or reported to parents to affect their decisions about school travel. A broadly administered, multifaceted active travel program would be likely to gain the attention and participation of parents.

Q technique as described in this study provides a fine-grained assessment of travel behavior for small populations that may benefit small-scale behavioral interventions. To be clear, that does not mean the findings from this study may be generalized beyond the parents of Edison Elementary School. This study's findings are context sensitive, including the core perspectives and the suggested tailored intervention approaches. Rather, the technique for ascertaining those findings may be recommended for guiding behavioral intervention with other types of small populations. The technical difficulty (i.e., ensuring adequate response rates) and cost of the survey-style data collection and analysis procedure approximate other traditional research techniques. However, case-wise cluster analysis of the Q sorts provided rich profiles of core attitude groups within the small population that could guide active travel programs to target specific, relevant perspectives with appropriate intervention approaches.

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