Evaluating the Impact of Neighborhood Trail Development on Active Travel Behavior and Overall Physical Activity of Suburban Residents

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Many studies have examined the impact that the built environment has on physical activity. Much existing research posits that if communities will provide and improve active infrastructure such as trails, sidewalks, and bike lanes, people will become more physically active. However, most of these studies have used cross-sectional methods that have allowed them to establish correlations but not behavioral causality. In this pilot project, a longitudinal design is used to assess a trail construction impact on active travel behavior and overall physical activity among suburban residents. A sample of suburban residents in West Valley City, Utah, was surveyed both before and after the construction of a Class 1 trail in their neighborhood by means of a preliminary household survey, individual activity diaries completed at three preassigned time points (before and twice after the trail's construction), new-resident surveys, and a trail user's intercept survey. This intervention technique (the intercept survey) performed a more direct test of causality by looking at the same group of residents over time and analyzing whether individual changes in behavior occurred following the construction of the trail. The paper shows that trail neighborhood residents did not use the facility after it was built, new residents did not move to the neighborhood because of the trail, and users of the trail came from elsewhere. It also discusses trail amenities that appear to be the more desirable ones.

As overweight and obesity have become bigger issues in Americans' daily lives, they have been widely attributed to a lack of physical activity in today's society. A new vigor in research interest in this arena has led many professionals to claim that current lifestyle patterns, such as the reliance on personal vehicle use and existing land use patterns, have "engineered physical activity for nonexercise purposes out of many Americans' lives" (*1*).

Numerous studies about promotion of physical activity through active transportation have produced data focusing on key environmental variables and specific components of the built environment that act as promoters or deterrents to active travel (walking or bicycling). These have given researchers as well as planners and policy makers guidance when they are trying to incorporate more bicycle and pedestrian travel opportunities in their communities. Ultimately, much of the existing research posits that if communities will provide and improve active infrastructure such as trails, sidewalks, and bike lanes, people will become more physically active (*2*).

Although this assumption is made, few studies have been able to quantify the impact that the construction of new active infrastructure has on human behavior and physical activity levels, as they rely heavily on cross-sectional methodologies (*3–7*). Only two studies to date have attempted to identify behavioral change over time that can be attributed to the construction of active infrastructure (*8, 9*), but neither provides an analysis of behavioral change over time at the individual level, which would require the use of a disaggregate longitudinal design.

Additional research has focused on behavioral causality from a different angle, positing that individuals living in areas that support physical activity are more physically active than those living in areas that do not support physical activity. In an alternative hypothesis, individuals who are more physically active may prefer to live in areas that support physical activity, while individuals who have a low preference for physical activity may choose to live in areas that do not support physical activity (*10*). This potential for residential self-selection requires the simultaneous modeling of travel behavior and the choice of residential location because the physical environment may simply reinforce a preferred behavior rather than be the cause of it. Several studies provide strong evidence of self-selection (*11–13*), although their cross-sectional nature allows for determination of correlation but not causality. Only one study used quasi-longitudinal methods to control for the potential of self-selection (*14*).

Although cross-sectional data can show a difference in behavior at two time points, it does not identify whether individual changes have occurred, and, if so, why the changes occurred; these data also not allow reliable estimates of how change may occur in the future (*15*). Kitamura stated that "[b]ehavioral relationships identified based on cross-sectional observations would not represent behavioral changes over time. . . . [L]ongitudinal data and analysis are prerequisite for proper identification and prediction of behavior" (*16*). By establishing preliminary baseline data with regard to active travel behavior and physical activity, data can then be gathered over time to identify whether changes in behavior have occurred because of changes in the built environment rather than attempting to predict causality

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based on comparative data correlations. Additionally, the use of a longitudinal research design allows for a direct observation of residential choice through the study of travel behavior in the same group of residents both before and after an infrastructure change takes place and surveying individuals who move to the area after the change has occurred.

This research design is the first of its kind to use a tailored panel survey attached to an intervention to quantify the impact of the installation of a neighborhood trail. The key questions are these:

- Does the installation of a neighborhood trail in an area not currently recognized for widespread physical activity trigger a change in the travel behavior and physical activity levels of neighborhood residents?
- Will changes in physical activity be maintained, increase, or decrease over time?
- Do residents living in closer proximity to the trail exhibit different behavioral patterns than those living further away?
- Are new residents to the neighborhood drawn to that area due to the presence of the trail?

STUDY DESIGN

This research highlights residents of the Academy Park neighborhood in West Valley City, Utah, a suburban area within the Salt Lake City, Utah, metropolitan region, where, as in most suburban locations in the country, active modes are rarely chosen. This location is significant due to the existence of a 1-mi (1.6-km) section of an irrigation canal owned by the Salt Lake–Utah Canal Company that runs diagonally from the center left edge to the bottom right corner of the study area (Figure 1).

The Salt Lake–Utah Canal Company collaborated with Salt Lake County and West Valley City to construct a Class 1 trail (two-way multiuse trail separated from existing roads and sidewalks) on the existing canal right-of-way. The trail serves the public as both a transportation and recreation facility (Figure 1) and is adjacent to two major schools. Furthermore, this trail creates a 2.5-mi (4.025-km) loop connecting two existing sidewalks.

Data collection took place in four waves: a preliminary household questionnaire and three activity diary data collection waves that measured individual behavior. The initial wave took place in October 2006, with questions about household demographics as well as lifestyle and travel preferences. Activity Diary 1 (AD1) was completed before the trail's construction (February 2007); AD2 was completed immediately (within 1 month) following the trail's construction (October 2007), and AD3 was completed approximately 5 months after the trail's construction (February 2008). The Academy Park activity diary was loosely modeled after an extensively tested household activity diary (*17*), with modifications to fit the study (e.g., a single day measuring individuals 5 years and older). The Academy Park activity diary provided specific data on activity type, begin and end times, activity duration, interpersonal interactions (Did they participate in the activity with anyone?), whether travel was part of the activity, and if so, distance traveled and mode used. Use of an activity diary allowed for identification of physical activity accumulated through means other than transportation (e.g., exercise at home or elsewhere). To control for within-individual day-to-day variation, individuals were assigned to a prespecified day of the week for all activity diary waves.

The preliminary household questionnaire was completed by 290 households consisting of 796 individuals (identified through a spatially stratified sample of neighborhood residents living within 1 mi of the proposed trail). Of those households that participated in the questionnaire, 196 agreed to participate in the activity diary portion of the data collection. Of those 196 households, 80 (175 individuals) participated in AD1 (40.8%), 56 (144 individuals) in AD2 (28.6%), and 41 households (107 individuals) in AD3 (20.9%). Summary

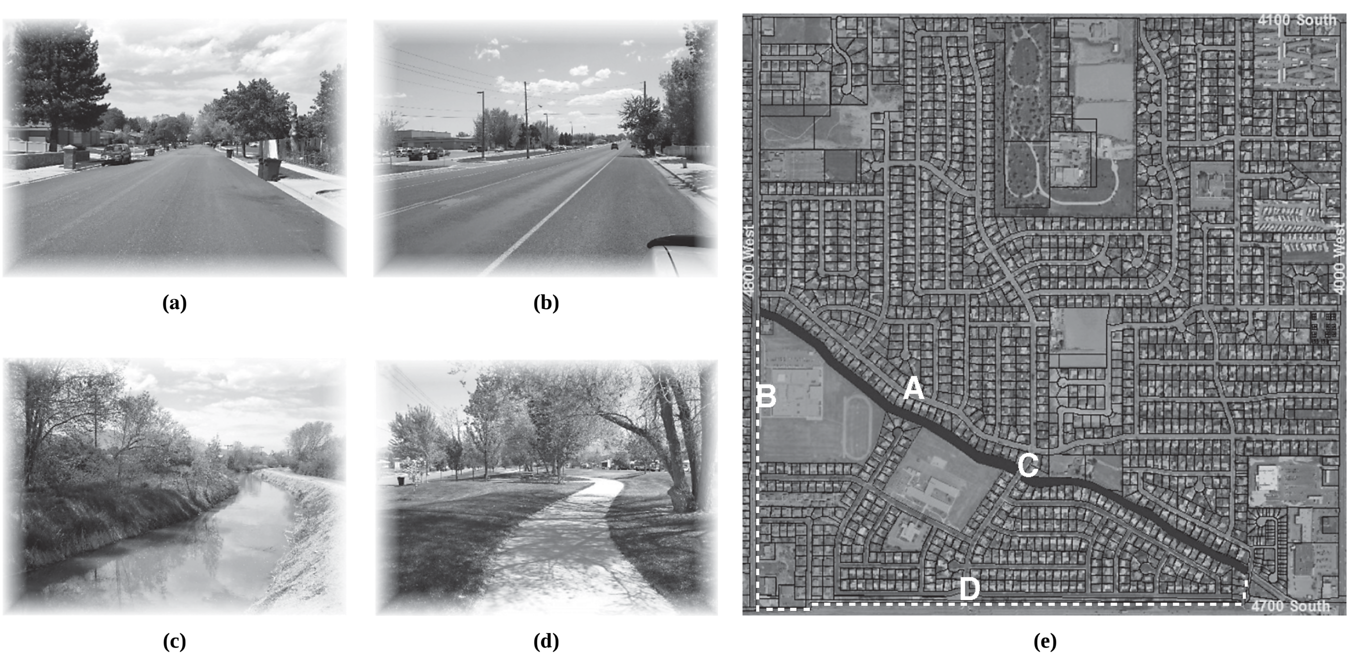

FIGURE 1 Canal trail right-of-way (solid line) and study area, with existing connecting sidewalks (dashed lines) at bottom and lower left of map: (*a*), (*b*), (*c*), and (*d*) show physical appearance of corresponding points on (*e*) map.

TABLE 1 Sample Characteristics for All Activity Diary Wave Respondents

Sample Characteristic	Study Sample (standard deviation)[a]	Academy Park Neighborhood[b]
Number of persons in the sample (age 5+)	82	11,790
Number of households in the sample	32	3,500
Percent of males in the sample	45.1	48.5
Number of persons per household	3.51	3.36
Mean age of respondents	47.77	Not available
% of persons age 5–12	12.5	17.8
% of persons age 13–15	1.3	
% of persons age 16–18	3.7	8.9
% of persons age 18+	82.5	66.3
% of persons 65–85	27.5	5.0
% of persons 85+	1.3	0.4
Number of cars per household	2.21	2.66
Number of bikes per household	2.06	Not available
% currently employed	47.6 62.5[c]	72.5
% possessing a driver's license	86.6	Not available
Total combined household income		
≤$40,000	37.8	41.2%
$40,001 to $80,000	43.9	41.7%
≥$80,001	18.3	17.1%

[a]Sample data gathered in 2006–2007.
[b]U.S. Census Bureau, 2000 (*18*).
[c]Rate for sample adults age 18–65.

characteristics for respondents who participated in all activity diary waves are shown in Table 1.

Concurrent with AD2 and AD3, a household questionnaire was sent to all new-resident households that had moved to the area after the construction of the Academy Park Trail. The new-resident questionnaire was identical to the initial household questionnaire completed by historic residents before the activity diaries but also included questions about residential location decision making and specific characteristics that drew them to this neighborhood. Of the 206 new-resident households contacted concurrent with AD2 and AD3, 32 households (117 individuals) completed new-resident surveys (15.5%).

FINDINGS

The analysis here is a summary of the extensive analysis reported in Burbidge (*19*).

Behavioral Change over Time

The central aspect of this research is the identification of the impact of the trail construction on total physical activity and active travel behavior. An analysis of trip-making behavior shows that individuals participated in the largest percentage of trips for work, followed by errands (and to return home from prior trips). Visiting, dining, and traveling to another mode resulted in the fewest number of trips. Table 2 shows that between AD1 and AD2 there was a decrease in the percentage of total trips related to work, school, and recreation, while there was an increase in the percentage of total trips related to errands, visiting, and traveling to another mode. From AD2 to AD3, there was an increase in work, shopping, escorting, appointment, and recreation trips and a decrease in trips for exercise, visiting, dining, religious services, and returning home. There was very little change in trips for school or traveling to another mode.

These data show the same pattern described above that alludes to some level of seasonal variation. AD1 and AD3 show relatively similar patterns with regard to behavior, while AD2 shows an up- or

TABLE 2 Mean Trip-Making Behavior by Activity Type

Activity Type	AD1	AD2	AD3
Work	18.3	12.3	14.5
Exercise	6.4	7.1	3.1
Errands	8.8	12.7	10.1
Visiting	2.4	5.6	2.3
Escorting	5.7	4.0	5.7
School	8.6	3.6	3.9
Shopping	7.3	3.8	5.2
Dining	3.7	3.3	2.3
Appointment	3.7	4.5	9.6
Traveling to another mode	0.7	1.4	1.6
Other recreation	7.0	2.7	3.4
Religious services	1.6	1.3	0.3
Returning home	25.6	37.7	27.9
Mode Choice			
Automobile	81.4%	86.1%	87.3%
Transit	4.4%	2.2%	2.3%
Walk	13.7%	11.1%	9.9%
Bike	0.6%	0.7%	0.5%

NOTE: Numbers represent percentage of total trips by each trip type or transportation mode.

TABLE 3 Mean Trip Duration by Activity Type

Trip Type	AD1	AD2	AD3
Work	36.27 (40.11)	29.66 (26.78)	28.16 (25.61)
Exercise	54.86 (41.19)	41.28 (32.19)	57.08 (22.61)
Errands	26.44 (31.74)	29.07 (30.87)	37.54 (49.22)
Visiting	30.15 (29.37)	24.77 (32.21)	18.00 (9.91)
Escorting	38.52 (40.21)	35.59 (50.65)	27.55 (33.79)
School	16.22 (10.84)	17.40 (9.21)	13.87 (8.17)
Shopping	61.25 (66.37)	70.48 (88.33)	29.80 (24.30)
Dining	48.26 (16.77)	44.72 (29.83)	14.22 (7.45)
Appointment	40.10 (41.04)	35.80 (28.09)	18.24 (13.19)
Traveling to another mode	28.75 (6.29)	25.00 (13.36)	21.67 (14.72)
Other recreation	93.55 (72.33)	102.67 (157.23)	23.08 (30.18)
Religious services	6.88 (6.97)	7.86 (5.67)	5.00 (0.00)
Returning home	23.66 (24.74)	23.14 (21.56)	29.52 (63.08)
All trips	29.49 (37.04)	31.43 (42.90)	28.17 (35.37)

NOTE: Numbers represent mean trip length in minutes (standard deviation in parentheses).

downturn in the number of trips taken for specific purposes. Trips for exercise are more frequent in the summer than in the winter, while work, escorting, and shopping trips are more prevalent in the winter. Table 2 also shows mode choice by wave with the automobile at over 80% per wave. Between AD1 and AD2 and again between AD2 and AD3, the automobile mode share increased while walking decreased and transit and bicycle use remained nearly the same. These data clearly show that the active mode choice was on the decline in this sample as time passed.

The average duration for all trips was around 30 min for all waves (Table 3), confirming Janelle's assumptions about travel time thresholds (*20*). Work trips were generally near the sample mean, at about 30 min long, comparable to trips for errands, visiting, and escorting someone. This time threshold was exceeded for traveling to other nonexercise recreation (with the exception of AD3), which would be expected because of the large recreational draw of the nearby Wasatch Mountains (skiing, mountain biking, hiking, fishing), approximately a 60-min drive from the study area. For the first two activity diary waves, shopping trips, dining trips, and appointments also took a bit longer than average, but in AD3 these trips were cut relatively short, as were recreation trips. It is unknown why this change in duration occurred. The shortest trips were for religious purposes and traveling to school. This was also expected because school districts are arranged geographically, with students assigned to local schools that are generally near their homes. In addition, the majority of residents in the study area who attend religious services noted attending a local community church.

Next, a preliminary comparison of means was conducted to identify whether any preliminary differences existed between the before-trail total physical activity (time and episodes) and active trips (walking and bicycling) and after-trail behaviors. Table 4 shows that the *t*-test revealed no significant change between AD1 and AD2 at the .05 level. However, the analysis of means between AD1 and AD3 showed that there was a significant decrease in both the number of physical activity episodes and the total number of walking trips taken. These results imply that the trail did not have a positive impact on active travel behavior. The change in behavior did not appear immediately (during AD2), but a significant decrease in total physical activity episodes and walking trips appeared 5 months after construction, during AD3, exactly the opposite outcome desired by construction of a trail.

To study in more depth the measured decrease in physical activity and the implied noneffect of the trail and while controlling for other exogenous factors, a fixed-effects panel analysis regression was conducted on active trip making and physical activity covariates to incorporate the time effect (AD1, AD2, and AD3) and the treatment effect (presence of the trail in AD2 and AD3) into analysis of individual behavior change.

The panel regression model is schematically $y_{it} = x_{it}\beta_t + c_i + u_{it}$, ($t = 1, 2, \ldots, T$), where y is a behavior indicator, x represents covariate i at time t, β is the regression coefficient, c encompasses the time constant unobserved effect, and u includes the random error terms (*21*). The fixed-effects estimator makes the longitudinal analysis more robust than the traditional means analysis and *t*-test by looking at individuals, which allows for the identification of causality. The

TABLE 4 Change in Active Trips and Physical Activity, Mean Test

AD1 versus AD2	AD1	AD2	*t*-Statistic	*p*-Value
Total physical activity (episodes)	0.86 (1.14)	0.74 (1.19)	–0.899	.370
Total physical activity (minutes)	29.75 (40.00)	35.70 (60.61)	0.944	.347
Total walking trips	0.59 (0.99)	0.50 (1.16)	–0.763	.447
Total biking trips	0.03 (0.26)	0.03 (0.22)	–0.000	1.000
AD1 versus AD3				
Total physical activity (episodes)	0.90 (1.17)	0.65 (0.96)	–2.126	.036
Total physical activity (minutes)	32.48 (44.64)	30.65 (50.49)	–0.330	.742
Total walking trips	0.64 (0.98)	0.38 (0.89)	–2.710	.008
Total biking trips	0.00 (0.00)	0.01 (0.10)	1.00	.320

NOTE: Number of cases: AD1–AD2 = 144; AD1–AD3 = 98.

TABLE 5 Change in Active Trips and Physical Activity, Panel Analysis

	Coefficients	*t*-Value	*p*-Value	*R*-Square
AD1–AD2				
Total physical activity (episodes)	–0.052	–0.45	0.655	.001
Total physical activity (minutes)	8.806	1.53	0.129	.008
Total walking trips	–0.059	–0.55	0.581	.001
Total biking trips	–4.14 E-18	–0.00	1.000	.000
AD1–AD3				
Total physical activity (episodes)	–0.245	–2.13	0.036	.045
Total physical activity (minutes)	–1.826	–0.33	0.742	.001
Total walking trips	–0.265	–2.71	0.008	.070
Total biking trips	0.010	1.00	0.320	.010

NOTE: Number of cases: AD1–AD2 = 144; AD1–AD3 = 98.

model is in essence a test of change in the dependent variable while at the same time accounting for other factors that may have changed between the two time points analyzed.

As Table 5 shows, the panel analysis also revealed that the installation of the trail had no significant impact on active travel behavior or physical activity in the sample in the short term (from AD1 to AD2), and between AD1 and AD3, there was a significant decrease in the total number of physical activity episodes as well as a significant reduction in the number of walking trips taken. The variables included in this analysis did not reveal conclusive evidence about why this significant decrease took place, and it is suggested that future research include additional exogenous variables (attitudinal or behavioral) to attempt to explain the reason for such a decline in active trip making and physical activity.

By controlling for age, sex, household income, driver's license possession, number of children in the household, number of household cars, residential distance from the trail, employment status, completion day, and seasonal variation (precipitation and outside temperature) within the model, this analysis determined that individuals between the ages of 18 and 64 significantly increased their total number of physical activity episodes between AD1 and AD3 ($\beta = 0.56$, $p = .024$). Because prior research has shown that the young (<18 years) and the old (>65 years) are the most likely to participate in physical activity (*22*) and active transportation (*23, 24*), this finding may be considered noteworthy.

Impact of Residential Proximity

Through use of a Poisson regression model, the impact of residential proximity to the trail (in feet) on total physical activity episodes was also examined. In AD3 (5 months following construction), proximity to the trail had no significant effect on total physical activity episodes. When the control variables were taken into account, day of the week proved significant for all included days, which suggests that the likelihood of participating in physical activity episodes is higher on Monday through Saturday than on Sunday (Table 6).

Furthermore, a Poisson regression model was run on residential proximity (in feet) for total walking trips. Residential proximity was not significant in determining physical activity events (Table 7).

When the data were controlled for distance, employment status and completion day were significant. Individuals who were currently employed and individuals who completed their diary on Wednesday were more likely to participate in walking trips than the remainder of the sample. In addition, the fact that only two bicycle trips were observed in the sample prevented analysis of bicycle trips.

Additional regression models were run by using categorical (dummy) variables for residential proximity, potentially allowing for greater accuracy. These categories identified residential proximity as less than ¼ mi (0.4 km), between ¼ and ½ mi (0.4 and 0.8 km), between ½ and ¾ mi (0.8 and 1.2 km) and more than ¾ mi (1.2 km). The only significant correlation revealed that households ½ to ¾ mi

TABLE 6 Impact of Residential Proximity on Physical Activity Episodes in AD3

	AD3-Total Physical Activity (episodes)		
	Coefficients	*z*-Statistic	*p*-Value
Proximity to trail	0.000	1.15	.251
Young (5–17)[a]	0.026	0.03	.0975
Middle (18–64)[a]	0.033	0.10	.923
Male	0.144	0.46	.646
# children	–0.919	–0.75	.454
HH income	–0.016	–0.34	.737
License[a]	–0.985	–1.10	.272
One car[a]	0.946	0.77	.443
Two cars[a]	1.225	1.05	.295
Three+ cars[a]	1.25	1.09	.275
Employment[a]	0.448	1.43	.153
AD Monday[a]	14.310	16.08	.000
AD Tuesday[a]	13.796	12.90	.000
AD Wednesday[a]	14.002	14.24	.000
AD Thursday[a]	14.356	16.38	.000
AD Friday[a]	14.438	16.34	.000
AD Saturday[a]	13.382	13.47	.000
_Constant	–15.453	–8.22	.000

NOTE: Age 65+, zero cars, and completion on Sunday, used as reference categories. Number of cases: 107; Pseudo $R^2 = .076$.
[a]Variable = 1 if person fits in the category; 0 otherwise.

TABLE 7 Impact of Residential Proximity on Walking Trips in AD3

	AD3-Total Walking Trips		
	Coefficient	*z*-Statistic	*p*-Value
Proximity to trail	−4.14 E-07	−0.00	.998
Young (5–17)[a]	−16.702	−0.00	.996
Middle (18–64)[a]	−0.048	−0.09	.929
Male[a]	−0.156	−0.45	.650
# children	−0.157	−0.98	.327
HH income	−0.088	−1.14	.256
License[a]	−18.531	−0.01	.996
One car[a]	−15.613	−0.00	.998
Two cars[a]	−.429	0.87	.385
Three+ cars[a]	−.163	0.38	.705
Employment[a]	1.173	2.46	.014
AD Monday[a]	−0.554	−0.51	.612
AD Tuesday[a]	0.444	0.84	.400
AD Wednesday[a]	1.014	2.12	.034
AD Thursday[a]	0.680	1.13	.260
AD Friday[a]	−17.016	−0.01	.996
AD Saturday[a]	−17.413	−0.00	.998
_Constant	16.781	0.00	.996

NOTE: Age 65+, three+ cars, and completion on Monday used as reference categories. Number of cases: 107; R^2 = .201.
[a]Variable = 1 if person fits in the category; 0 otherwise.

(0.8 to 1.2 km) from the trail participated in significantly fewer minutes of physical activity (nearly 45) than the remainder of the sample. The explanatory variables included in the models could not fully account for why this may be the case, but prior research has shown that a threshold of "active travel" exists at approximately ¼ mi (0.4 km) for walking (*22*). This finding would explain why this group of individuals was less likely to participate in walking trips. This same evidence also shows the likelihood that individuals living more than ¾ mi (1.2 km) from the trail did not exhibit a significant change in behavior because they may not have lived sufficiently close to the trail for it to have an effect.

Several demographic variables proved to be significantly correlated to physical activity and total walking trips in AD3. Completion day was significantly correlated to total physical activity (episodes and time) and walking trips, with individuals who completed their diary on a weekday reporting more physical activity than those who completed their diary on a weekend (especially Sunday). Individuals who were currently employed reported more physical activity episodes and walking trips than the remainder of the sample. When the data were controlled for distance, young individuals (ages 5 to 17), licensed drivers, and members of households with one or more vehicles were significantly likely to participate in walking trips.

New Residents

When new residents (those who moved to the area after the trail's construction) were compared with historic residents (those surveyed living in the area before the trail's construction), it was immediately evident that they differed greatly. New residents were younger, from larger, middle-income families. Nearly one in five new residents (18.8%) was under the age of 5, and nearly 35% were under age 12.

TABLE 8 Sample Characteristics of Historic Versus New Residents

Sample Characteristic	Historic Residents	New Residents
Number of persons in the sample (age 5+)	181	117
Number of households in the sample	80	32
Number of persons per household	3.66	3.66
% of persons under age 5	7.4	18.8
% of persons age 5–12	13.0	15.4
% of persons age 13–15	3.2	2.6
% of persons age 16–18	2.3	4.3
% of persons age 18+	74.1	56.4
Number of cars per household	2.53	2.47
Number of bikes per household	2.01	1.65
Total combined household income		
≤$40,000	28.1%	13.7%
$40,001 to $80,000	41.7%	81.2%
≥$80,001	19.1%	5.1%
Mean length of tenure in current residence	12–15 years	6–9 months

A quite small percentage of new residents were teenagers (less than 10%), and barely over half of new residents were adults (Table 8). These data are likely due to neighborhood turnover in which young families were moving into an area where a majority of historic residents had already raised their children to adulthood. This point is further supported by the recognition that the mean duration of tenure in a current residence for historic residents is 12 to 15 years and only 6 to 9 months for new residents. Rates of ownership for vehicles per household were relatively comparable, but new-resident households owned fewer bicycles. Commonalities were also found in motivating factors for choosing this location for a residence. Table 9 shows that the major motivations for moving to the area were similar for historic and new residents. Housing affordability, proximity to work, and

TABLE 9 Motivation for Choosing Residential Location

I Chose My Residence. . . .	Historic Residents (%)	New Residents (%)
Because it was affordable	82.7	69.2
To be close to work	34.6	30.8
To be close to friends or family	32.7	28.2
For the safe neighborhood	28.8	13.7
As a good environment for kids	25.0	14.5
Because I grew up in the area	21.2	19.7
To be close to shopping	17.3	6.0
For good access to transportation	5.8	15.4
To be closer to other amenities	5.8	10.3
For another reason	0.0	1.7

proximity to friends and family were the top three contributors for both groups (in that order).

Perception of accessibility and amenities was more positive for new than historic residents, and perception of affordability was higher among the historic residents. New residents noted access to transportation as more important than proximity to shopping, finding a good environment for children, or neighborhood safety. This finding is rather ironic when one considers that new residents have younger households and more children than historic residents. Other amenities (i.e., trails, parks, and open space) were more important to new residents than historic residents as well. More than 80% of new-resident households moved to the location from a prior residence less than 5 mi (8.05 km) away, and 30% relocated to the Academy Park neighborhood from within West Valley City. These results suggest that location familiarity may have been a big (although unrecognized) factor in choosing this new residential location.

When asked about walking behavior, nearly two-thirds of respondents from new-resident households stated that "the safety of their neighborhood impacts the amount of walking they do" (compared with one-quarter of historic residents), and 40% of new residents claimed that they "would walk more if they lived in a different neighborhood" (compared with 26.4% of historic residents). These findings suggest that (*a*) they do not feel that the current neighborhood promotes walking and (*b*) they did not choose this location on the basis of walking environments. For context, the reader is reminded that this survey of both new and historic residents was conducted after the trail's construction was complete.

Trail Users

The lack of positive significance in the change of physical activity and trip making, plus the lack of evidence that new residents were drawn to the neighborhood because of the trail, raises additional questions that were not originally expected at the design stage of this research. This made it highly important to identify other exogenous factors that may inhibit local residents from using the new trail. It was determined that the best way to acquire such information was to survey trail users directly. To gain information from trail users, an intercept survey was used. A convenience sample was employed for two separate 4-h periods per day, on two days of the week (Wednesday and Saturday) to intercept individuals using the trail and to invite them to answer a small number of questions about both demographics and information on their trail usage. The trail intercept survey yielded responses from 31 of the 43 total users (72.1%).

An analysis of survey responses from trail users showed that they were walkers (71%), bicyclers (16.1%) and joggers–runners (12.9%). Of the individuals surveyed, the mean usage rate of the trail was between two and three times per week (2.74). The mean residential distance from the trail for all trail users was 1.75 mi (2.82 km). Although this distance is within walking–biking distance for many, it may not be considered as such for a large percentage of individuals. Trail users who participated in walking lived closer [1.22 mi (1.95 km)] than those who biked [1.75 mi (2.82 km)]. Runners lived the farthest from the trail [4.62 mi (7.44 km)], which suggests that they used the trail as just one portion of a much longer running route. Trail users were overwhelmingly accessing the trail by an active mode of transportation (93.5% walking–jogging or bicycling), and only a small percentage of users reported accessing the trail by automobile (6.5%). No users reported accessing the trail by transit.

A second key factor used to analyze trail users' responses was whether they were actively engaged in their chosen activity before the trail's construction, and if they did previously participate in this activity, where they participated. Approximately 87% of trail users reported participating in the same type of activity before the trail's construction. The most frequent location for participation before construction was on local sidewalks (62.9%), local streets (18.5%), or on another trail (18.5%). These findings confirm prior research showing that people are most likely to participate in physical activity on neighborhood streets, sidewalks, or trails (*25*). They also show that this trail is merely a convenience for the majority of users, as only 13% reported not participating in this type of physical activity before the trail's construction.

Last, by asking trail users about their likes and dislikes about this trail, the study attempted to create a clearer picture of potential benefits or problems associated with the newly constructed trail, information that may also shed some light on why a larger percentage of residents had not chosen to use the trail for physical activity. A qualitative analysis of the pros and cons offered by trail users revealed that the most positive aspects of the trail included its newness or "novelty factor" (32.3%), cleanliness (26%), width (19.4%), proximity to residence (9.7%), and lack of crowds (9.7%). In contrast, the most negative aspects of the trail included lack of amenities such as benches, lighting, and signage (32.2%), lack of distance or length ["too short" (22.6%)], and lack of connectivity to other destinations (9.7%). If this small sample of trail users reported these as weaknesses of the trail, it is highly likely that a larger number of local residents felt the same way. However, for non-trail-using residents, these factors may be sufficiently critical to discourage completely their use of the trail.

CONCLUSIONS

This analysis shows that, in this case, the construction of a trail in a suburban neighborhood setting did not have a significant positive impact on the active travel behavior or physical activity levels of neighborhood residents in the short term. The mean test and panel analyses both show that construction of the trail was correlated to active transportation and physical activity, but the correlation was significantly opposite of expectations.

In addition, residential proximity to the local trail had rather limited correlation to total physical activity and active travel behavior. There was no significance in an analysis of the continuous-distance variable, and a categorical analysis revealed that only households within ½ to ¾ mi of the trail participated in significantly fewer minutes of physical activity (nearly 45) than the remainder of the sample.

Several demographic variables proved to be significantly correlated to physical activity and total walking trips after the trail's construction, including day of the week, employment, age, possession of a driver's license, and number of household vehicles. Although overall sample as a whole did not, adults age 18 to 64 showed a significant increase in physical activity episodes over the measured period. This result suggests that perhaps building the trail did not affect those who, as research has shown, are predisposed to participate in physical activity (the very young or very old); but the trail's construction may have affected individuals who were less likely to participate in physical activity and active travel behaviors in the first place. This evidence may prove promising if in fact there is an isolated impact on those who may need physical activity the most. However, this segment of the population showed only an increase in overall physical activity episodes, not specifically in walking or biking, indicating that they may not have used the trail infrastructure.

It is highly unlikely that new residents were drawn to this neighborhood by the new walking–biking trail. New residents were in large, young, middle-income families that moved to this location for much the same reasons as their historic counterparts—primarily housing affordability and proximity to employment or friends and family. They reported the importance of access to transportation and other amenities (i.e., trails, parks, and open space) at a higher rate than historic residents but also viewed their neighborhood as less safe than historic residents and reported that they would be more likely to walk if they lived in a different neighborhood.

The trail intercept survey revealed that, although the mean residential distance from the trail for all trail users was within walking–biking distance for many [1.75 mi (2.82 km)], it may not have been considered as such for a large percentage of individuals. This information also suggests that future studies should include a larger geographic catchment area when intervention analyses of this type are being conducted. The follow-up with trail users suggests that the trail did not result in an increase in physical activity participation for the majority of them; it simply changed the location of that participation. This data also confirmed the finding that the trail's construction did not produce a significant increase in active travel behavior or physical activity, and in fact the contrary was established.

Although approximately 63.1% of this sample's respondents stated that "an increase in neighborhood trails would be a positive thing," these results suggest that this specific trail must not have possessed all the necessary characteristics to induce a behavioral change (suggested by the trail users' intercept survey). A lack of information may also be affecting the trail's usage. There is a 2.5-mi (4.025-km) loop created by the trail and adjoining sidewalks (Figure 1), but a lack of adequate signage delineating the existence of this loop may be limiting the trail's effectiveness. In addition, this trail segment, although part of a large network of infrastructure, was only 1 mi (1.6 km) long. Perhaps a longer segment would be necessary for direct impact on physical activity or creation of a larger behavioral change. In addition to being a concern raised by trail users, the necessity of "destinations" to promote active transportation has been expressed in prior studies (*26, 27*). This location may not be close enough to adequate destinations (i.e., shopping, parks, etc.) to promote physically active transportation.

Although some of the findings of this research run counter to the original hypotheses that in turn were based on the literature, a trail does indeed have a place as a part of the overall urban structure. This research simply shows that trails should not be constructed merely to provide the supply needed by an imagined demand for physical activity but rather should be incorporated into the overall design of a community as one component of a multimodal transportation and recreation system. Care should be taken to design the trail to include appropriate characteristics, discussed earlier and, according to current urban design best practices, to account for the needs of residents. Simply installing a generic-trail paved path where there was not one before is not enough to induce demand for physical activity among an entire local population when that physical activity does not fit the lifestyle and the everyday behavior patterns of the people residing in the area.

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