

**'23 minutes is walking distance, unless...': Factors reducing walking time thresholds of Twitter users**

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**Introduction**

When discussing destinations, time is more often and colloquially used as a measurement than distance for efficiently planning activities. For example, if an individual plans to arrive at work on time, they might more often consider their '30-minute commute' than their '15-kilometer commute'. However, the perception of walking time can differ greatly among individuals and can be influenced by various factors. Similarly, these perceptions might change during pleasant weather with a flat terrain instead of hot, humid, or hilly conditions. Therefore, by analyzing the public discussion of a 23-minute walking threshold, different factors improving or diminishing opinions toward walking can be determined. As a result, the circumstances or attitudes contributing to the choice of another mode or of foregoing a trip entirely can be better understood, providing an indication of where urban planners or transportation managers with a goal of encouraging walking and shifting behavior away from short motorized trips (for example, within the x-minute city) can focus.

**Data and Methods**

On 28 March 2022, a London-based Twitter user posed the question, 'Do you guys consider 23 minutes a walking distance?', which garnered a response of 11,905 replies. Replies subsided on 10 June and were retrieved on 7 July using the Twitter Developer Portal. The final dataset consists of 4,970 replies, of which 3,238 (65.2%) include elaborated text to be used for thematic analysis. The remaining 1,732 (34.8%) responses were simple positive, negative, or neutral answers that were not possible to include in thematic analysis, but were included in the subsequent semantic analysis using the Azure Machine Learning (AML Team) add-on in Microsoft Excel. Subsequently, ANOVA mean-comparison tests were employed to investigate whether the mean polarity scores of tweets belonging to each theme was positive, negative, or neutral compared to tweets not belonging to the theme.

**Results**

Respondents either agreed (63.3%) that 23 minutes was a walkable distance, were impartial (23.9%) or disagreed (12.8%). Twenty-seven themes were identified as aspects related to perceptions of walking time, categorized into four groups: External factors, Circumstantial factors, Subjective factors, and Accessibility factors (Table 1). Overall, the sentiment toward 23 minutes being walkable was positive (mean = 0.547). Mean polarity scores lower than the sample mean indicate that tweets mentioning a given theme had a more negative sentiment.

Table 1: ANOVA tests investigating polarity scores of tweets mentioning each theme, with frequency, % frequency, mean score, and significance (Bold = significance at p<0,05 level)

Sample mean = 0.547		% Freq.	Mean Pol. Score	<i>p</i>
External	Weather conditions	<b>0,12</b>	<b>0,497</b>	<b>&lt;0,001</b>
	Planning design & diversity elements	<b>0,05</b>	<b>0,469</b>	<b>&lt;0,001</b>
	Topography, environment, & shade	0,04	0,517	0,100
	Crime concerns	<b>0,03</b>	<b>0,458</b>	<b>&lt;0,001</b>
	Urbanization	0,03	0,529	0,369

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	Traffic safety, noise, & pollution	<b>0,02</b>	<b>0,431</b>	<b>&lt;0,001</b>
	Planning policy	0,02	0,547	0,996
Circumstantial	Route familiarity & regularity	<b>0,10</b>	<b>0,373</b>	<b>&lt;0,001</b>
	Time pressure	<b>0,06</b>	<b>0,469</b>	<b>&lt;0,001</b>
	Trip purpose	<b>0,05</b>	<b>0,462</b>	<b>&lt;0,001</b>
	City-contingent	<b>0,05</b>	<b>0,497</b>	<b>0,002</b>
	Accompanying others	<b>0,03</b>	<b>0,444</b>	<b>&lt;0,001</b>
	Carrying objects	<b>0,02</b>	<b>0,378</b>	<b>&lt;0,001</b>
	Preparation	<b>0,02</b>	<b>0,484</b>	<b>0,020</b>
	Intoxication level	0,00	0,575	0,624
Subjective	Culture & norms	0,04	0,520	0,098
	Subjective well-being	<b>0,03</b>	<b>0,486</b>	<b>0,002</b>
	Behavioral goals	<b>0,02</b>	<b>0,468</b>	<b>0,002</b>
	Health	<b>0,02</b>	<b>0,478</b>	<b>0,010</b>
	Exploration & experience	0,01	0,502	0,126
	Listening & playing	0,01	0,599	0,079
Accessibility	Mode options & parking	<b>0,06</b>	<b>0,415</b>	<b>&lt;0,001</b>
	Unable to walk	<b>0,06</b>	<b>0,405</b>	<b>&lt;0,001</b>
	Ease of activity	0,06	0,559	0,400
	Distance & pace	<b>0,02</b>	<b>0,608</b>	<b>0,009</b>
	Age	<b>0,01</b>	<b>0,445</b>	<b>0,002</b>
	Saves money	<b>0,01</b>	<b>0,431</b>	<b>0,005</b>

## Conclusion

While there was an overall tendency to agree that 23 minutes is walking distance, the large number of factors negatively associated with this threshold may indicate that 23 minutes may be reaching the upper limit for many. While walkability is largely understood through variables measuring design, diversity, density, destination accessibility, and distance to transport, this study provides evidence that the choice to walk is further related to a number of additional external, circumstantial, subjective, and accessibility factors. Improving walking conditions with an emphasis on these factors may be influential in changing travel behavior to encouraging walking and discouraging motorized vehicle use for short trips, potentially contributing to more active, equitable, and sustainable cities.