

Wait time, travel time and waiting during travel: existing research and future directions

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Wait time, travel time, and waiting during travel are closely related time uses that often overlap in how they are perceived, viewed, and/or valued. Studying these time uses is critical within a transport context because they can define or influence the experience of the overall trip. In this editorial, we synthesise major themes, and identify avenues for future research, a key one being the bi-directional relationship between travel and the duration and experience of the activity at the destination.

1. Parallels between the utilities of wait time, travel time, and waiting during travel

Waiting is an inevitable part of life. We often wait, for instance, for someone to arrive, for a favourite TV show to start or at the doctor's office. We wait for a certain activity to happen. Hence, waiting is a derived demand. Waiting time is frequently perceived as wasted time but can also be viewed by some as a welcome window of time that serves as a buffer between activities. Research shows that how long we are willing to wait depends on the activity (or person) for which (or whom) we are waiting for. Web users' tolerable waiting time for information retrieval, for instance, is approximately 2 seconds (Nah, 2004), while the acceptable waiting time for a doctor's appointment is around 23 minutes (Pruyn & Smidts, 1998).

Similar to wait time, travel time is also a derived demand (*most*, though not *all*, of the time), i.e., the time we need to reach out-of-home activities; and as such, is seen as time to minimise. However, studies asking for people's ideal commute time do not find an ideal commute of 0 minutes, but mostly between 10 and 25 minutes (e.g., Redmond & Mokhtarian, 2001; Ye et al., 2020). This indicates that travel time has a certain positive utility. People might enjoy certain aspects of travel (e.g., sensation of speed, exposure to the environment) or can use travel time to escape from obligations, to adjust and alter between places (e.g., as a transition between work and home), or use it to perform certain productive, social or entertaining activities (Jain & Lyons, 2008; Mokhtarian & Salomon, 2001). However, this positive utility of travel disappears when travel durations exceed maximum acceptable or tolerable travel times, which were found to be around 30 to 45 minutes for commuting (Ermagun et al., 2022; Humagain & Singleton, 2021; Milakis et al., 2015).

Waiting during travel – e.g., waiting for a bus or train to arrive, waiting in a traffic jam, or waiting for a traffic/pedestrian crossing light – is closely related to the prior time uses, i.e., wait time and travel time, but has unique attributes that make it worthy of being studied in its own right. In parallel to the previously discussed findings, waiting during travel can have both positive and negative utility. Studies show that there is a cost threshold above which people do not necessarily want to minimise waiting during travel. Hess et al. (2004) found that most people would prefer to wait five minutes for a free bus than pay \$0.75 to travel right away, while studies focusing on High Occupancy/Toll (HOT) lanes

indicate that most drivers are not willing to pay for a congestion-free lane (Brownstone et al., 2003). Due to the derived demands of wait time, travel time and waiting during travel, the perceived waiting/travel time has been found to exceed the actual waiting/travel time, both in travel and non-travel contexts (Fan et al., 2016; Meng et al., 2018; Pruyn & Smidts, 1998).

As already alluded to, subsets of wait and travel times are pursued for their own sake, i.e., not always a derived demand. For instance, people may go fishing and wait for hours without catching any fish. In this case, waiting can be regarded as a (recreational) activity. Fishers may enjoy the scenic beauty, the exposure to the environment or just use the waiting time to reflect on aspects of their life. Similarly, people may not always travel to reach out-of-home activities, but may travel for its own sake, without reaching a destination. These undirected trips, such as recreational walking, cycling and jogging, are done because of certain positive aspects they provide, such as physical activity, the sensation of speed, and the enjoyment of the outdoor environment (Mokhtarian & Salomon, 2001). In these cases, travel has become the activity and people may not necessarily want to limit its time. Hook et al. (2021, 2022) found that the average duration of these undirected trips is no less than 71 minutes, that trip duration positively affects trip satisfaction and that people are considerably more satisfied with these trips compared to directed trips (e.g., to work or leisure activities).

2. Perceptions and experiences of wait time, travel time, and waiting during travel

How wait time, travel time and waiting during travel are *perceived* and *experienced* are strongly affected by whether this time is *equipped* or *expected* (Mishra, 2015; Shaw et al., 2021). Note as well that these are related, as perceptions of time use can influence the experience of the time windows discussed, while expectations that wait time will occur can increase the probability of being equipped.

2.1 Equipped time use

Being equipped refers to having tools that can be used to pass the time. For instance, watching TV in the waiting room of a hospital, or the presence of amenities at public transport stops (e.g., benches and shelters) can reduce perceived waiting times (Fan et al., 2016; Pruyn & Smidts, 1998). Similarly, performing certain activities while using public transport, such as entertainment-related activities (e.g., watching videos, listening to music, reading a book), social activities (e.g., making phone calls), or productive activities (e.g., working, studying) may affect perceived travel times. In addition, activities which do not require being equipped with tools (e.g., sleeping, resting, gazing out of the window), may also have their effects. However, the influence of multitasking (performing activities while travelling) on perceived travel time has not been explored adequately (Cornet et al., 2022).

Equipped time may also affect the experience, utility, and satisfaction levels for wait time and travel time, although results are mixed. The TV in the waiting room of a hospital did not affect the experience of waiting (Pruyn & Smidts, 1998), while performing activities (e.g., reading, talking to others, and using a smartphone) while waiting for a bus lowered irritation levels in a Japanese study (Ohmori et al., 2004). Activities performed during travel may also impact travel satisfaction. While Ettema et al. (2012) found that talking to other passengers positively affects satisfaction with public transport, and entertaining and relaxing activities lead to lower satisfaction levels, Wang and Loo (2019) found that the use of mobile Information and Communications Technology (ICT) devices has a positive effect on travel satisfaction of high-speed rail passengers. Further supporting these findings is a large and growing body of literature that has shown positive (and, less frequent but still present, negative) impacts of multitasking on the utility of travel time (Malokin et al., 2019; Shaw et al., 2019).

2.2 Expectations around occurrence and time duration

Waiting time being (un)expected, e.g., because of (a lack of) adequate waiting time information, also affects the perceived waiting time (Antonides et al., 2002). Elements such as traffic congestion and public transport service disruptions may result in unexpected waiting during travel and travel time uncertainty. Psychological and behavioural theories alongside empirical research confirm that mechanisms like advance notice and real time information can improve wait and travel experiences. For example, it has been found that providing road and public transport users with detailed information about the state of the transport network allows them to better anticipate possible delays, and avoid early or late arrival (Cats & Gkioulou, 2017; Ettema & Timmermans, 2006). In fact, satisfaction seems strongly affected by differences between perceived and expected waiting times (e.g., Shaw et al., 2021). When waiting times are longer than expected (e.g., due to certain delays) this may result in uncertainty, anger, and frustration, as found by delayed airline passengers (Taylor, 1994). Unexpected events such as traffic congestion and public transport delays – increasing travel time (uncertainty) – also negatively affect satisfaction levels (e.g., Mouwen, 2015; Smith, 2017).

2.3 Impacts of time perceptions on experiences

The (perception of) wait time, travel time and waiting during travel can also influence satisfaction with these time frames, and with the activity people are waiting for, or are travelling to. In general, a negative relation between (perceived) waiting time and wait evaluation has been found (Antonides et al., 2022), while waiting satisfaction can also be affected by the duration of the activity people are waiting for (Anderson et al., 2007). In the travel behaviour literature, many studies found a negative effect of (self-reported) travel duration on travel satisfaction (e.g., De Vos et al., 2022; Morris & Guerra, 2015), especially when the actual travel time is longer than the ideal travel time (Humagain & Singleton, 2020; Ye et al., 2020). Waiting time for public transport has also been found to negatively affect satisfaction levels (e.g., dell’Olio et al., 2011). The waiting time might not only negatively affect waiting time experience, it can also negatively influence the satisfaction with the activity or service people are waiting for, such as a visit to a hospital, or attractions at a theme park (Pruyn & Smidts, 1998; Torres et al., 2018). In terms of travel, De Vos (2019) found that the duration of a leisure trip has a modest negative effect on satisfaction with the leisure activity at the destination (through satisfaction with the trip to reach the activity), while Clark et al. (2020) found a negative effect of commute duration on job satisfaction. However, more studies on the bidirectional relationships between travel duration and the activity at the destination are desired. Although some studies have found that travel time and activity duration are positively correlated (e.g., Schwanen & Dijst, 2002), and that people generally travel longer durations to work or leisure activities than for shopping (Schwanen et al., 2002), no studies have adequately analysed whether people are willing to travel longer durations for more satisfying activities or whether travel satisfaction is affected by the duration of the activity at the destination. Additionally, despite some studies finding higher travel satisfaction levels for trips to enjoyable activities (e.g., leisure activities) compared to trips to less enjoyable activities (e.g., work) (Anable & Gatersleben, 2005; Mokhtarian et al., 2015), the effect of activity satisfaction on travel satisfaction is largely unknown.

Figure 1 provides an overview of how the experience of travel time is affected by the actual travel time, the activities performed during travel (equipped or not), and travel time uncertainty (partly affected by unexpected delays). The type of activity, (perceived) activity time, and satisfaction with the activity at the destination can affect travel (time) satisfaction. Furthermore, the activity type (e.g., work, leisure, shopping) can determine the time people are willing to travel to them, while activity satisfaction may also be affected by satisfaction with the trip to reach the activity.

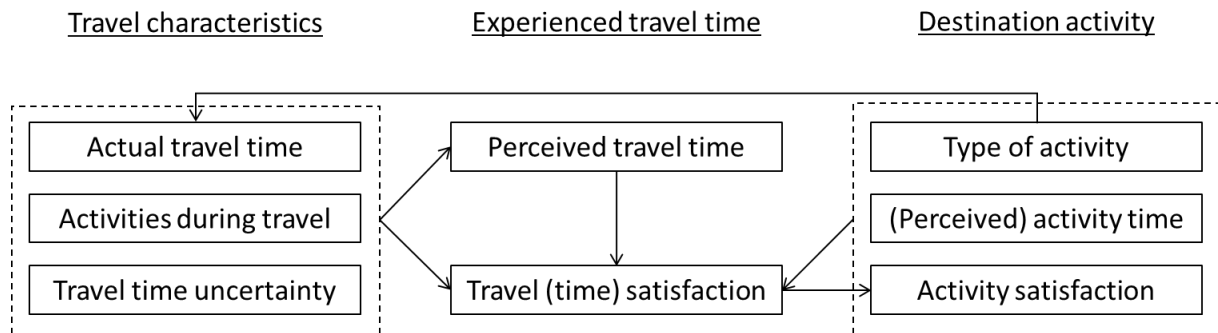


Figure 1. Experienced travel time in relationship with travel characteristics and the destination activity

3. Future directions of research

Despite the body of literature that has analysed ideal and tolerable travel times for commuting, the examination of travel time (preferences) for other purposes (leisure, shopping, undirected travel) is largely absent. Furthermore, how travel and wait time (experiences) relate to the duration and experience of the activity at the destination remains underexplored. For instance, people may be willing to travel for longer durations to activities with long durations (e.g., work), or rewarding activities (e.g., leisure/social activities), in contrast to short and unrewarding activities (e.g., grocery shopping). Since (perceived) travel time can impact travel satisfaction (but also satisfaction with the activity at the destination and satisfaction with life in general (e.g., De Vos, 2019)), it is important to reduce experienced travel time and travel time unreliability. Reducing experienced travel time may be done by either reducing the actual travel time (e.g., increasing public transport frequency and punctuality), but also by reducing the perceived travel time by making travel more comfortable or enjoyable (e.g., by providing free Wi-Fi and increasing comfort and seating capacity on public transport, or by creating comfortable and protected bicycle lanes). Travel time reliability can be improved by providing drivers and public transport users with detailed information on delays in the transport network. However, the extent to which this will result in higher satisfaction levels is unknown.

In sum, future studies on travel time (experience) should focus on (i) trips other than commuting, (ii) the (bidirectional) relations between travel time (experience) and the activity (time/experience) at the destination, and (iii) the effect of activities performed during travel and travel time information on the travel (time) experience. Doing so will help create more insights on how the experience of travel time but also the experience of out-of-home activities – both affecting people’s quality of life – can be improved.

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