

## **Travel, health and well-being: A focus on past studies, a special issue, and future research**

### **Abstract**

This introduction to the special issue on travel, health and well-being is subdivided into three parts. In Section 1 we provide a summary of existing literature analysing how health and well-being are related with transport and travel behaviour. An overview and short description of the studies included in this special issue are given in Section 2. In Section 3 we conclude this editorial by uncovering research gaps and suggesting avenues for further research.

### **1. Existing studies on travel, health and well-being**

Travel can affect physical health in multiple ways (for an overview, see e.g., Handy, 2014). First, traffic safety has long been recognised as an important health concern in the transportation field. Despite improved safety standards in many countries, road traffic crashes are still the eighth leading cause of death in the world, resulting in 1.35 million deaths and tens of millions injured each year (WHO, 2018a). The risk of serious injury or death from traffic is a lot higher in developing countries compared to developed countries, and higher for cyclists and pedestrians compared to drivers (although fatality rates for active travellers in countries with a considerable share of walking and cycling are low) (Pucher & Dijkstra, 2003; WHO, 2018a). Second, the transport sector is responsible for a large proportion of (urban) air pollution, and its relative contribution is even growing (due to a reduction in pollution in other sectors). Air pollution results in approximately 4.2 million premature deaths each year and can result in respiratory diseases, asthma, lung damage, high blood pressure, and cancer (WHO, 2018b). Although car users are mostly exposed to the highest levels of air pollution, active travellers might have higher respiratory rates resulting in higher inhalation doses (Cepeda et al., 2017; de Nazelle et al., 2011; Schepers et al., 2015). Third, the increase in motorised transport has resulted in a decrease in physical activity which can (together with an increased intake of foods that are high in calories) be regarded as one of the sources of rapidly increasing levels of overweight and obesity in many countries of the world. In 2016, 1.9 billion adults were overweight of which 650 million obese. Overweight can result in cardiovascular diseases (which currently are the leading cause of death), diabetes and some cancers (WHO, 2020). Frequent walking and cycling can help people to reach the recommended 150 minutes of moderate physical activity per week, while driving a car – a sedentary activity – increases the chances of being overweight (e.g., Dill, 2009; Frank et al., 2004; Martin et al., 2015). Finally, motorized road transport (and to a lesser extent air and rail transport) contribute to noise pollution. This noise can disturb sleep and result in annoyance responses, but it can also (in case of long-term exposure) result in hearing loss, tinnitus, and psychological and physiological distress (WHO, 2018c). Noise levels originating from road traffic increase with higher traffic volumes and speeds (e.g., Handy, 2014).

Less obvious than the link between travel and (physical) health is the link between travel and (subjective) well-being. However, over the past decade multiple review papers have explored different ways in which travel can impact well-being (Chatterjee et al., 2020; Delbosc, 2012; De Vos et al., 2013; Ettema et al., 2010; Mokhtarian, 2019). These studies indicate that travel can impact well-being mainly in three ways, i.e., (i) through the experience of trips, (ii) through participation in spatially separated activities, and (iii) through spill-over effects of trip experience on the performance of and satisfaction with activities at trip destinations. The first way has received a lot of attention in the last decade, with studies analysing the effect of elements such as travel mode, trip duration, and travel attitudes on

travel satisfaction. These studies mostly found that active travel modes, short trip durations and a positive stance towards the chosen mode result in high levels of satisfaction (e.g., De Vos et al., 2016; Singleton, 2019; St-Louis et al., 2014; Ye & Titheridge, 2017). The second way refers to the indirect effect of travel on well-being, i.e., travel enables participation in rewarding out-of-home activities which can foster the experience of positive emotions but also contribute to self-development and social relationships. Limited travel options and not being able to participate in (preferred) out-of-home activities (i.e., social exclusion) can have clear detrimental impacts on well-being (Delbosc & Currie, 2011; Lucas, 2012). Studies have indicated that the effect of travel on long-term well-being (e.g., life satisfaction) is mainly indirect through activity participation (Bergstad et al., 2011; De Vos, 2019). Finally, the experience of trips can impact the performance of – and satisfaction with – the activity at the destination. A satisfying trip can positively impact the mood during the activity at the destination, which has been found for commute trips (Friman et al., 2017), leisure trips (De Vos, 2019), and school trips (Stark et al., 2018). Furthermore, travel satisfaction can also impact the performance at school or work (Loong et al., 2017; Westman et al., 2017).

Although studies have indicated that good mood and high levels of life satisfaction are beneficial to one's physical health (Diener & Chan, 2011), and that physical activity is often regarded as an important determinant of mental health and life satisfaction (Diener et al., 1999; Paluska & Schwenk, 2000; Penedo & Dahn, 2005), transport studies including both health and well-being are limited. Although some studies found that the physical activity related with walking and cycling results in increases of pleasure and energy (see Ekkekakis et al. (2011) for an overview), a comprehensive overview of the links between travel, health and well-being remains underexplored (De Vos, 2018; van Wee & Ettema, 2016).

## **2. A special issue**

This special issue contains thirteen studies analysing the links between travel, health and well-being. Eight of these have a clear focus on well-being. Gärling et al. (2020) present a review and assessment of methods measuring travel-related well-being, focusing on what is measured (cognitive evaluations, emotional responses, or moods), the way it is measured (proactively, instantaneously, or retrospectively), and when it is measured (before, during, or after travel). Lunke (2020) find that efficient transport routes with short waiting time and reliable time use are more important than short distance to stations and direct routes for commuters' satisfaction with public transport in Oslo, Norway. Olsson et al. (2020) compare satisfaction levels with public transport across five generations in five cities in Northern Europe and find that older generations are more satisfied compared to younger generations. Levels of travel satisfaction have a positive effect on life satisfaction, an effect that is stable across different generations. Humagain and Singleton (2020) indicate that commuters in Portland (Oregon) have a commute duration longer than preferred, and find that the actual commute duration and the dissonance between actual and preferred commute duration have a significant negative effect on travel time satisfaction. Van den Berg et al. (2020) find that satisfaction with school travel of Dutch children (7-12 years) is positively affected by parental safety perception, travelling with a friend, good weather conditions and cycling (in case this is the preferred mode). This satisfaction with travel has a strong effect on children's mood. Biehl and Stathopoulos (2020) examine the joint adoption of active travel and public transport using a multiple-indicators multiple-causes structural equation model on respondents from six Midwestern US states. Among other findings, they indicate that active mobility and transport use is indirectly linked to neighbourhood cohesion and life satisfaction. Xiao et al. (2020) analyse the effect of commute time on mental health of migrant workers in Chengdu, China. They find that short commute times and the use of active modes result in better

mental health levels, although the effect of the used travel mode on mental health reduces with increased commute time. Finally, Oviedo and Sabogal (2020) use data from low-income informal settlements in the periphery of Abuja, Kaduna and Ibadan (Nigeria) to test a framework analysing transport problems faced by low-income urban dwellers. Applying a structural equation modelling approach, they find a strong correlation between perceived transport (dis)advantage and transport well-being (i.e., well-being components affected by transport).

Five of the papers included in this special issue focus both on health and well-being. Kroesen and De Vos (2020) – using a 10 waves panel dataset from the Netherlands – indicate that active travel does not affect future Body Mass Index (BMI) levels, but that BMI does negatively influence later levels of active travel. Regarding mental health, they find an opposite pattern; the effect of active travel on mental health is significant, while the reverse effect is not. Sha et al. (2019) find a negative effect of commute duration on salary satisfaction and life satisfaction in Hong Kong, but no significant effects of commute duration on BMI and self-rated health. Since salary satisfaction has a positive effect of life satisfaction, the authors indicate that the negative impact of commuting time on subjective well-being may be alleviated by improving the commuter's salary satisfaction. Li et al. (2020) analyse the frequency of primary care visits and satisfaction with primary care of older adults (50+ years) in eight Chinese provinces. They find that active travellers (mainly low-income respondents) access primary care most frequently, while high transportation costs are related with fewer trips. Satisfaction with the primary care visit is positively affected by walking to primary care and negatively affected by travel time to primary care. Gunn et al. (2020) review planning policies identifying environmental features known to support healthy and active behaviours. For residents in two case studies in Melbourne (Australia), they find that those living in places where destination and transport access are relatively poor are less satisfied, whilst those in the more walkable areas are more satisfied. Finally, Wang et al. (2020) indicate that High-Speed Rail (HSR) commuting – between Suzhou and Shanghai, China – has a (modest) negative effect on commuters' physical and mental health. Certain travel-related factors (e.g., active transfer modes, short travel times to and from HSR stations) and personal factors (contact with family/friends) show significantly positive (physical and mental) health benefits.

### **3. Future research needs**

One of the goals of organising this special issue was to collect studies incorporating both physical health and mental well-being in relation with transport. Despite most of the included studies focus either on health or well-being, some of them analyse the effect of travel on both physical and mental health (Sha et al., 2020; Wang et al., 2020), or the bidirectional effects of (active) travel with both physical and mental health (Kroesen & De Vos, 2020). Although these studies provide valuable insights, further studies are desired, analysing for instance how personal fitness levels and the physical activity provided by walking and cycling influence satisfaction with active trips, or whether happy people are more inclined to perform active travel. New insights can help shape policy recommendations improving people's health and well-being. Although most studies in this special issue originate from Western countries, five of them were performed in an Asian or African context (i.e., China, Hong Kong or Nigeria), providing new understandings of how travel, health and well-being are related with each other in a non-Western context.

An interesting direction for future research is on health and well-being effects of new forms of mobility, which might be less straightforward than assumed. For instance, automated vehicles (AVs) might improve traffic safety and mood during travel (e.g., due to a reduction of driving-related stress and positively experienced relaxing/entertaining activities performed during travel), but might also result

in reduced physical activity due to a mode shift towards AVs (Singleton et al., 2020). E-bikers, for instance, generally feel safer than traditional cyclists, although they are more likely to be involved in crashes requiring medical treatment (Fishman & Cherry, 2016). A Dutch study found that a shift from car use to e-cycling results in improved levels of travel satisfaction (de Kruijf et al., 2019), while e-cycling is experienced rather negatively in Chinese studies (Ye & Titheridge, 2017; Zhu & Fan, 2018). Recent studies also indicate that new mobility concepts such as Mobility as a Service (MaaS) might not be perceived as positively as initially assumed (Pangbourne et al., 2020; Storme et al., 2020). Anyhow, more insights in how new mobility forms, such as AVs, electric vehicles (EVs), MaaS, ridehailing, and (shared) micro-mobility affect health and well-being is desired. Furthermore, the recent outbreak of the COVID-19 virus – quickly spread by our hypermobile society – has drastically changed how people live and travel, and the effects of this virus on people’s activity participation, time use, and travel behaviour might linger for multiple years. A reduced participation in out-of-home activities – in combination with reduced levels of travel to reach these activities – might negatively affect subjective well-being and health status, as it might result in social isolation and limited physical activity (De Vos, 2020). On the other hand, the global pandemic might also result in more (utilitarian or recreational) active travel, a reduction in pollution, fewer road traffic injuries and reduced community severance (Musselwhite et al., 2020).

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