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Identifying, measuring, and minimising the hazards of frequent business air travel

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Abstract

The primary objective of this research is to investigate the impact of frequent air travel on the wellbeing of international business travellers (IBTs). The study delves into essential insights encompassing the existing strategies and endeavours to address the distinctive health, emotional, and social hurdles encountered by IBTs. The paper reviews the approaches adopted to monitor and alleviate the enduring consequences of frequent business travel on these individuals. Moreover, it offers pertinent recommendations geared towards establishing a comprehensive framework for effectively managing IBTs. This framework entails the integration of wearable health-tracking devices, the utilisation of contemporary technological platforms to enhance the convenience of business voyages, and the formulation of adaptive policies that account for individual variables and circumstances. These provisions seek to introduce a heightened level of personalisation into the planning of business-related travel. Furthermore, the research sheds light on the strategic significance of prioritising the wellbeing of IBTs for the benefit of organisations. This exploration also uncovers promising prospects that lie ahead for travel service providers, including airlines and travel partners, within the context of catering for the evolving landscape of wellness-focused business travel.

1. Introduction

Businesses today are split across the globe, creating the need for frequent travel as a typical job requirement. The business travel market size was valued at USD 787.76 billion in 2021 and is expected to reach USD 1.88 triillion by 2028, growing at an annual rate of 13.20% in the forecast period (2022-2028) (Statista, 2022a). A study conducted by Oxford Economics revealed that for every dollar invested in business travel, companies realise $12.50 in incremental revenue and $3.80 in profits (Oxford Economics, 2009). The study further suggested that cutting back on business travel can have serious and long-lasting negative repercussions. This strategic workforce is often neglected by organisations when creating appropriate policies and frameworks addressing wellbeing concerns in the short- and long-term (Welch et al., 2007). The challenges faced by business travellers can negatively impact organisational success through stress, sickness and absence, further leading to productivity issues, low customer satisfaction and strained supplier and other global stakeholder relationships (Rattrie & Kittler, 2019). Therefore, understanding and mitigating the challenges faced by International Business Travellers (IBTs) is critical to the success of organisations. The objective of the research is to appeal to relevant stakeholders – businesses, corporate travel agencies (e.g. FCM, Flight Centre) and service providers (Qantas, Singapore Airlines, and Marriott, Hilton, IHG, etc.) in adding dimensions to their offerings for their highest paying customers - to address the negative impacts of business travel.

Despite the mediatised effects, only few IBTs are fully aware of the artificial environment and the long-term health hazards of frequent air travel. Air passengers are exposed to reduced atmospheric pressure, reduced available oxygen, noise, and vibration. Scholarly research has documented associations between substantial air travel time and health outcomes (Rogers & Reilly, 2000). For example, research led by Andrew Rundle, Professor of Epidemiology at the Mailman School of Public Health, has shown that employees spending 14 nights or more per month away from home may have significantly higher body mass index (BMI) and are more likely to report poor health, clinical symptoms of anxiety, depression and alcohol dependence, smoking, trouble sleeping, and no physical activity or exercise. Other studies by medical and travel experts have reached similar conclusions. Also, the phrase "economy class syndrome" has received popular press attention. The term refers to the possibility of developing deep vein thrombosis (DVT) in the tight confines of an aircraft cabin, much more often than it occurs in other modes of transport or during prolonged sitting. However, the impact of international business travel expands beyond the short-term effects. Exacerbation of chronic diseases, prolonged fatigue, anxiety, premature ageing and obesity, are among the impacts frequently cited. While extremely relevant, the carbon footprint associated with this travel is not discussed in the paper.

The purpose of this paper is to present a thematic analysis of the literature on the hazards faced by frequent flyer business travellers, an exploratory analysis of the support extended by companies, and a summary of measures deployed by airlines to minimise the impact of the chronic diseases arising from frequent air travel. To present evidence on the impact of business travel on stress, productivity, and health, the Job-Demands-Resources (JD-R) model is applied as a framework. The focus is on current organisational policies and measures that can be taken to minimise the negative health impact of frequent business travel. The findings are based on data from leading organisations that have championed the cause of travel wellness. The paper concludes with an outline of a range of recommendations for corporations, travel management companies, travel managers and human resources teams to efficiently track and minimise long-term health hazards of frequent business travel.

2. Background

Business or corporate travel is the tourism segment that focuses on people who travel for work or professional purposes and therefore 'consume' travel and related tourism services. This branch also includes the meetings industry, which refers to business events, conferences, congresses, trade fairs, and exhibitions. According to the World Travel and Tourism Council (WTTC), business travel accounted for 20% of the global tourism expenditure in 2021 (Statista, 2022a). Despite representing only 12% of the number of passengers, business passengers represent 75% of airline's profits (Statista, 2022a), reflecting the strategic importance of business travel for the airlines.

Organisations lack the support framework required to address the wellness concerns of frequent business travellers (Welch et al., 2007). Research suggests that well-rested and healthy employees are more present and productive and vice-versa (Nielsen et al., 2017). Thus, IBT wellness is a major concern and good management may lead to positive outcomes – be it efficient knowledge transfer, winning global sales objectives or creating thriving relationships with stakeholders, such as clients and suppliers. On the flip side, travel-related stress, burnout and health concerns impacting employee's well-being can hamper productivity and performance and thus create high costs for employers, especially in the case of organisations spending hefty amounts for business travel to achieve strategic and high-value goals in limited

time intervals. Furthermore, higher medical claims and long-term health issues leading to absenteeism can rise the costs incurred by employers (Rattrie & Kittler, 2019). Thus, a poor travel policy may negatively impact organisation's ability to attract and retain talent, which is critical in the current competitive marketplace. Consequently, a thoughtful travel well-being strategy could be a competitive advantage for any company, particularly for millennial workforce who are said to place more emphasis on a healthy work-life balance (Diesing, 2016).

3. Multi-dimensional impacts of frequent business travel

A substantial number of research papers and articles have primarily focused on the environmental impact of frequent travel (e.g., Shaw & Thomas, 2006), but limited work has been dedicated to identifying the long-term impact of frequent business travel on individual's wellbeing and personal life. Also, business travel has been showcased by a range of social constructs and perceived positively by travellers (Cohen & Gössling, 2015), thus it becomes difficult to highlight its negative impacts. Business travel is highly glamorised in society and considered a prestigious activity (Thurlow & Jaworski, 2006). Only recently, scholarly work has engaged in establishing 'healthy boundaries' and discussing optimal business travel activities for individuals and organisations. Cohen and Gössling (2015) consolidated findings from a range of interdisciplinary papers to bring attention to the negative aspects of frequent business travel, labelled as 'hypermobility', on physiological, psychological & emotional, and social aspects of the travellers and their families.

Air travel is most associated with jetlag, a disruption of the body's circadian rhythm (Anderson, 2015). In addition to affecting a person's biological clock, jetlag also causes fatigue, an unwell feeling, trouble staying alert, and stomach problems (Striker et al., 2000). Frequent disturbances with the body's biological clock can cause deeper issues impacting routine biological processes, including gene expression responsible for premature ageing (Archer et al., 2014). Prolonged and repetitive jetlag has been found to have a significant impact on immunity, increasing the risk of heart attacks, stroke, or severe chronic diseases (Knapton, 2014).

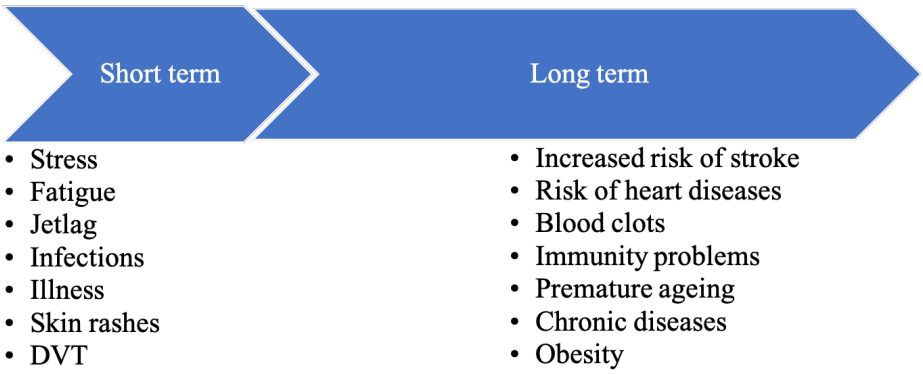
The in-flight conditions also increase the risk of DVT and exposure to germs and can contribute to discomforts like dry eyes and dehydrated skin (Anderson, 2015). One in 10 long-distance flight passengers develop symptomless DVT, from which there is the potential to develop blood clots (Scurr et al., 2001). Early research by Kemmerer (1998), showed major problems related to infections such as travellers' digestive problems (35%), respiratory infections (29%), skin rashes (10%) and fever (7%). This research, based on a survey of 350 corporate travellers, also signalled the high probability of contracting infectious diseases during air travel. During COVID-19, the risks of in-flight transmission led to a surge in corporate and government policies, particularly restricting international travel, which impacted the viability of commercial passenger airlines globally (Sun et al., 2022). As noted by Tufnell (2021), since then, companies took it as their duty to protect IBTs from infectious diseases, by initiating measures to identify those with increased vulnerability to COVID-19 and creating policies for pre-travel risk assessment for business travellers as well as on-travel and post-travel support.

Since the 2000s, the research increased its focus to non-communicable diseases, as a result of many lifestyle changes. Business travellers typically not only get less exercise while travelling, but also often indulge in unhealthy eating habits and higher alcohol consumption compared to when they are at home (Gustafson, 2014). 'Kinetic elite' programs, such as lounge access and priority boarding, encourage these behaviours (Adey, 2006). Airlines and airports, often

downplay the long-term effects of accumulated physical tiredness and sleep debt, advertising their amenities, with the ability to make mobility 'smooth' and minimise the impact of travel on health. Furthermore, flights and airports facilitate, at a global level, business travel and intense work schedules, with odd hours, both early and late (Beaverstock et al., 2009). Significant long-term health hazards for IBTs were noted by Rundle et. al (2018): compared with those travelling 1 to 6 nights per month for work, those who travelled 21+ nights were more likely to be sedentary, to smoke, and to report sleeping issues. They also scored above clinical thresholds for alcohol dependence (CAGE score >1), reported mild or worse anxiety (Generalized Anxiety Scale [GAD-7] >4), and depression symptoms (Patient Health Questionnaire [PHQ-9] score >4).

Finally, corporate policies posing to be 'frugal and responsible' increasingly force business travellers to travel economy/coach, exacerbating physical and mental fatigue, thereby contributing to the severity of the health impact (Beaverstock et al., 2009). This 'creeping tiredness', repeated jetlag and accumulation of travel stress may turn chronic and has been described as 'frequent traveller exhaustion' (Ivancevich et al., 2003). Common short- and long-term negative health impacts of frequent business travel have been summarised in Figure 1.

Figure 1: Negative health impact of business travel



Source: Authors' elaboration

In response to the increasing wide-ranging health and safety concerns related to travel (from digestive problems to exposure to infectious diseases), we note a growing amount of attention in specialised literature. Several academic journals, like the *Journal of Travel Medicine* and *Travel Medicine and Infectious Disease*, are solely devoted to travel medicine, creating awareness of the impacts of hypermobility on physical health and proposing solutions for mitigating its effects.

4. Addressing frequent traveller health issues

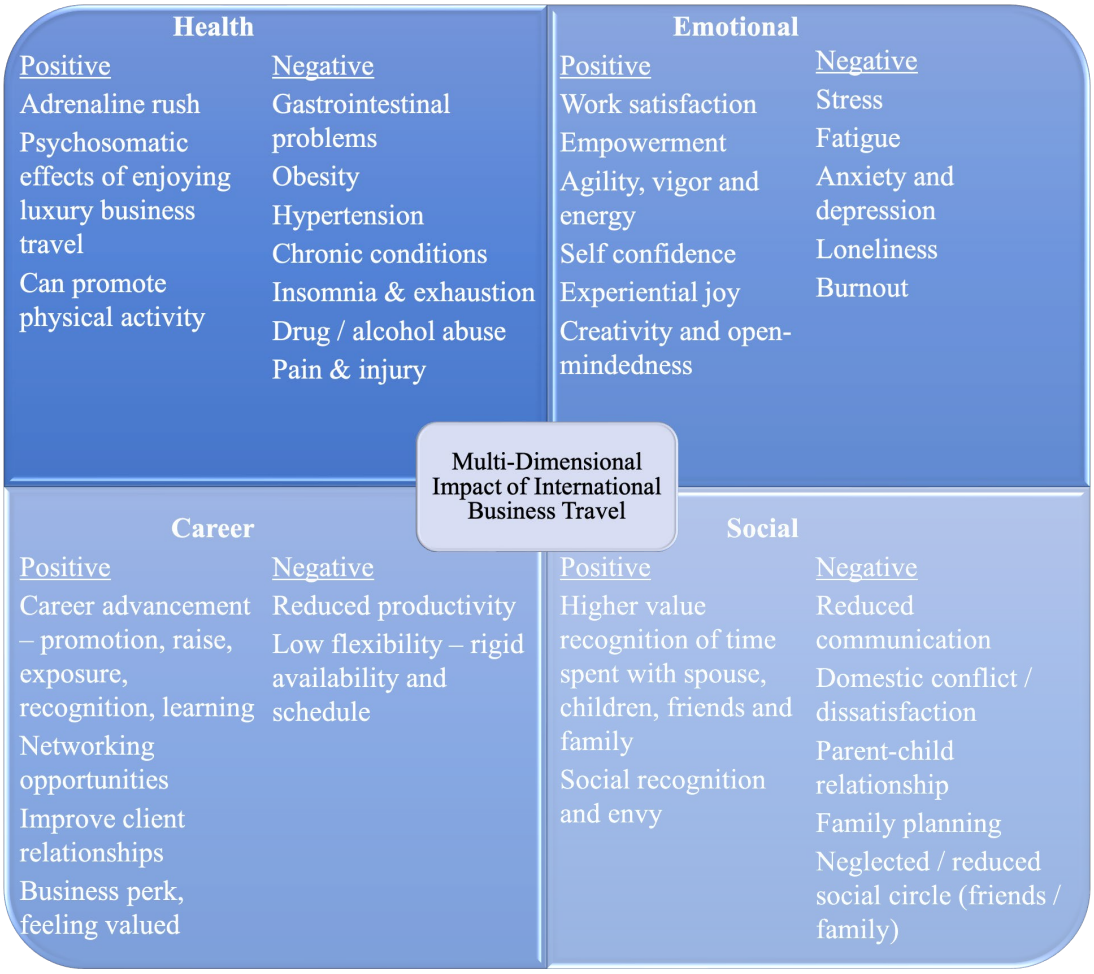
Despite many negative health outcomes, which were discussed above, research also suggests positive IBT outcomes, coming from the opportunity to travel to new places, the interaction with people of different cultures, exposure to cosmopolitan identities, broader outlook, prestige, and open-mindedness (Beaverstock et al., 2009). In a nutshell, though IBTs may face negative health outcomes and suffer psychological issues like loneliness and anxiety (Cohen & Gossling, 2015), positive or motivational factors may simultaneously help them rebalance or enhance their well-being. Figure 2 presents the positive, as well as negative, impacts of business travel on physical, emotional, and social well-being and career impact of IBTs.

The diagram suggests that designing business travel policies based on individual preferences, health pre-conditions and family requirements is a balancing act on the part of employers, travel

companies, airlines, hotels and policy-makers to boost employee health and morale. Widely adopted in promoting employee well-being and productivity, the JD-R model proposed by Demerouti et al. (2001) is a useful framework for examining IBT (Ratterie & Kittler, 2019). The JD-R model posited that job characteristics can be categorised into job demands and job resources. Job demands are physical, social, or organisational aspects of the job that demand physical or psychological effort and are thus associated with physiological and/or physical costs (Demerouti et al., 2001). Conversely, job resources are characteristics of the job that reduce job demands and are associated with positive physiological and psychological effects, aiding in achieving work goals and hence leading to personal well-being and development (Demerouti et al., 2001). JD-R theory differentiates between a health impairment process linking job demands to strain and ill-health, and job resources to motivation, productivity, and well-being (Bakker & Demerouti, 2007; Demerouti et al., 2001). The JD-R shows that when job demands (negatives) are high and job resources (positives) are low, stress and burnout are common outcomes (Bakker & Demerouti, 2017).

According to JD-R, workload is one of the major important predictors of exhaustion in the context of international business travel (Rattrie et al., 2022). As IBTs experience additional work hassles, extended workdays, and build-up of fatigue, factors known to be critical in the recovery-performance balance (Demerouti et al., 2009), it is even more important to offer job resources to match the demands.

Figure 2: Impact of international business travel



Source: Authors' elaboration

Figure 2 portrays the result of imbalance between demands and resources in the context of IBT work. As identified in the JD-R literature, prolonged business air travel has effects not only on physical and mental health of the individuals, but also on their productivity and wellbeing.

Based on data collected from 134 international business travellers (IBTs) from diverse industrial backgrounds, Rattrie et al. (2022) reported that human resources (HR) departments are not currently well-equipped to manage the wellbeing of IBTs. Most multi-national organisations outsource the job to travel procurement partners, who typically lack in considering employee well-being and engagement. This partially explains why organisations report challenges in IBT retention and performance (Rattrie & Kittler, 2019). Given the increased risk of stress-related symptoms for employees frequently engaging in international business travel (Cohen & Gossling, 2015; Rundle et al., 2018; Rattrie & Kittler, 2020), it seems natural that companies would consider recovery experiences for this group of employees. While there is a clear need for adequate support and intervention for globally mobile staff, research suggests that most organisations tend to fall short in terms of implementing interventions specifically tailored to these employees' unique needs (Collings et al., 2007; Rattrie & Kittler, 2020).

4.1. Current initiatives by organisations

The JD-R model suggests that enhancing the job resources is an example of supportive HR practices for IBTs, which can be instrumental in fostering employees' motivation (Welch et al., 2007). However, as indicated, in multinational companies, organisational support for IBTs is rare and policies for travel are typically developed within functions other than HR (Collings et al., 2007). This means that the support to IBTs' needs during their travels may be lacking, especially where travel partner agencies are taking care of employee travel. These companies are mostly focused on bookings and expense management, with little regard to health and wellbeing.

A study conducted on Australian and Danish business travellers (Welch et al., 2004) found that IBTs are mostly a neglected resource and organisations have not paid enough attention to the formulation of policies for IBT wellbeing. Similarly, a study of Mäkela et al. (2015) showed that supporting HR practices for IBTs are non-existent. Suutari et al. (2013) also concluded that although short-term business travel has become prevalent and important for organisations, the development of HRM policies is lagging. Bucker et al. (2020) further revealed that institutional support was not perceived to be necessary for IBTs, and their research noted that based on the response of HRM practitioners, an institutional void appears in managing IBTs.

To date, policies failed to account for the individual circumstances of the traveller, by age, gender, life stage. For example, studies have shown that business trips are more stressful to women compared to men, with stress levels at their peak before and after a trip (DeFrank et al., 2000). In a study of 51 interviews with women IBTs from different geographical and technical backgrounds, Puchmüller and Fischlmayr (2007) highlighted that female business travellers, with family and childcare obligations, experience even stronger work stress, as a results of the lack of organisational support. Considering the efforts of organisations to build a diverse workforce with increasingly more substantial female representation in middle to senior management positions, there is a genuine need to create IBT support policies and practices. Additionally, the ageing population requires adaptations to the demands and resources provided to the employees, with distinct interest in wellbeing, accounting for their specific conditions (e.g., cardiovascular conditions, musculoskeletal injuries and fatigue). Research and corporate policies around tracking and managing the unique requirements of ageing business traveller appear non-existent. Further research is suggested in evaluating the frequent traveller

risk profile based on age and co-morbidities to be further utilised in framing policies to support the ageing workforce.
Overall, this body of research seems to indicate a substantial gap in the development of HRM support policies specific to IBT job conditions and challenges.

4.2. Current initiatives by airlines

Several airlines have taken steps to create a wellness-oriented flying experience for passengers. Alejandro Bataller, co-founder and vice president of the SHA Wellness Clinic in Spain, operating wellness outlets in the Madrid airport focussed on healthy food and targeted spa treatments, summarised the objective of their initiatives: *"There´s no reason that our healthy habits should slip when we travel, as maintaining optimal health should always be the priority"* (Ramani, 2018). Some of the noteworthy developments and programs focused on wellness in the air are as follows:

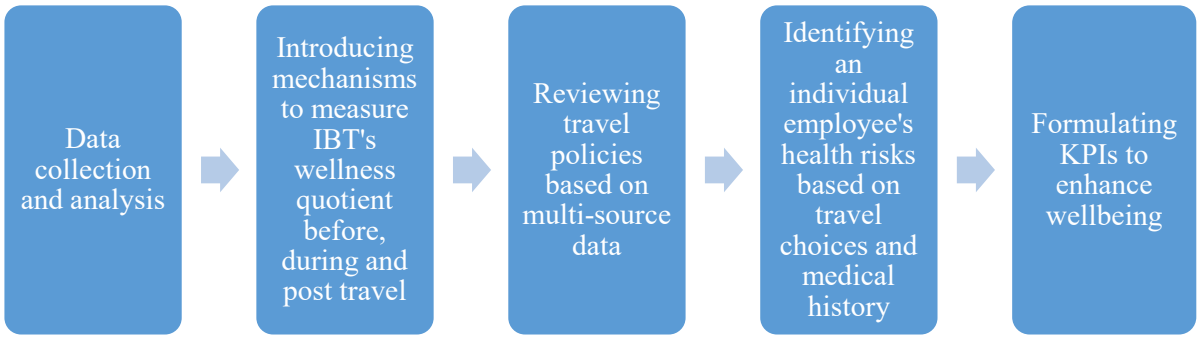
- Air France's (AF) expanded Business Lounge in Charles de Gaulle's Terminal Two, featuring an approximately 6,000 square-foot wellness area, the largest of any in the carrier's worldwide lounges; This features an "Instant Relaxation" area with sun loungers, private mini-suites, a detox bar, two saunas, and a Clarins Spa. The wellness journey further continues in the air with a series of guided mindfulness programs on the seatback screens (Ramani, 2018).
- Singapore Airlines (SA) partnered with iconic wellness brand Canyon Ranch to design and deliver services for ultra-long-haul travel, including integrative medicine, exercise, and nutrition, with a focus on global wellness cuisine, rest and relaxation (via specially designed lighting and passenger sleep tips), and movement (with guided stretching videos, led by Canyon Ranch exercise physiologists, available in the personal entertainment systems) (Singapore Airlines, 2018).
- American Airlines (AA) recently partnered with mattress industry expert Casper to design upgraded bedding for multiple cabins. They have also partnered with Microsoft Corp. to use technology to create better, more connected experiences for customers and crew. Through this partnership, AA and Microsoft aim to use data and digital technologies to meet customer demands while also streamlining business processes. The companies envision a future where a cohesive and stress-free travel environment is created for passengers using digital technologies deployed in areas such as bag tracking and early flight notifications (American Airlines Group & Microsoft Corp, 2022).
- Virgin Australia has partnered with Australian mindful meditation company Smiling Mind to create a stress relief program targeted to anxious passengers (Virgin Australia, 2018).

By developing strategic partnerships, resources offered by airports and airlines in reducing traveller fatigue and stress can be utilised by organisations to enhance traveller well-being. As suggested by the JD-R model, such resources can be instrumental in compensating for the high demands and creating higher employee motivation and engagement.

5. Call to action/recommendations

IBT wellbeing initiatives can be effective if holistically developed in partnership with employers, travel partners, airlines, business hotels, insurance companies and government policymakers. This section lays out important steps in creating, managing, and enhancing IBTs' well-being framework to help organisations efficiently manage employee travel programs and boost their wellness, thereby, increasing the productivity of frequent travellers. These steps are summarised in Figure 3.

Figure 3: Essential steps to evaluate IBTs' wellbeing



Source: Authors' elaboration

Nevertheless, data is pivotal for embedding well-being in frequent business travel and in measuring the outcomes (physical, psychological, and social) of travel policies and programs on individuals. Business travel partners have access to vast amounts of travel data, and connecting these data to other data sets, such as those owned by HR managers, travel managers and airlines, transport agencies, can be used in reviewing travel policies and further designing and defining insightful measures for improving traveller wellbeing. Moreover, Key Performance Indicators (KPIs), an important element for IBT well-being, are elements that most global organisations lack today (Welch et al., 2007).

An important consideration is that travel policies do not impede or complicate employee's work and thus negatively impact wellbeing, especially under the umbrella of cost-cutting. The long-term health cost of frequent travellers and its impact on an organisation's growth and revenue could far outweigh the short-term cost benefits. Furthermore, it becomes vital to review and update policies to support employees' well-being by understanding the health cost of travel and embedding measures to reduce this cost, when possible. Reviewing and improving policies around departure and arrival times, specifying limits on layover timings, minimising the impact of night flights by introducing higher comfort and allowing time compensation can potentially help in reducing the negative impact of frequent air travel. Instead of restricting to an 'economy-only' policy, accommodating business class for frequent travellers who have reached a certain number of total flying hours can substantially help reduce travel-related burnout (Peck & Gallago, 2022). In addition, travel that can be reduced, by using virtual meetings, should be considered.

Yet, all these measures are generic and do not account for the personal circumstances of the traveller. That is why creating a traveller risk profile is the next important step towards formulating employee specific travel plan. This profiling would assist to distinguish between various traveller types, understanding which employees travel most intensively and for what purposes, and targeting them with the appropriate service and amenities. Traveller risk profiles would provide data that can help organisations to identify which travellers are most at risk of travel fatigue or burnout. With an understanding of the work design conditions, travel intensity and personal characteristics, organisations can take mitigate impacts and reduce the stresses on travellers, both physical and mental (Rattrie & Kittler, 2019). Table 1 presents a possible travel card with basic information on the IBT.

Table 1: Components of Business Traveller Card

	Personal circumstances (e.g., age, family commitments, location)	Job/Role	Travel Frequency, Distances, Time-of-day	Travel Medication History	Prior Conditions
Identifying Impact based on employee specific parameters	Understanding how employee's age and family circumstances can impact travel behaviour and health outcomes	Travel intensity and workload during travel; Nature of work at destination	Number of days per month or year an employee needs to travel; Time-of-day for travel and length of flights (including number of stopovers)	Medication requirements during previous trips and regular medication requirements	Potential impact of travel on existing medical conditions, chronic diseases, etc.

Collecting and analysing data on IBTs' travel

To document changes in the health status attributed to intensive air travel, we propose using wearables, devices capable of passive and routine recording and delivery of multiple indicators, either in real time or as aggregate statistics to the wearer, with minimal attention or training required (Harms et al., 2019). While many wearables are used for their potential to precisely capture the wearer's daily physical activities (accelerometer) often in conjunction with a GPS (for location information), wearables can also passively track/monitor physiological measurements. Such measurements include: heart rate, oxygen level, temperature, blood pressure, sleep, and other critical health parameters for travellers (Shen et al., 2021), thus offering convenient healthcare monitoring.

Using wearables for tracking health measurements during IBT travel offers the potential to anticipate fatigue and associated health impacts before the onset of a condition or its diagnosis (e.g., inflammations, Lyme disease, diabetes). Furthermore, wearers can provide information on nutrition, mood, any additional symptoms, aspects that can be combined with light activity diaries to document the travel experience. For example, wearable devices, such as bracelets, rings, or seatbelts, the new-type point-of-care system, can be comfortably used by air travellers to detect the sleep apnea-hypopnea syndrome (SAHS) on long flights when sleeping is almost inevitable. SAHS is highly prevalent in the general population and is associated with an increased risk of hypertension, diabetes, coronary disease, stroke, and myocardial infarction (Shen et al., 2021). However, 75–85% of patients with SAHS are undiagnosed and untreated, which causes irreparable consequences (Bratton et al., 2015). Similarly, the heart rate variability is indicative of stress and therefore, can be utilised to track both physical and mental health (Chalmers et al., 2021). Circadian disruptions during the flights and jetlag may contribute to mood changes, it may elicit or exacerbate symptoms in individuals with a predisposition for mental health disorders (Walker et al., 2020).
Li et al. (2017) concluded that *"that the information provided by wearable sensors is physiologically meaningful and actionable"* and drew attention to *"striking changes in particular environments such as airline flights"* (p.1), with blood O_2 levels decreasing during high-altitude flights, which leads to fatigue. By combining sensor information with frequent medical measurements, they made several important observations that can assist health professionals to predict the risk of certain medical conditions.

The combination of wearables continuous data with behaviours and self-reported experiences over time enables establishing baselines for individuals and assessing changes related to air travel during business trips, as well as comparisons across individuals and their circumstances, symptoms, or long-term effects. Companies can analyse internal data and compare results across employees, to identify potential 'sweet spots' for trip frequency and length, create the right travel policies and measure progress in traveller wellbeing on a regular basis.

Unfortunately, systematic data collection to monitor the experience and effects of intensive travel for IBTs, or programs specific to occupational frequent flyers are yet to be implemented. We ascribe this to the high cost of devices in the past. However, the recent developments in miniaturisation and long battery lives, combined with the computational power and new data mining techniques, make this feasible by creating a smart environment that can 'observe/sense' and inform of the health impacts of travel.

Benefits to organisations from IBT Wellness Programs

Research and evidence emphasising the role of employee wellbeing in employee and organisational success is increasing (Miller, 2016). The "happy worker-productive worker" theory (Nielsen et al., 2017), whereby employees who are happy are more productive, reveals the impact of employee wellbeing on business outcomes and organisational performance. International business travel has become crucial for global organisations in tackling critical and highly rewarding multi-geography business task. Organisations rely on IBTs' physical and psychological fitness, focus and productively to perform complex and challenging tasks across different working environments. Therefore, promoting healthy travel for these travellers can have several benefits for employers, including improved productivity, reduced absenteeism, higher employee morale, reduced health care costs along with a positive corporate reputation.

Given IBTs' vital role in the success of international businesses (by making valuable contributions to sales, knowledge transfer and multi-geography strategic relationships, thus representing a strategic resource), their wellbeing should receive further attention. Yet, Welch et al. (2007) showed that IBTs' contributions are often unrecognised, as evidenced by organisational lack of support, compared to expatriates. Travel policies aligned to promoting better employee wellbeing and extending support to employee dependents are, therefore, more relevant, and significant for current workforce.

Measures by companies

Organisations can take several steps to promote healthy travel for IBTs, such as providing health and wellness resources and access to fitness facilities, nutritionists, and wellness programs to help them maintain a healthy lifestyle while travelling. Employers can further help by offering flexible travel options such as choosing to take the train instead of flying, booking hotels with gyms, and allowing for extra time between flights to get some exercise. Inculcating the right travel behaviour is one of the most important aspects of healthier travel, and organisations should offer workshops and seminars about travel-related health risks and the importance of healthier choices during travel. As frequent business travel can be stressful, employers can also provide employees with access to therapists and/or counselling services. By taking such steps, employers can help ensure that their frequent business travellers maintain a healthy lifestyle while away from home.

Finally, organisations, airlines, policymakers must determine if IBTs have different concerns and experiences than other travellers, which may require support from an occupational health perspective, in addition to general physiological and psychological assistance. This approach can become a steppingstone for occupational health practitioners' collaboration with

companies on proactive prevention strategies for work-related travel health initiatives (Rogers & Reilly, 2000). Creating an ecosystem, in which companies are working with airlines and health professionals to limit the negative impacts of frequent IBT, is an ideal, yet achievable proposal for tackling long travel for work purposes.

In summary, the use of wearables would provide easy-to-collect data (passive) on movements, heart rate, sleep, which combined with apps recording activities and eating habits, would inform health professionals in the travel routines of IBTs. Measuring health impact during and post-travel is critical for ensuring the future health and well-being of business air travellers. Tracking a combination of physical and mental health metrics over time can then be analysed together with sick days, medical claims, productivity levels and retention rates, enabling IBTs and their organisations to identify any negative impacts of travel on their health and well-being and make necessary adjustments to their travel habits.

The organisational support in collecting and recording the wearable data from IBTs is required to enable further research towards understanding psychological and physiological effects on IBTs, as frequent travellers, and thus foster the development of care systems for all air travellers.

6. Conclusions and further research

In this preliminary investigation, we have shed light on the risks linked with frequent corporate air travel, while also uncovering its potential to positively influence individuals' overall health and wellbeing. A core message of this study highlights the strategic significance of organisational backing in identifying distinct limitations and incentives among travellers, fostering enhanced productivity. Furthermore, a thorough examination of existing support measures enacted by companies, airlines, and travel collaborators has revealed a shortfall in comprehensive policies and commitment towards addressing the complexities of international business travel (IBT), ultimately leading to insufficient and generalised assistance.

Recent years have witnessed a heightened focus on health and wellbeing, prompting certain airlines to make strides in improving the long-haul travel experience. It would be prudent for organisations and travel partners to engage in further dialogue and collaborations, aimed at comprehending the health hurdles faced by IBT. By melding distinctive traveller profiles encompassing aspects such as gender, age, medical history, motivations, and family commitments with on-flight data collection, potentially facilitated through wearables, surveys and diaries, a holistic business travel framework can be flexibly crafted. Such a plan would not only amplify employee productivity during corporate trips, but also address long-term health concerns.

The insights gleaned from this study, coupled with its recommendations, serve as a foundational platform for future research aimed at gauging and enhancing the wellbeing of IBTs. This understanding underscores the strategic advantage for organisations in nurturing and retaining this vital workforce segment. The research's aim is to resonate with a diverse array of stakeholders, including businesses, travel agencies, and service providers. Encouraging these entities to augment their offerings for their most valued clientele, could be instrumental in setting them apart through differentiation, rather than resorting to price-based competition.
As with any research, there are limitations to this work. The focus has been on employee wellbeing and the cascading effects on productivity, without addressing the carbon footprint

associated with the travel. While the most effective way to minimise GHG is to reduce the need for travel in the first place, many organisations are justifying business travel through the strategic, tactic, and operational roles of IBTs. Many companies are adopting measures such as: purchasing carbon credits to offset their travel-related emissions, investing in projects that reduce or capture an equivalent amount of GHG, purchasing eco-friendly accommodation, and organising more efficient itineraries, including trains/public transport. The efficiency of these measures is debatable. Thus, a joint approach, highlighting the travel effects on IBTs together with the carbon footprint may be more successful and companies will account for them in their triple bottom line (costs, productivity and wellbeing, as well as environmental impact).

References

American Airlines Group & Microsoft Corp. (2022, May 18). American Airlines and Microsoft partnership takes flight to create a smoother travel experience for customers and better technology tools for team members. Available at: https://www.prnewswire.com/news-releases/american-airlines-and-microsoft-partnership-takes-flight-to-create-a-smoother-travel-experience-for-customers-and-better-technology-tools-for-team-members-301549857.html (accessed 18 Apr 2023).

Anderson, J. (2015). Exploring the Consequences of Mobility: Reclaiming Jet Lag as the State of Travel Disorientation. *Mobilities*, 10(1), 1–16, https://doi.org/10.1080/17450101.2013.806392.

Archer, S.N., Laing, E.E., Möller-Levet, C.S., van der Veen, D.R., Bucca, G., Lazar, A.S., Santhi, N., Slak, A., Kabiljo, R., von Schantz, M., Smith, C.P., & Dijk, D.-J. (2014). Mistimed sleep disrupts circadian regulation of the human transcriptome. *Proceedings of the National Academy of Sciences - PNAS*, 111(6), 2063–2063.

Baer, A., Libassi, L., Lloyd, J.K., Benoliel, E., Brucker, R., Jones, M.Q., Kwan-Gett, T.S., McKeirnan, S., Pecha, M., Rietberg, K., Serafin, L., Walkinshaw, L.P., & Duchin, J.S. (2014). Risk factors for infections in international travelers: An analysis of travel-related notifiable communicable diseases. *Travel Medicine and Infectious Diseases*, 12(5), 525–533, https://doi.org/10.1016/j.tmaid.2014.05.005.

Bakker, A.B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psycholo*gy, 22(3), 273–285, https://doi.org/10.1037/ocp0000056.

Barish, R.J., & Dilchert, S. (2010). Human Resource Responsibilities: Frequent Flyer Radiation Exposure. *Employee Responsibilities and Rights Journal*, 22(4), 361–369, https://doi.org/10.1007/s10672-010-9159-6.

Beaverstock, J.V., Derudder, B., Faulconbridge, J.R., & Witlox, F. (2009). International business travel: some explorations. *Geografiska Annaler. Series B, Human Geography*, 91(3), 193–202, https://doi.org/10.1111/j.1468-0467.2009.00314.x.

Behrens, R.H. (1990). Protecting the health of the international traveller. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 84(5), 611,629–612,629, https://doi.org/10.1016/0035-9203(90)90123-V.

Bratton, D.J., Gaisl, T., Wons, A.M., & Kohler, M. (2015). CPAP vs Mandibular Advancement Devices and Blood Pressure in Patients with Obstructive Sleep Apnea: A Systematic Review and Meta-analysis. *JAMA: the Journal of the American Medical Association*, 314(21), 2280–2293, https://doi.org/10.1001/jama.2015.16303.

Bücker, J., Poutsma, E., Schouteten, R., & Nies, C. (2020). The development of HR support for alternative international assignments. From liminal position to institutional support for short-term assignments, international business travel and virtual assignments. *Journal of Global Mobility*, 8(2), 249–270, https://doi.org/10.1108/JGM-02-2020-0011.

Chalmers, T., Hickey, B.A., Newton, P., Lin, C.-T., Sibbritt, D., McLachlan, C.S., Clifton-Bligh, R., Morley, J., & Lal, S. (2021). Stress Watch: The Use of Heart Rate and Heart Rate Variability to Detect Stress: A Pilot Study Using Smart Watch Wearables. *Sensors*, 22(1), 151, https://doi.org/10.3390/s22010151.

Cohen, S.A., & Gössling, S. (2015). A darker side of hypermobility. *Environment and Planning. A*, 47(8), 166–1679, https://doi.org/10.1177/0308518X15597124.

De Frank, R.S., Konopaske, R. & Ivancevich, J.M. (2000). Executive Travel Stress: Perils of the Road Warrior. *Academy of Management Perspectives*, 14(2), 58–71. https://doi.org/10.5465/ame.2000.3819306.

Diesing, G. (2016). MILLENIALS Who they are, what they want, & why you need them. *Hospitals & Health Networks*, 90(11), 22–4, 26-27, PMID: 30005534.

Gustafson, P. (2014). Business Travel from the Traveller's Perspective: Stress, Stimulation and Normalization. *Mobilities*, 9(1), 63–83, https://doi.org/10.1080/17450101.2013.784539.

Harms, T., Olaru, D., Pattison, C (2019). Using wearable technology to analyse daily travel behaviour, *Australasian Transport Research Forum (ATRF)*, Canberra, 30 Sep-2 Oct.

Ivancevich, J.M., Konopaske, R., & Defrank, R.S. (2003). Business travel stress: A model, propositions, and managerial implications. *Work and Stress*, 17(2), 138–157, https://doi.org/10.1080/0267837031000153572.

Khan, Y., Ostfeld, A.E., Lochner, C.M., Pierre, A., & Arias, A.C. (2016). Monitoring of Vital Signs with Flexible and Wearable Medical Devices. *Advanced Materials (Weinheim)*, 28(22), 4373–4395, https://doi.org/10.1002/adma.201504366.

Knapton, S. (2014). Why night shift and jet lag make you feel so bad. The Telegraph 21 January, Available at: https://www.businessinsider.com/what-jet-lag-and-night-shifts-do-to-your-body-2014-1 (accessed 13 Mar 2023).

Li, X., Dunn, J., Salins, D., Zhou, G., Zhou, W., Schussler-Fiorenza Rose, S.M., Perelman, D., Colbert, E., Runge, R., Rego, S., Sonecha, R., Datta, S., McLaughlin, T., Snyder, M.P. (2017). Digital Health: Tracking Physiomes and Activity Using Wearable Biosensors Reveals Useful Health- Related Information. *PLoS Biol* 15(1), e2001402, https://doi.org/10.1371/journal.pbio.2001402.

Liese, B., Mundt, K.A., Dell, L.D., Nagy, L., & Demure, B. (1997). Medical insurance claims associated with international business travel. *Occupational and Environmental Medicine*, 54(7), 499–503, https://doi.org/10.1136/oem.54.7.499.

Mäkelä, L., & Kinnunen, U. (2018). International business travellers' psychological well-being: the role of supportive HR practices. *International Journal of Human Resource Management*, 29(7), 1285–1306, https://doi.org/10.1080/09585192.2016.1194872.

Nielsen, K., Nielsen, M. B., Ogbonnaya, C., Känsälä, M., Saari, E., & Isaksson, K. (2017). Workplace resources to improve both employee well-being and performance: A systematic review and meta-analysis. *Work and Stress*, 31(2), 101–120, https://doi.org/10.1080/02678373.2017.1304463.

Oxford Economics (2009). The ROI of US Business Travel. Available at: https://web.archive.org/web/20141020063758/http://www.ustravel.org/sites/default/files/09-10-09_Oxford%20Economics.pdf (accessed 28 Apr 2023).

Peck, S.H., & Gallago, A. (2022). Business traveler well-being. Available at: https://amadeus.com/documents/en/pdfs/business-traveler-wellbeing-whitepaper.pdf (accessed 20 Mar 2023).

Puchmüller, K., & Fischlmayr, I. (2017). Support for female international business travellers in dual-career families. *Journal of Global Mobility*, 5(1), 22–42, https://doi.org/10.1108/JGM-05-2016-0023.

Ramani, S. (2018). Welcome to the Mile-High (Health) Club. Available at: https://robbreport.com/travel/destinations/6-airlines-wellness-offerings-2825023/. (accessed 26 Apr 2023).

Rattrie, L., & Kittler, M. (2020). Ill-being or well-being? Energising international business travellers. *Journal of Organizational Effectiveness: People and Performance*, 7(2), 117–137, https://doi.org/10.1108/JOEPP-02-2019-0011.

Rattrie, L., Kittler, M.G., Cohen, S., & Chen, J.L. (2022). Does Job Demands-Resources Theory work for international business travel? *Journal of Transport & Health*, 26, 101366, https://doi.org/10.1016/j.jth.2022.101366.

Rogers, H. L., & Reilly, S.M. (2000). Health Problems Associated with International Business Travel: A Critical Review of the Literature. *AAOHN Journal*, 48(8), 376–384, https://doi.org/10.1177/216507990004800803.

Rundle, A. (2018). Just how bad is business travel for your health? Here's the data, Available at: https://hbr.org/2018/05/just-how-bad-is-business-travel-for-your-health-heres-the-data (accessed 7 Feb 2023).

Rundle, A., Revenson, T.A., & Friedman, M. (2018). Business Travel and Behavioral and Mental Health. *Journal of Occupational and Environmental Medicine*, 60(7), 612-616. https://doi.org/10.1097/JOM.0000000000001262

Singapore Airlines (2018, August 15). SIA And Canyon Ranch Announce Partnership To Enhance Customer Experience And Well-Being On The World's Longest Flights. Available at: https://www.singaporeair.com/en_UK/hr/media-centre/press-release/article/?q=en_UK/2018/July-September/jr1018-180815 (accessed 15 Apr 2023).

Statista (2022a). Expenditure of business tourists worldwide from 2001 to 2021, Available at: https://www.statista.com/statistics/1093295/business-travel-spending-worldwide (accessed 16 Nov 2022).

Statista (2022b). Market value of the business travel industry worldwide in 2020, with a forecast for 2028, Available at: https://www.statista.com/statistics/752327/value-business-tourism-worldwide (accessed 12 Mar 2023).

Striker, J., Dimberg, L., & Liese, B. H. (2000). Stress and business travel: Individual, managerial, and corporate concerns. *Journal of Organizational Excellence*, 20(1), 3–10, https://doi.org/10.1002/1520-6734(200024)20:13.0.CO;2-U.

Shaw, S., & Thomas, C. (2006). Social and Cultural Dimensions of Air Travel Demand: Hyper-Mobility in the UK? *Journal of Sustainable Tourism*, 14(2), 209–209, https://doi.org/10.1080/13688800600808013.

Shen, S., Xiao, X., & Chen, J. (2021). Wearable triboelectric nanogenerators for heart rate monitoring. *Chemical Communications*, 57(48), 5871–5879, https://doi.org/10.1039/d1cc02091a.

Sun, X., Wandelt, S., & Zhang, A. (2022). COVID-19 pandemic and air transportation: Summary of Recent Research, Policy Consideration and Future Research Directions. *Transportation Research Interdisciplinary Perspectives*, 16, 100718, https://doi.org/10.1016/j.trip.2022.100718.

Suutari, V., Brewster, C., Riusala, K., & Syrjäkari, S. (2013). Managing non-standard international experience: evidence from a Finnish company. *Journal of Global Mobility*, 1(2), 118–138, https://doi.org/10.1108/JGM-10-2012-0014.

Tufnell, M. L. A., Kause, J., & Iley, S. (2021). Pre-travel risk assessment for international business travellers during the COVID-19 pandemic. *Travel Medicine and Infectious Disease*, *44*, 102162–102162, https://doi.org/10.1016/j.tmaid.2021.102162.

Virgin Australia (2018). Sir Richard Branson and Virgin Australia hold world-first meditation flight with smiling mind. Available at: https://newsroom.virginaustralia.com/release/sir-richard-branson-and-virgin-australia-hold-world-first-meditation-flight-smiling-mind (accessed 28 Apr, 2023).

Welch, D. E., Welch, L. S., & Worm, V. (2007). The international business traveller: a neglected but strategic human resource. *International Journal of Human Resource Management*, 18(2), 173–183, https://doi.org/10.1080/09585190601102299.

Walker, W.H., Walton, J.C., DeVries, A.C., & Nelson, R.J. (2020). Circadian rhythm disruption and mental health. *Translational Psychiatry*, 10, 28, https://doi.org/10.1038/s41398-020-0694-0.

Wright, T. A., & Cropanzano, R. (2000). Psychological Well-Being and Job Satisfaction as Predictors of Job Performance. *Journal of Occupational Health Psychology*, 5(1), 84–94, https://doi.org/10.1037/1076-8998.5.1.84.

Xie, J., Wen, D., Liang, L., Jia, Y., Gao, L., & Lei, J. (2018). Evaluating the Validity of Current Mainstream Wearable Devices in Fitness Tracking Under Various Physical Activities: Comparative Study. *JMIR mHealth and uHealth*, 6(4), https://doi.org/10.2196/mhealth.9754.