



She moves

Women's Issues
in Transportation

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DISCLAIMER

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TIME FOR ACTION

The media tend to portray men as bold travellers, yet women throughout history have been daring travellers and have undertaken epic journeys of discovery. Even though few studies focus on the place and the role of women travellers, there is ample evidence of women as intrepid travellers and explorers, women and their families journeying to make a new life in remote parts of the world, and women making pilgrimages to distant holy places. In today's world, women travel widely for many diverse social and economic reasons, for instance for scientific discovery and research, employment in other countries, as journalists and war correspondents, and as tourists seeking new experience.

Little research has been done to understand the major obstacles and constraints encountered by women travellers of the past. Analysis of the present situation shows that there have always been major differences between men and women with regard to travel comfort, security and safety. Such issues have only recently gained the prominence in research.

Women's mobility in day-to-day life still diverges from that of men, even though the gender gap is slowly closing. Since the 1970s, gender issues have been considered in urban planning, but differences in mobility persist, for instance, women travel shorter distances closer to home and with less dependence on the family car.

WOMEN'S ISSUES IN TRANSPORT

The Fifth Conference on Women's Issues in Transport (WiiT) focuses on bridging the gaps between men and women, between rich and poor countries, and between knowledge and policy. To this end, the conference is directed to identifying and addressing the issues at stake in the transport system to enhance women's mobility and to make transport more gender neutral. This conference builds on the achievement of previous conferences, the first of which in 1978 analysed women's travel behaviour and conditions. The second conference held almost 20 years later expanded the scope from primarily research to include policy-making, planning and engineering processes. In 2004, participants were invited from all levels - national, regional and local - in



the public and private sectors. The fourth WiIT conference in 2009 was opened to a broader international audience and focused on personal safety and security, changing demographics, crash and injury prevention, and the impact of extreme events.

A key outcome of the 2009 Conference was the decision to broaden the focus to gender-neutral transport rather than to focus solely on women's issues. Defining gender-neutral transport with respect to values, needs, choice, constraints, and impacts, concepts that vary significantly with place and time, requires international collaboration. This was the inspiration to hold the 2014 conference for the first time outside the USA, in Paris with the focus on bridging the gap.

ISSUES AT STAKE

The key issues at stake to achieve gender-neutral transport have been identified as mobility, safety and security, employment and sustainability. While many of the issues in gender mobility and travel patterns have been extensively researched, they have received limited attention in developing gender-specific policies, programmes, and mandates. Studies are needed to explore methods for translating the findings of gender research into policy. In this respect, gender impact assessment of transport policies need to be carried out regularly to monitor their contribution to gender-neutral transport system.

GENDER DIMENSION IN EU RESEARCH

A priority in EU research policy is the integration of the gender dimension into projects funded and cofunded under the European Commission's Research and Innovation Framework Programme. The recently adopted **Horizon 2020** for the period 2014 to 2020 is structured to respond to societal challenges that need of innovative solutions. Innovation is needed in transport to meet worldwide challenges such as reducing greenhouse emissions and fossil fuels dependency without curbing mobility. Consideration of gender issues in research and innovation is paramount in developing the knowledge base to support the development of a sustainable transport system responsive to the needs and constraints of all components of the society.



SARTRE - SOCIAL ATTITUDES TO ROAD TRAFFIC RISK IN EUROPE

The number of women drivers in the European Union has steadily grown by 3.5% in the last decade, a trend largely attributed to the changing role of woman in society. This was a finding of the large-scale SARTRE survey of opinions and reported behaviour of car drivers in the European Union. Since 1991, more than 24,000 drivers have participated in interviews and questionnaires in four multi-country surveys on driver behaviour, attitudes and experience.

The SARTRE findings are in line with other studies that show female drivers have a more positive attitude to traffic regulations and safety; have committed fewer traffic offences; and have been involved in fewer road accidents than men. This is contrary to the opinions of some specialists who claim that as more women are driving they may adopt a "male" style of driving and so the number of road accidents involving women may increase.

Just over 50% of the population are women (average 51.3%; UNECE Statistical Division Database) and in 2010, the percentage of women in the driver population was 45%, but the percentage varied between EU Member States.

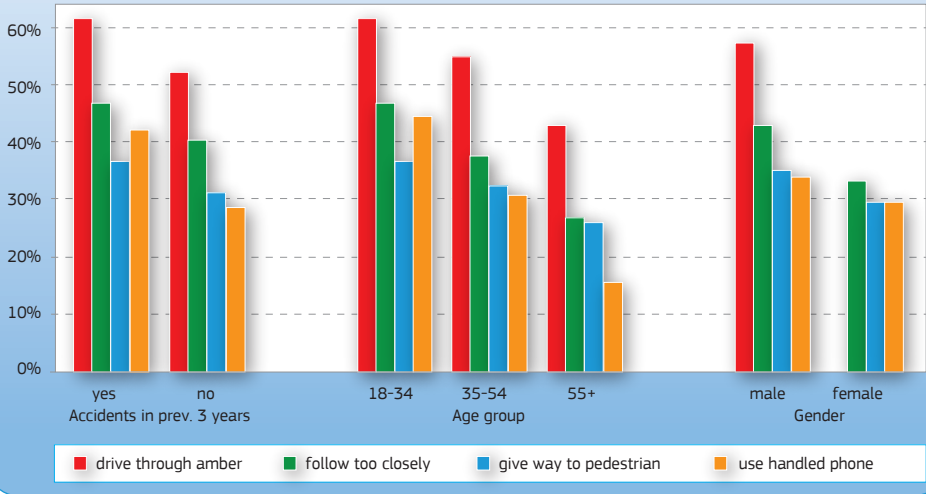
Table 1: Proportion (%) of women drivers in the countries surveyed in the SARTRE project

	SARTRE 4 (2010)		SARTRE 3 (2001)		Change
	Male	Female	Male	Female	2010-2001
Serbia	72.8	27.2			
Poland	65.9	34.1	76.8	23.2	11.0
Hungary	64.2	35.8	66.6	33.4	2.4
Czech Rep.	57.2	42.8	63.9	36.1	6.8
Greece	57.1	42.9	75.0	25.0	17.9
Spain	56.9	43.1	59.4	40.6	2.5
Germany	56.8	43.2	55.1	44.9	-1.7
Italy	56.4	43.6	48.5	51.5	-7.9
Israel	56.3	43.7			
Slovenia	55.9	44.1	57.1	42.9	1.2
Belgium	55.8	44.2	52.6	47.4	-3.2
Cyprus	55.3	44.7	49.3	50.7	-5.9
SARTRE	55.0	45.0	58.8	41.2	3.8
Austria	51.7	48.3	52.2	47.8	0.5
France	51.1	48.9	54.3	45.7	3.2
Finland	49.9	50.1	60.5	39.5	10.6
Ireland	49.8	50.2	57.3	42.7	7.5
Netherlands	47.9	52.1	58.0	42.0	10.1
Sweden	46.3	53.7	51.6	48.4	5.3
Estonia	36.0	64.0	63.4	36.6	27.4

Source: European road users' risk perception and mobility, The SARTRE 4 survey

Figure 1: Potential risky driving behaviour

In 2010, the relationship between risky driving behaviour and accident involvement was shown to be closely linked to age and gender. Younger drivers and men drivers were more prone to risky driving behaviour than older drivers and women drivers. This finding is in line with other studies (Rhodes & Pivik, 2011).



Source: European road users' risk perception and mobility, The SARTRE 4 survey

The gender ratio was found to differ in the various road user categories. For instance, only 13% motorcyclists were women but this proportion varied from 4% in Hungary and Serbia to 30% in Italy. Two-thirds of the other road user group were women, with slight variation between countries.

Table 2: Proportion of female participants in each road users group

	Motorcyclists	Car drivers	Other road users		Motorcyclists	Car drivers	Other road users
Austria	14%	48%	57%	Ireland	7%	50%	66%
Belgium	10%	44%	66%	Israel	15%	44%	63%
Cyprus	14%	45%	64%	Italy	30%	44%	50%
Czech Rep.	17%	43%	53%	Netherlands	26%	52%	61%
Estonia	8%	64%	87%	Poland	7%	34%	60%
Finland	11%	50%	78%	Serbia	4%	27%	53%
France	23%	49%	60%	Slovenia	6%	44%	79%
Germany	12%	43%	72%	Spain	19%	43%	68%
Greece	13%	43%	88%	Sweden	19%	54%	70%
Hungary	4%	36%	72%	Total	13%	45%	66%

Source: European road users' risk perception and mobility, The SARTRE 4 survey

Differences were found between men and women in their motivation for walking, cycling or using public transport. While slightly more men than women preferred these alternatives to the car for financial reasons, there were no significant differences between the genders with regard to health reasons. Yet, women were more prone than men to choose walking, cycling and use of public transport for environmental reasons, a finding that was statistically significant.

Women were more motivated to walk, cycle or use public transport for reasons of physical exercise or fear of driving. The proportion of women with a fear of driving was more than twice as high as men, 18% versus 7%. The difference between the genders was statistically significant in most countries.

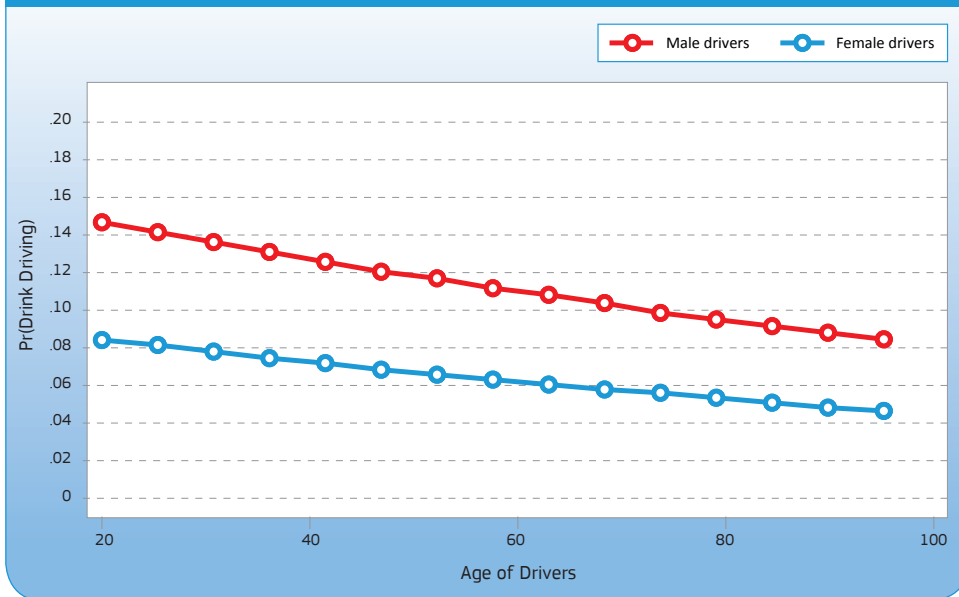
Among male car drivers the rate of those already punished for speeding is significantly higher by 10 per cent-points than among females. This statement applies equally for car drivers and motorcyclists.

Table 3: Penalty for breaking the speed limit (%)

		Gender		
	%	Male	Female	Mean
No punishment	car drivers	71.6	82.6	76.6
	motorcyclists	79.5	89.1	80.8
fined and/or other penalty	car drivers	28.3	17.3	23.4
	motorcyclists	20.5	10.8	19.2

Source: European road users' risk perception and mobility, The SARTRE 4 survey

Figure 2: Predicted probability of driving over the legal limit



Source: European road users' risk perception and mobility, The SARTRE 4 survey



EQUITY THROUGH MOBILITY

THE ISSUES AT STAKE

Mobility patterns of men and women differ significantly in many ways. Women are more likely to travel shorter distances and to stop more frequently than men during their journey. Changes in the social role of women in the last few decades, particularly wider access to employment, have had an impact on female mobility patterns, with more women driving and using the family car.

The gender division of household roles and responsibilities affects individual mobility. Although differences are decreasing between women and men in caring tasks and responsibilities, women still spend significantly more time than men on these tasks. Women responsible for the mobility of other family members are often involved in a complex spatial-time organisation with specific transport requirements. In many cases, this prevents or restricts the use of public transport, thus reducing motility - the capacity to be mobile geographically and socially.

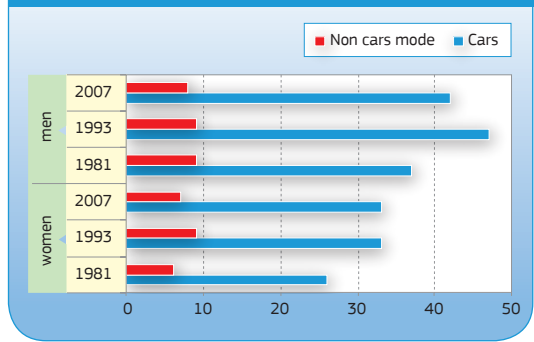
To include caring tasks in public transport planning, the innovative concept of 'mobility of care' is used to identify the number of trips made for this purpose. Including these data in 'trip chaining' analysis (number of stops per journey) will support the design and implementation of more equitable and responsive public transport services and more efficient urban planning. Regular and systematic gender impact assessments are essential for designing and implementing gender-neutral transport.

GENDER-AGE DIFFERENCES

While there is a clear-cut gender gap in mobility patterns in the age group 35-54 years, the gap narrows

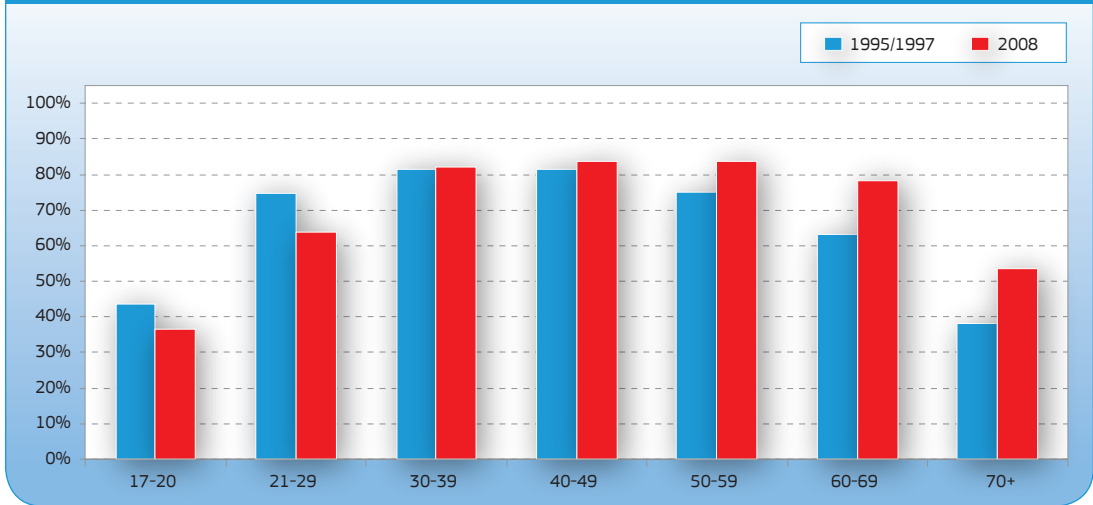


Figure 3. Average kilometres per trip per day



Source: IFMO, 2012, *Mobility Y-The Emerging Travel Patterns of Generation Y.*

Figure 4. Proportion (%) of licences drivers per age group in the United Kingdom



Sivak, M., Schoettle, B. (2011). *Recent Changes in the Age Composition of Drivers in 15 Countries*. UMTRI, Michigan

in older age groups and also in the younger age group, the Y generation, which has adopted new behaviour in mobility and transport.

Women over 54 are part of the X generation, with more access than their mothers to the family car and to car driving. As they grow older, the habit of personal mobility is not so easily abandoned and comes closer to that of men in the same age group. Similarly, young men and women in the Y generation are coming closer together in their mobility patterns (see *Highlight*).

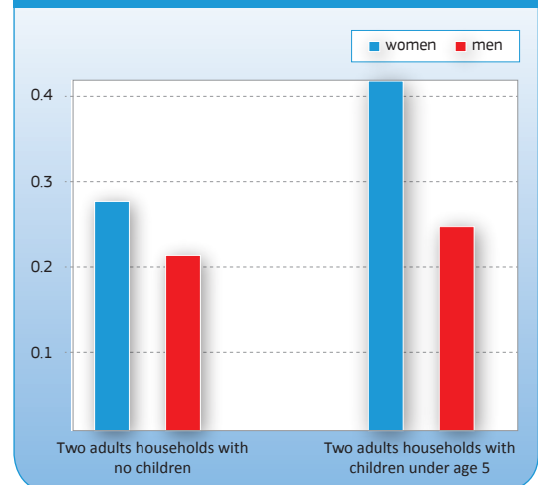
MOBILITY PATTERNS

Understanding transport patterns and mobility is fundamental to the development of evidence-based, gender-sensitive policies. Policies have to be designed that provide an enabling environment for both men and women to share safe, secure, accessible, reliable and sustainable mobility, and non-discriminatory participation in transport. Gender-sensitive transport policies that serve men and women equally have to be based on knowledge and understanding of mobility determinants, monitoring and evaluation of the impact they generate, as well as incentives, regulations, and measures for more non-discriminatory and sustainable transport.

Policies to stimulate equity in mobility need to be based on gender socio-economic research, and sharing experience and good practice in gender-

sensitive policies. However, the social conditions for women vary widely between and within countries in terms of culture, finance, localisation, and special needs. Thus, data disaggregated by gender and socio-economic factors, such as income, family status and employment status, are needed to provide the basis for science-based transport policy that adequately address gender differences.

Figure 5. Average number of stops per journey, USA, 2001



Source: Schiebinger, L., Klinge, I., Sánchez de Madariaga, I., Schraudner, M., and Stefanick, M. (Eds.) (2011-2013). *Gendered Innovations in Science, Health & Medicine, Engineering, and Environment* (genderedinnovations.stanford.edu).

THE Y GENERATION: CLOSING THE BEHAVIOURAL GAP

The Y generation of young adults is breaking with established mobility and travel patterns. In the last decade, the dominance of the private car has decreased in the mobility of this age group in industrialised countries (UK, USA, France, Japan, Germany, Norway, Canada, Denmark). Young men are driving less and obtaining their driver's licence later, while young women are using the private car more and obtaining a driver's license much earlier than men in the same age group.

INDICATORS FOR THIS TREND

Car availability measured in terms of a driver's license and ownership of a household car has fallen in the Y generation but has remained stable for young women.

Car usage has decreased as the first choice for mobility but has increased for women in all age groups in all countries. While the average annual distance travelled by car has declined, the decrease is higher for men and in cities than in rural areas.

Multi-modal travel is being adopted by the Y generation, thus reducing car use for short distances and also increasingly for long distance travel.

REASONS FOR CHANGING TRENDS IN CAR USAGE

A key factor in the reduction in car usage is related to the lifestyle of the Y generation. Young people are staying longer in fulltime education and entering the job market later, living longer with their

parents, becoming parents later, and more of them especially women are living in cities. Furthermore, public transport has continued to evolve in terms of comfort, speed and cost including high speed trains, lower cost air travel, and reduced travel costs for students.

Analysis of changes in mobility patterns of young adults opens new perspectives for transport planning, and for a greener and more equitable transport system that takes account of different needs of young people in urban and rural areas.

More research is needed to project scenarios for future mobility, taking into account changing mobility trends, and the socio-economic evolution in urbanisation, job instability, and new family structure. A clear focus on gender roles is essential in planning transport policies and mobility schemes to respond to the evolving societal demand.



CATHERINE COUELLE

Representative at the Parlement for the Vienne department. Chair of the Parlement Committee for Women's rights and Equality of chance for women and men, Representative at the City of Poitiers in charge of transportation and Chair of the NGO "femmes en mouvement", France

Two-thirds of public transport users in urban areas are women. It is essential to know why and how they use public transport in order to design services that meet their expectations in terms of spatial mobility as well as social and professional mobility.

Women have the responsibility to make themselves heard, express their expectations so that appropriate policies for fairer, more efficient and sustainable transportation can be developed. In this respect, women employees are needed in all transport sectors and particularly in management positions to create gender parity in decision-making in public transport authorities.

The priorities are better accessibility, reliable timetables, regular and safe services. Transport is a vehicle to increased autonomy and equality for women, providing access to the world of work and contributing to social integration.



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GENDER NEUTRAL SAFETY

THE ISSUES AT STAKE Statistics show a divergent trend in road accidents between men and women with fewer women than men involved in fatalities even though the gender gap closes with increasing age. This divergence may be explained by differences in attitudes to risk taking, with biological differences, such as high testosterone levels in young men, partly accounting for the higher percentage involved in fatal accidents (see Figure 6). Other causes should also be analysed, such as traditional education patterns that tend to accept more risky behaviour in boys than in girls, who are more likely to be protected and sheltered in a safer environment (see cycling attitude in Sustainability).

ATTITUDES TO RISK

However, the traditional gender gap in attitudes to transport is closing as girls are educated in a more similar way to boys and are less subject to social pressures regarding their behaviour (see example of early license holder under Mobility). As the traditional gender gap closes, women are increasingly more exposed to serious accidents, often because of their attitude to risk. For instance, alcohol consumption and drug use in young women are coming closer to that of young men, exposing them to a more danger, even if as yet not in more road fatalities.

The perceived cognitive differences between the genders could have the same basis in education patterns, with some studies even arguing a biological difference originating in the traditional gender share of tasks in the Stone Age (the man was the *hunter* and the woman the *child-minder* and *gatherer*, leading to different social behaviours). More research is

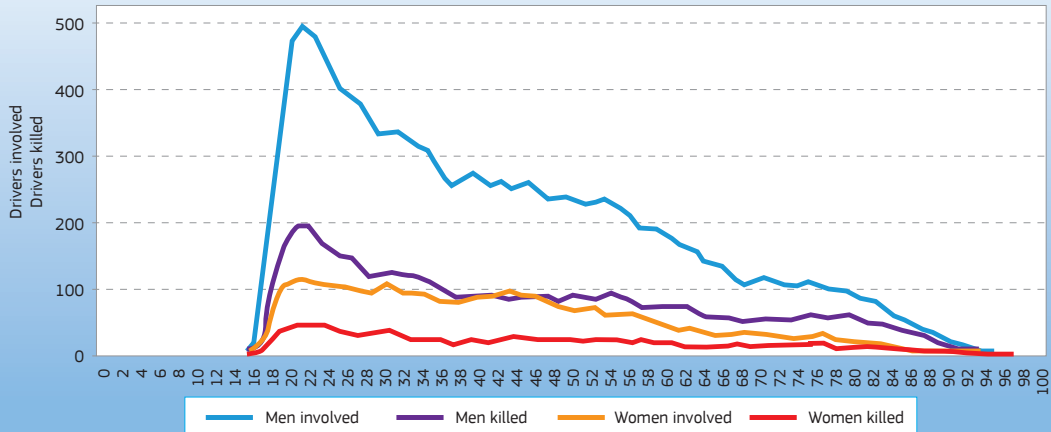
required to gain better understanding of the differences claimed. For instance, more research is required on distracted driving in order to develop and implement effective preventive measures, and gendered analysis can contribute knowledge and understanding leading to gender-targeted measures.

VEHICLE DESIGN

Differences in body structure and biology between men and women are a key issue with regard to vulnerability in car crashes. Car design needs to be modified to accommodate the differences in ergonomics between the genders. Recent research using a specially designed dummy of the average female body showed differences in reaction to passenger restraint systems and increased vulnerability of women to injury. Innovative design of vehicles and passenger restraint systems that correspond more closely to the biomechanics of women are being investigated, but market introduction is slow and with

Figure 6. Car fatalities and injuries

The number of car drivers involved in fatal accidents differs significantly between 20-year old men and women.



Source: CARE database

little support by manufacturers. A dummy model of a pregnant woman specially developed for use in the redesign of seat belts illustrates a new approach in gender-based research that incorporates the needs of all groups in society.

Based on differences in anthropometrics, ergonomics for both men and women need to be incorporated into guidelines for innovative design of vehicles, in-

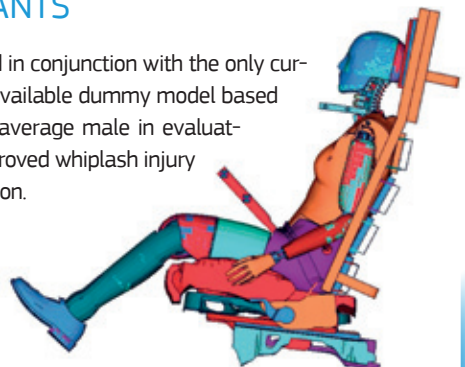
frastructure and transport equipment. It is becoming increasingly urgent for operators to be made aware of the different needs of women consumers. Scientific evidence is needed to support an innovative approach to the concept, design and production of vehicles and infrastructure with appropriate safety levels for all users – women, children, elderly, and people taller, smaller or larger than the norm – of private and public transport.

NECK INJURIES TO WOMEN CAR OCCUPANTS

Whiplash injuries can lead to severe pain and suffering, and may result in substantial cost to society. Women have a 1.22 to 3.1 times higher risk of sustaining whiplash injuries than do men. ADSEAT focused on evaluating the protective performance in reducing whiplash associated disorders of an innovative seat design that can be adjusted to support both men and women.

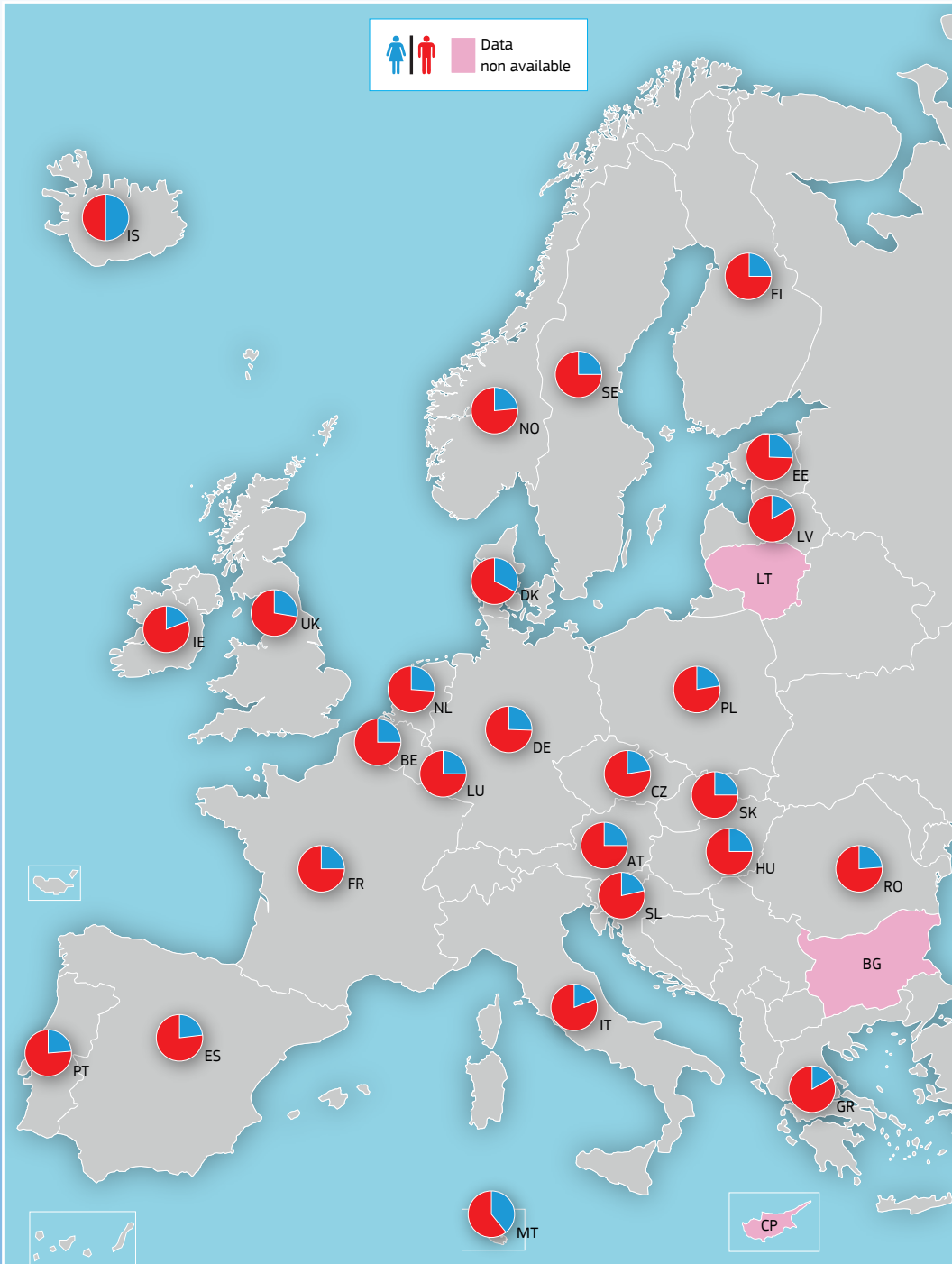
Based on anthropometric data, a virtual (computerised) dummy model of the average female body EvaRID (Eva female, RID – Rear Impact Dummy) will

be used in conjunction with the only currently available dummy model based on the average male in evaluating improved whiplash injury protection.



ADSEAT: Adaptive Seat to Reduce Neck Injuries for Female and Male Occupants Funded under the EU Seventh Framework Programme

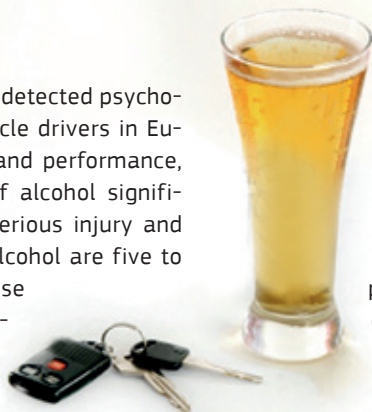
Figure 7. Percentage of women killed in car accidents is constant, regardless of the safety level in the country



Source: CARE database

DRINK DRIVING

Alcohol is the most frequently detected psychoactive substance on road vehicle drivers in Europe. Impairing driving skills and performance, driving under the influence of alcohol significantly increases the risk of serious injury and fatality. Drivers impaired by alcohol are five to eight times more likely to cause a fatal accident, and the fatality risk increases 15 to 21 times for highly intoxicated drivers. While men are responsible for a significant proportion of drink and drive incidents, evidence indicates that the number of women arrested for drink drive offences is increasing, especially in the USA. There in 1980, just 9% of those arrested for drink driving were women with the percentage rising to almost 15% by 1996 and 20% by 2004 (TIFT, 2011), and continued to rise by 28.8% between 1998 and 2007. While the number of arrests has increased, the number of women involved in car accidents and road deaths have not.



There are some differences between men and women with regard to alcohol and driving. Women, arrested for drink driving are more likely to live alone or with a partner with an alcohol problem, to be older, have higher education level but in lower paid jobs, and have factors contributing to an alcohol problem such as family history, trauma, abuse or relationship problems. These differences between men and women need to be considered in developing effective rehabilitation. The European Commission co-funded DRUID (Driving Under the Influence of Alcohol, Drugs and Medicines) has developed Europe-wide standards and recommendations for rehabilitation, which underline the need to tailor rehabilitation to the type of offender including a gendered approach.

Source: DRUID, 2012; Traffic Injury Research Foundation, 2011



MARÍA SEGUÍ GÓMEZ

Directora General, Dirección General de Tráfico, Ministerio del Interior Spain

The fact that nowadays women have more intense transport needs means we have to decide whether the private car is the most efficient for our purposes. The first priority is to bring rationality to travel and to avoid “I drive because I can”. However, when the private car is indeed the most efficient option, the focus has to be on choosing the safest vehicle, the safest possible road, and observing the safety rules of speed limits, using seat belts and head rests, and not driving under the influence of drugs, alcohol or medication.

Transport safety is everyone’s responsibility. In reducing the risk of a car accident, specific messages should be addressed to women. For example, physiological differences make women more susceptible to higher alcohol blood limits with less alcohol consumed than men, or the importance of an appropriate headrest setting, and the value of safety belt use in pregnancy. The car industry needs to incorporate women’s physical characteristics in terms of ergonomics and force tolerance in vehicle design. Ideally, this should be done on a voluntary basis, but authorities may need to push for safety performance tests to include biofidelic female models. Industry, consumer associations and government should also empower women educating them to purchase and use safer cars.



GENDER PERCEPTIONS OF SECURITY

THE ISSUES AT STAKE Since the 9/11 attacks, airport security measures have been substantially reinforced, but with the drawback of longer check times and more privacy-sensitive procedures, such as body scanners. While the resulting delays and inconvenience have become the norm for air passengers, this is not the case for rail, bus and metro travellers, who transit daily in their thousands through stations and in vehicles. These travellers are highly vulnerable, as shown by the bomb attacks in Madrid in 2004 and in London in 2005.

Concerns arising from these attacks have led to significant investments in protective measures at public transport stations. However in these environments, it is practically impossible to physically screen the thousands of passengers passing through daily. Better security requires smarter processing and dynamic control while respecting passenger privacy.

PERCEIVED SECURITY

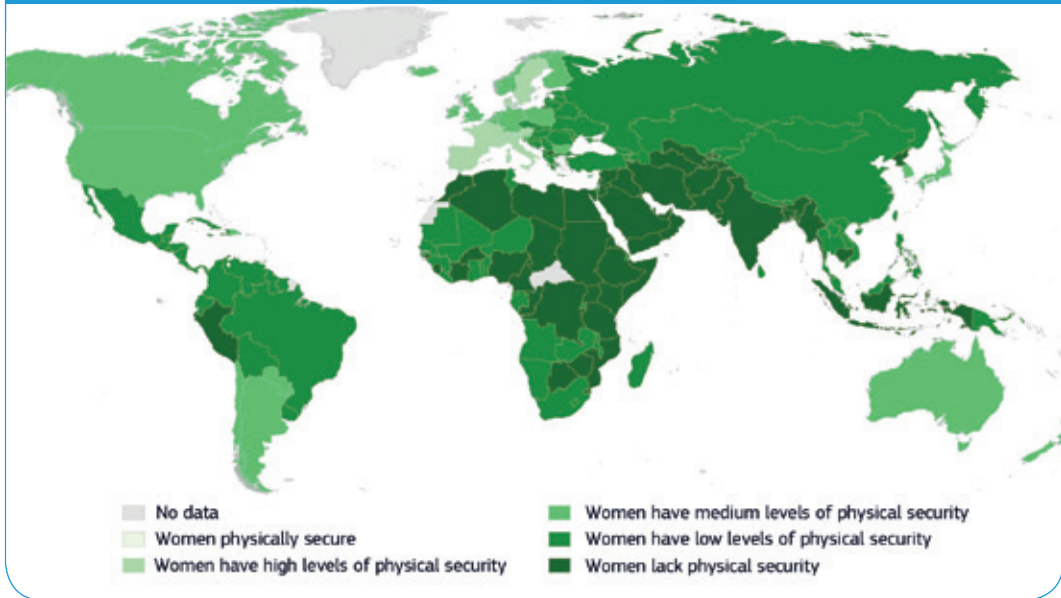
In spite of progress made in improving the security of public transport, significant fears still remain. Women passengers especially are concerned about travelling at certain times of the day and under certain conditions. Women do not feel safe travelling alone at night, travelling alone with small children, travelling through depressed neighbourhoods with high crime rates, or during long waits on deserted stations.

Most incidents involving women on public transport reported in the USA are not Type 1 crimes such as rape and aggravated assault, but are more likely to be intimidation, groping, or verbal assaults that are difficult to substantiate (Loukaitou-Sideris, et al., 2009).

Not only public transport is considered unsafe for women. In the United Kingdom, 62% of women are afraid to be alone in a multi-storey car park at night, 61% feel unsafe in underground stations, and 60% on railway platforms. Most women feel unsafe in crowded transport services where harassment and groping can occur.

In some countries, women-only wagons have been introduced as a measure to reduce the vulnerability of female passengers. This “exclusive” method of dealing with the security of women in public transport is

Figure 8. Women's Physical Security in 2010



Source: The WomanStats Project, July 2010

increasingly being replaced by a more “inclusive” attitude. This extends responsibility for ensuring security to all travellers and highlights the social responsibility of security and respect of women.

In terms of traffic accidents, public transport is inherently safer than private transport. However, there is an urgent need to improve effectiveness of security measures so that people are not discouraged from us-

ing public transport. This is particularly the case for women, who rely more on public transport than do men, and for whom public transport is less safe in terms of violent assault (Khan, 2013).

TECHNOLOGY SOLUTIONS

New technologies such as closed circuit TV surveillance (CCTV) have been introduced to increase surveillance in public spaces. But such measures are not always considered by women to be the most appropriate for their security. Uncertainty about the effectiveness of CCTV and the response of security staff means that these measures tend to be considered as good backup but not a substitute for visible human presence.

Other technologies, such as real-time information displays and Internet services, are effective in reducing waiting time in unsafe environments and thus increase the level of perceived security by female passengers.

However, involving women in planning and design of public transport stations and systems enables them to express their concerns and work together on appropriate solutions.



BETWEEN STOP SERVICE

DESCRIPTION	
<p>“Between stop” is a service available to passengers who, after a certain time at night, feel that their safety may be at risk and are given the opportunity to ask the driver to get off the bus between regular bus stops.</p>	
BENEFITS	POTENTIAL ISSUES
<p>✓ Safety: Passengers can feel safer using public transit at night</p>	<p>✓ Speed: May slow down service by increasing the number of stops</p> <p>✓ Safety: May cause traffic confusion, although bus drivers are expected to gauge whether there are any traffic-related risks before stopping</p>
COSTS / BUDGET	
<p>There is no direct cost associated with this service.</p>	
EXAMPLE: “ENTRE DEUX ARRÊTS / BETWEEN STOPS”, STM, MONTRÉAL	
<p>In 1996, the STM (Montreal, Quebec) has implemented the Between Two Stops initiative to provide women traveling on their own at night the opportunity to ask the bus driver to stop between two regular stops. The woman must ask the driver one stop in advance, then the driver determines if it is safe to bring the vehicle to a halt at the requested stop.</p> <p>This service is also available in Whistler, British-Columbia (“Request A Stop”) and Sherbrooke, Quebec (“Entre Deux Arrêts”)</p>	
ADDITIONAL RESOURCES & INFORMATION	
<p>UITP. “Entre deux arrêts - Between two stops (Montreal, Canada).” <i>UITP Public Transport and Social Inclusion - Good Practices</i>. Oct. 2008. Sept 27.</p> <p>http://www.uitp.org/public-transport/urban/PDF/D_Entredeuxarrets_new.pdf.</p>	

Source: Public Works and Government Services Canada, *Improving bus services*, 2012





SUSTAINABILITY AND THE WIRELESS REVOLUTION

THE ISSUES AT STAKE The goals and measures to achieve more sustainable transport are not gender-neutral but as yet, very little gender analysis of sustainable mobility has been carried out.

As with all aspects of sustainable development, sustainable transport embraces three key dimensions. In terms of *environmental* sustainability, the focus has been on cutting emissions and reducing noise hindrance with research on alternative fuels and low-carbon transport technologies, and on higher resilience of transport infrastructure. In the *economic* context, sustainable transport entails green growth and jobs and largely focuses on strategies for decarbonisation with the introduction of electric cars and high speed trains to shift passenger traffic from cars and short haul flights.

Yet little is known, for instance, about the potential impact of the electric car on women's mobility. Current performance of electric vehicles corresponds more closely to female than to male mobility patterns (see *Mobility*). But the first vehicles on the market are not affordable for most women on lower incomes, or women who rely on the family car (see *Access to job market*).

Green growth also implies sustained growth in high quality jobs, targeted at improving public transport and mobility management. This includes establish-

ing mobility centres, promoting customer friendly intermodal mobility systems, promoting innovations in mobility services and transport technologies, awareness raising, training and education. This new market can offer opportunities for women with more equity than in the more traditional markets.

More women than men use low-carbon transport modes, such as public transport and walking, although conditions do not always respect the specific needs and constraints of women (see *Highlight*). Action is called for in raising awareness and implementing measures to achieve equal use and benefits of a sustainable transport system by both men and women.

The third dimension of sustainability is social equity. It is achieved through measures to ensure greater mobility for all including the elderly and the disabled, and ensuring the same level of mobility and service for people in urban and rural areas. Consideration of 'mobility of care' (see *Mobility*), which mainly concerns women, should be part of any plan to achieve this aspect of sustainability.

WIRELESS REVOLUTION

Sustainable mobility is a major challenge of the 21st century addressed by numerous research domains and public policies. The revolution of Internet, smartphones and wireless technologies is contributing to sustainable mobility and has a potential impact on transport accessibility for more vulnerable societal groups, such as women and the elderly. Information and communication technologies can also contribute to reducing the environmental impact and offers new market opportunities for green businesses.

Intelligent Transport Systems (ITS), such as traffic management, contribute to reducing congestion and travel time, and journey planners provide information on travel options. Opening access to multimodal journeys, ITS contribute to more inclusive mobility. Women could benefit from the various services

provided by ITS to adapt the mobility offer to their needs. Provision of real-time information can facilitate better planning of daily journeys in terms of route and timing, a shorter waiting time in perceived dangerous situations (see *Security*), and assist drivers to improve safety and security. However, gendered analysis is required to assess what needs can be met by ITS and the impact on mobility behaviour.

Little research has been done on the gender relevance of human-machine interfaces (HMI), and specific needs of women to be addressed by innovative ICT technologies. In this respect, more women entrepreneurs need to be involved in the ITS market (see *Access to Job Market*) and in the development of innovative services to ensure that those deployed are equally beneficial for all groups in society.

GENDER DIFFERENCES IN ADOLESCENT ATTITUDES TO ACTIVE TRAVEL

The decline in physical activity by children, particularly adolescent girls, is well documented. A recent study explored attitudes to active travel of children in the age group 11-16 years, and age and sex differences in their perceived ability, self-efficacy, and sensitivity to certain environments and facilities.

The Family Activity Study, a multi-year longitudinal intervention in Portland, Oregon (USA), surveyed 490 children on their attitudes, perceptions, and behaviour with regard to walking, bicycling and being driven in the car.

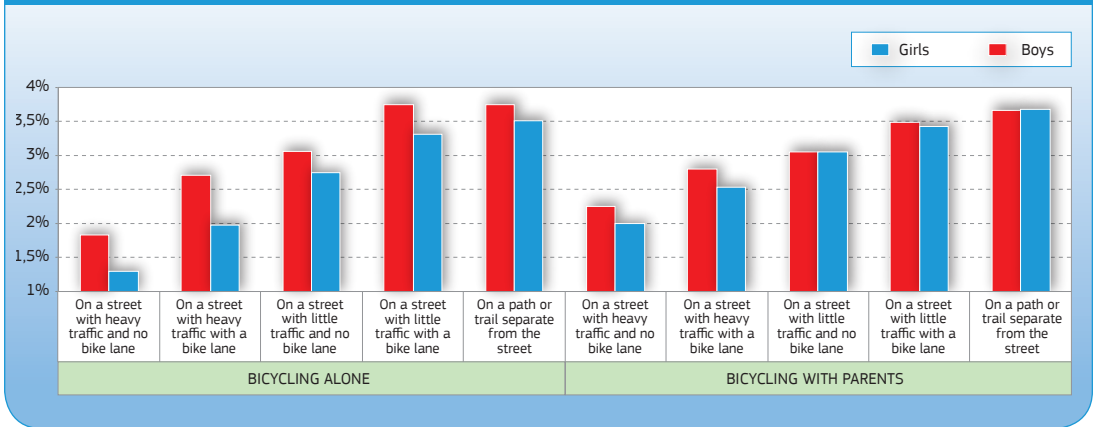
The analysis showed the expected gender gap in views about active travel, particularly in adolescents.

No differences were found between the younger boys and girls in their attitudes to cycling. However, adolescent girls were more likely than boys to report embarrassment about riding a bike and about avoiding falls and injury. For girls more so than boys in the study group, the judgement of their peers is reflected in their self image and is thus another element that could hinder participation in physical activity. These insights into attitudes about active travel and physical activity suggest possible interventions to positively affect the attitudes of adolescent girls about cycling and walking, and to increase these activities with a positive health impact.

Source: Goddard and Dill, 2013.



Figure 9. Comfort levels for bicycling on different Infrastructure, Portland, Oregon 2010-2011



Source: Goddard and Dill, 2013.



LUISA PRISTA

Head of Unit Eco-innovation, European Commission, Directorate General for Research and Innovation

It is common understanding that sustainability is a “female” value, and various research studies have confirmed that women tend to have more sustainable behaviour than men. However, measures to enhance sustainability are rarely subjected to gender impact analysis. And when they are, measures are often considered in isolation rather than as part of a complex and interconnected system. As a result, effects and impacts are underestimated.

This is the case in mobility, where women are playing a pivotal role in the transition to sustainable mobility. This transition requires new thinking and new innovative solutions - technological, organisational and social - across the transport system and economic sectors and engaging all actors, particularly the users. Women and gender considerations are essential in new mobility systems, such as car sharing or leasing, multimodal transport, and green transport.

Women are agents of the change. They may be ‘owners’ of new business models, entrepreneurs, or new users driving demand and specifying new requirements. Public transport should take into consideration the differences in the ways women and men use transport, such as travelling with children, carrying heavy bags, and travelling short distances that require frequent transfers.

While use of IC technology contributes real-time information for smoother and seamless travel planning, these systems are not a panacea. Information systems need to be designed to respond to the diverse needs of users. Modern technology is sufficiently powerful to supply tailor-made solutions that enhance the efficiency of the system to meet the needs of all users.

Research needs to continue in this direction to achieve a responsive mobility system that is energy efficient, economically viable to respond to users, and that contributes to social integration meeting the needs of all components of the society. Let’s take the gender dimension seriously and consider women as key stakeholders in sustainable mobility.



ACCESS TO THE JOB MARKET

THE ISSUES AT STAKE Employment is closely related to access to transport and mobility. Research has shown that access to transport and availability of social services are not equal for men and women. As a consequence, there are inequalities in access to the job market and limitations to women's participation in economic growth.

While women's participation in the labour market has steadily increased in the last few decades, employment rates for men and women still differ. This may be explained to some extent by the broad division of household tasks and responsibilities between men and women. Faced with heavier family responsibilities, women tend to take jobs closer to home within shorter commuting distances, and are often in part-time jobs with lower remuneration.

A large number of women find employment in service sectors such as health care, education, catering and cleaning, with irregular working hours. Income levels are often low because many women are in part-time employment. In 2010, 31.9 % of women in employment in the EU27 were working part-time compared to only 8.7 % of men.

Part-time employment has been actively supported by labour policies that stimulate employment opportunities with flexible working hours enabling women to contribute financially to the household. However, flexible work times are often hindered by infrequent public transport services outside peak hours. Yet, women in low-income households with limited access to the

family car have to depend on public transport. Meeting their mobility needs requires measures to stimulate more suitable and innovative transport systems, such as personal on demand transport services and corporate transport services.

GENDER GAP NARROWS

The gender gap with regard to transport and access to the job market narrows as women's educational and economic levels rise. This trend can be explained by several factors such as living in less 'emarginated' places, better able to afford personal transport, and having higher employment status.

In this respect, the term *motility* is used to describe an individual's capacity to be mobile through *access*, *competence* and *appropriation*. Access covers the range of service options available to an individual and *conditions* for using them at certain times and places. Competence is the individual's skills and abilities to use the different forms of movement available. Appropriation is the consideration of the appropriateness of specific mobile behaviour and the assessment of own skills, access or decision referred to different types of movement (Kjaerluff, 2011).

Based on socio-economic level, *options* - depending from spatial distribution of people and infrastructure, and *conditions* - an individual's barriers to use a form of movement tied to their socio-economic position - vary with transport means used and the type of employment.

For example, the trend for professionals, such as journalists IT specialists and consultants, is from physical mobility to 'virtual' or new forms of mobility with reduced physical movement. Access to this new form of mobility requires increased competence. For instance, the 'connected traveller' has the option to integrate information about access to transport and personal needs for mobility, thus increasing the competence to be mobile. Accessibility and affordability of these new forms of communication and information are at present the privilege of the well educated and of young

people. Their use should be expanded to all societal levels and groups, and particularly for women in closing the gap arising from differences in access to the transport system.

EMPLOYMENT IN THE TRANSPORT SECTOR

Data indicate that the number of women in employment has increased in the last ten years, but they are still in a minority in the transport sector, especially in road transport. While little research has been done on the employment of women in transport, the sector is not adapted to their needs and many barriers hinder their full participation on the work floor and in management and supervisory roles.

One of the main barriers is male-centred ergonomics and working conditions that do not provide a comfortable work environment for women. These factors include male-focused ergonomics of bus and truck driver's cabins and seats, lack of separate hygiene facilities in rest places, and non-targeted security measures for drivers of public and commercial vehicles. Furthermore, work times and working schedules, especially in the rail sector, are often incompatible with family life and are not conducive to the employment of women.

Adaptive measures to respond to women's ergonomic requirements have been explored (*see Highlight*), but more research and policy actions are needed to create equal employment opportunity in transport sector.

From data available, few women hold supervisory and managerial positions and most are confronted by the glass ceiling, even more so than in other sectors. The limited participation in higher management levels can be explained by several factors. Little is known about the job opportunities for women in the male transport environment and career advice tends to favour young men, perhaps re-enforced by gender stereotypes. Increasing numbers of women are studying engineering, only to be faced with a male-dominated work market, in which female needs and values are not prioritised, thus making the transport sector less attractive for work opportunities. Focused action plans are urgently needed to change the sector's image and to open technical and management opportunities for women (*see Highlight*).



TAKING A LEAD IN GENDER PARITY IN THE WORKFORCE

The automotive sector has long been less attractive to women with little gender parity in terms of career development, training, and remuneration. However, human resources policy to attract, promote and retain the best talent needs to incorporate gender equality.

With fewer women than men employed in the international group, Valeo targeted actions in 2013 to stimulate gender equality by:

- Raising awareness of women's role in the company;
- Supporting an in-company women's network;
- Conducting an internal survey on diversity, women's positions and working conditions;
- Benchmarking and establishing diversity policy.

FURTHER ACTION TO SUPPORT GENDER PARITY

Promoting the engineering profession to women

- Join the Forum *Top Women, Top Careers* that promotes women engineers in industry;
- Sponsor *ShARE*, an association of students from the best universities in Asia;
- Build partnerships with leading business and engineering schools in France and associations that promote engineering professions to female high school students and undergraduates;
- Improve the company's image as an employer of choice.

Promoting gender equality

Human resources action

- Gender status reports on the Group subsidies in France;
- Independent econometric report to measure variables influencing salary disparities between men and women in France;
- Diversity Working Group led by the Vice President of Human Resources.

Improved conditions for women

- Actions to improve work-life balance, such as a company day nursery and no evening work meetings;
- Yearly or half yearly reviews with women employees on career development.

Paving the way for leadership

- Mentoring system with a dedicated website to organise national events to stimulate networking within the Group;
- Coaching, mentoring and internal networks to promote women to middle and senior manager positions;
- Diversity promotion including code of ethics and e-learning sessions.



ERGONOMICS FOR WOMEN TRUCK DRIVERS

Women working as lorry driver are obliged to adapt to specific conditions in a profession in which they are in the minority. In trucking, women do the same work and carry out the same tasks as men, face the same constraints, and work in the same way to achieve the productivity goals they share with their male colleagues. But being in a minority in a job built on male values, women have to adopt specific behaviour in order to be accepted, and to overcome misconceptions about their motivation for working in this male environment.

Ellen Voie, Chairperson of Women in Trucking, an association defending the rights of women truck drivers, states that a major barrier to women in trucking is the ergonomics of the driver's cabin that is basically designed for the male body.

Anthropometric differences between men and women have implications for women truck drivers:

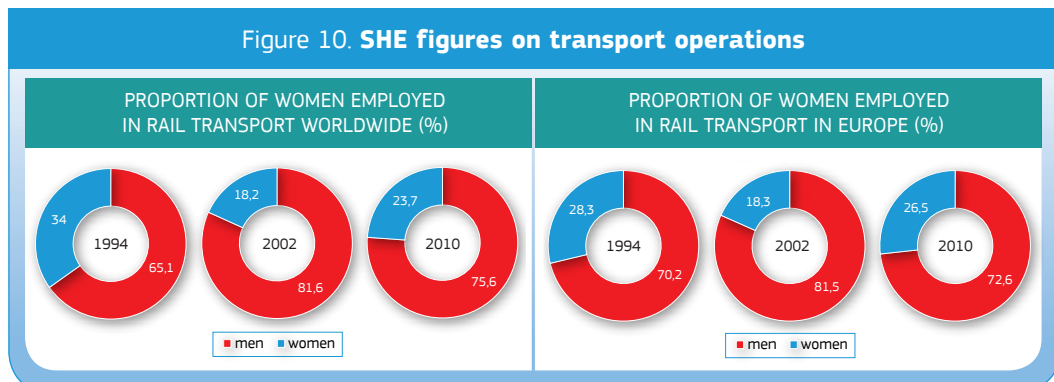
- On average, women are smaller than men, with shorter legs but proportionately wider hips.
- Studies have shown that women are more susceptible than men to overstretched tendons.
- Women have more flexible joints than men, particularly in the pelvic and lumbar region, and the shoulder joint.
- Men can muster greater strength than women, particularly for tasks involving the upper limb.
- Women do not exert the same grip strength as men do.
- Women are relatively more resistance to fatigue than are men.



- Women suffer higher levels of discomfort, particularly in the upper limb region including the head/neck and upper back.

These physical differences between men and women call for adjustments to the design of truck cabins. SEATS: The driver's seat needs to be designed with adequate adjustability in the seat pan length to accommodate the shorter legs of women, and in the seat pan width to accommodate women's wider hips.

Figure 10. SHE figures on transport operations



Source: EUROSTAT/UNECE/ITF Common Questionnaire

VISIBILITY: The driver's seat has to be designed to ensure good visibility for the driver as well as comfort to reach and operate the pedals. Thus, the seat has to be higher enough for short stature drivers to see over the hood and hood mirrors and low enough to comfortably reach the pedals.

SEAT BELTS: Seat belts have to be redesigned so that regardless of the driver's height, the shoulder strap meets the regulation of fitting across the collarbone and snugly between the breasts.

DASHBOARD: Adjustable seat height has to be designed to take account of the position of the steer-

ing wheel and to ensure visibility of all gauges on the dashboard.

SLEEPER BERTH: Designs need to be adjusted to accommodate the physical differences between men and women, for instance the ladder to access to the bunk, and the position of lights and light switches in the sleeper.

STEPS: A recent study found that 40% of driver injuries occur when climbing into or out of the cabin, or at the rear of a truck, tractor or trailer. Thus, grab rails and steps need to be configured to accommodate the body types of both male and female truck drivers.



DOMINIQUE SAVOIE

Deputy Minister, Ministry of Transport, Quebec, Canada

It's encouraging to see the gains made by women in Quebec in accessing the job market. The gap between male and female employment has reduced considerably, with the proportion of women completing a high level of education now reaching 76.1% against 77.4% of men. Women are increasingly being employed in full-time and not just in part-time jobs.

Yet in spite of these advances, many women continue to choose jobs in the traditional sectors of health, social services, education and retail, jobs that are less well paid than in the more male dominated sectors.

One such sector is transport sector, where even though women occupy around 30% of jobs, they account for 54.7% of administrative posts, remaining in the more traditional employment for women. This trend is reflected in Quebec Ministry of Transport, where women held 36% of jobs in 2012-2013, the majority of which are administrative posts. Nevertheless, progress is being made; 28% of engineers are women, and women hold 46.8% and 20.2% respectively of professional and management positions.

To stimulate the employment of more women in non-traditional sectors, measures are needed to provide low-cost care for pre-school children, parental insurance schemes accessible to both women and men, and more sharing of parental leave after childbirth. Sharing parental leave with fathers has helped to prevent women sacrificing careers to care for newborn children for long periods. The added value of gender balance to transport enterprises has to be demonstrated and enterprises stimulated to offer work-life conciliation measures. No one measure will attain this objective. A coordinated approach and concerted actions are needed to support women to break into non-traditional sectors, and in the transport sector, we need to attract more young women.

However, positive discrimination and equal access measures will never compensate for adequate education and training for women to equip themselves adequately to extend their horizons. In my Ministry, we now have a growing pool of women engineers, who in turn act as role models for others, demonstrating that the glass ceiling can be broken.

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Glossary

Sex is a classification of sexually-reproducing organisms, based on a set of biological characteristics that derive from chromosomal complement and physiology. Males and females are defined according to genetics, gametes, or morphology (primary and secondary sex characteristics, which may overlap between sexes).

Gender is a socio-cultural process defining femininity and masculinity, and attributes that refer to each gender. As a social construct, it varies in time, place, and between cultures.

A **gendered stereotype** is a widely held, simplified and essentialist belief about men and/or women. Essentialist means that the justification for this belief is done through the nature of men and women, instead of considering socio-cultural influences.

Gender equality is a situation where individuals of all sexes are free to develop their personal abilities and make choices unhindered by gender roles.

Mobility (in transport) is the field of study covering the movement of people, its causes and the social implications of those movements. Why, how, when and where do people or freight move are questions related to mobility.

Motility (in transport) is the individual's capacity to be mobile (A.A. Kjaerluff, Trafikdage på Aalborg Universitet, Motility – finding a way to mobility attitude and behaviour)

Safety (in transportation) is the condition of being protected against physical harm in a transport context. Passive safety measures are related to the design of transport means, such as car bumpers or safety belts ergonomics; while active safety measures is used to refer to technology assisting in the prevention of a crash or collision.

Security is the risk of harm due to intentional criminal acts such as assault, burglary or vandalism. In the context of transportation, perceived and real security of areas have an impact on the mobility of people or goods departing, arriving or transiting through it.

Sustainability is the capacity to endure and may be evaluated through several axis, such as economic sustainability, environmental sustainability and societal sustainability. The objective is to ensure that a system is viable over time. Transportation has an impact on all three axis.

Analysing sex is the process of reporting the sex of research subjects, identifying when relevant the differences and analysing these results; while **analysing gender** involves identifying and analysing how sex, social and cultural factors (such as education) lead to such differences.

Gender-blind research is research that does not collect, or at least does not analyse the gender factor impact on the studied system.

Cross-sectional analysis is a class of research methods that involve observation of all of a population, or a representative subset, at one specific point in time. It allows to investigate the prevalence of phenomena or behaviours and correlate this data to a set of factors such as sex, age, socio-economic factors, etc., hence exploring different cause/effect possibilities.

Even though the gap is closing, day-to-day mobility of women still diverges from that of men. While gender issues have been considered in urban planning since the 1970, gender differences in mobility persist. The issues at stake in enhancing women's mobility and making transport more gender neutral are addressed in this publication. Many of these issues have been extensively researched, but still receive limited attention in developing gender-specific policies, programmes, and mandates. Methods to translate gender research findings into policy need to be explored. In this respect, the gender impact of transport policies needs to be regularly assessed in monitoring their contribution to a gender-neutral transport system. As the concept of gender-neutral transport varies significantly in place and time with respect to values, needs, choices, constraints, and impacts, gender-neutral transport needs to be addressed through international collaboration. EU research policy gives priority to integrating the gender dimension into projects funded and co-funded under the European Commission's Research and Innovation Framework Programme. The recently adopted Horizon 2020 for the period 2014 to 2020 is structured to respond to societal challenges that need innovative solutions, of which sustainable transport is high on the agenda.

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