

# UNDERSTANDING PEDESTRIAN COMFORT IN EUROPEAN CITIES: HOW TO IMPROVE WALKING CONDITIONS?

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## 1. STUDYING PEDESTRIANS IN EUROPEAN CITIES

This paper presents some results concerning pedestrian comfort from the PROMPT project (New means to PROMote Pedestrian Traffic in cities). PROMPT is a research project within EU's Fifth Framework under the Key Action "The City of Tomorrow and Cultural Heritage". Comfort is one of several aspects affecting pedestrians being studied in the PROMPT project. Safety, accessibility, attractiveness and intermodality are among other aspects looked upon.

Involving six European countries: Belgium, Finland, France, Italy, Norway and Switzerland, the project is based on case studies. The case areas are shown in table 1, and they cover *city centres*, *residential areas* and *suburban areas* in European cities with differences in city size, climate, topography and culture.

Table 1: PROMPT case areas and interview sites

<i>Country</i>	<i>City</i>	<i>Case Areas</i>	<i>Interview period</i>	<i>No of interviews</i>
Belgium	Liege	City centre	Aug 01	209
	Eupen	City centre	July 01	42
	Ans	Suburb	Aug 01	53
Finland	Helsinki	Centrally located residential area and suburb	July/Aug 01	79
	Jyväskylä	City centre and suburb	Aug 01	80
	Kuopio	City centre	Aug 01	40
France	Amiens	Residential area	May 01	67
	Nantes	Residential area	May 01	52
Italy	L'Aquila	Residential area	July 01	40
	Frascati	Residential area	July 01	65
	Modena	Suburb	Sept 01	54
Norway	Trondheim	City centre, residential area and suburb	April 01	119
	Lillehammer	City centre and a village	May 01	61
Switzerland	Zürich	Residential area and suburb	June 01	53
	Geneve	Residential area	May 01	41
	Sursee	Centrally located residential area	June 01	37

## 1.1 How to Assess Comfort?

The theory on comfort presented in previous public transport studies formed a background when designing the work package on comfort for pedestrians. Based on the theory, comfort for pedestrians is a positive *emotional* reaction to external surroundings (the walking environment) in different situations, including physiological, physical, social and psychological reactions. Absence of discomfort means that nothing is unpleasant for the pedestrian. Comfort is also a cognitive comparison between actual objects and some point of reference, meaning that expectation and earlier experience affects her evaluation of comfort.

The feeling and degree of comfort is dependent on the *surroundings*, the *situation* and the *individual*. To assess the pedestrian comfort in the case areas, both mapping and interviews have been undertaken. The general idea was to ask individuals about comfort factors in the interviews (subjective data) and to map data concerning the same comfort factors (objective data).

Because we think comfort is short-lived emotional reactions rather than cognitive reflections, we interviewed pedestrians on the street asking questions about the actual walking trip and the situation there and then.

The factors that may influence pedestrian comfort are numerous and great more than we are able to ask people about on an on-street interview. We call these factors comfort factors. We included questions concerning *thermal comfort, visual comfort, acoustic comfort, tactile comfort, smells, air pollution and allergens, the ease to move and the feeling of security* as well as a few questions about the individual and the situation. The interview design also had to take into consideration that people were asked in case areas with very different walking situations; both in areas with cold winter climate and in baking hot streets in more southern parts of Europe.

For each factor the pedestrians were asked to evaluate the situation there and then on a scale from 1 to 7 with 7 as the best value, as well as stating how important each factor was for them when walking. One of the questions asked was: *How comfortable do you feel it is to walk here just now?* This question was used as a yardstick to which all other 35 comfort factors were compared.

Based on all the answers, we went through with a factor analysis to identify underlying dimensions in the assessments made of each respondent. These dimensions are factors that seem to be assessed in the same way, which means they seem to belong together when assessing any of the 22 interview sites. Looking into which factors are grouped together, each dimension is given a name. These dimensions are shown in figure 1.

<i>Safety and security:</i>	Feeling safe when walking at the site, confident in walking alone at the site both during daytime and when it is dark, not afraid of whom to meet
<i>Attractiveness:</i>	Not too easy to get an overview, appealing surroundings, not unpleasant odours
<i>Traffic conditions:</i>	Pleasant sound level, pleasant and exiting sounds, no bothersome car traffic, fresh air
<i>Social meeting places and pleasantness:</i>	Easy to meet requirements for rest, food and toilet, enough places to sit down, be protected from the weather by buildings, vegetation or topography, smooth and nice pavement surface
<i>Move efficiently:</i>	Minimal differences in altitude, not too windy, feel free to choose your own speed, not too much presence of vegetation, nature and water
<i>Physiological factors:</i>	Not too high temperatures, not too hard/exhausting trip, not too dry air, not being blinded of light
<i>Dressing:</i>	Not too little clothing and too thin shoes
<i>Space and light:</i>	Not too narrow surroundings and not too dark
<i>Comfort:</i>	Comfortable weather for walking, comfort feeling

Figure 1: Dimensions describing the pedestrian environment. Each dimension is characterised by several comfort factors.

The comfort level we perceive is the result of our reactions to all these factors, but discomfort can emerge from any one of them. It is also thought that at least for some of the factors, there can be threshold levels, but these may depend on the individual and the situation.

We started out with the hypotheses that pedestrian comfort

1. Depends on the *individual*; the resulting comfort level based on values and ranking of comfort factors may be different for different user groups depending on age, gender, ability and personality factors.
2. Depends on the *situation*; the resulting comfort level based on values and ranking of comfort factors may be different depending on travel purpose, time available and whether the person walk alone or accompanied.
3. Depends on the *surroundings*; in the way that the resulting comfort level based on values and ranking of comfort factors may be different for *central areas* and *suburban areas*, as well as streets with different functions, due to differences in orientation and expectations.
4. Is *hierarchical*; needs on a higher level do not affect the feeling of comfort until the needs on lower levels are fulfilled.

## 1.2 On-Street Pedestrian Interviews

Totally we made 1092 interviews at 22 interview sites in 16 European cities, see table 1. We found many similarities between the pedestrians being interviewed in the six participating countries.

Most of the respondents were quite familiar with the area in which they were being interviewed, with about one out of ten respondents who seldom walked in the areas or had never been there before. There were a high percentage of the respondents in all countries *that stated to appreciate walking*. Only 3 - 9 % stated clearly that they did not appreciate walking, fewest of them in Finland and most in Switzerland. To go for a walk showed to be the main purpose of the trip for about one out of nine respondents in France and Switzerland, one out of six in Finland, and one out of five in Norway, Belgium and Italy. *This shows that walking is an activity by itself that is being practised to a great extent in all participating countries.*

In Italy, France, Finland and Norway, nearly 60 % of the respondents walked all the way on the current trip, while 23 % in Belgium and only 8 % in Switzerland did the same. In Switzerland nearly 55% did combine walking with bus transport and about 20 % combined with cycling. Also in Finland there was a relatively high share of respondents combining walking with cycling, 16 %. In Belgium and Italy we found the highest shares of pedestrians who combined walking with car driving on the current trip, around 30 %.

## 2. HOW DO PEDESTRIANS ASSESS THEIR ENVIRONMENT?

When stating the importance of different factors regarding comfort, we found that in all six countries the feeling of *safety and security* was regarded as *the most important factor* for the respondents when being pedestrians. The comfort feeling and the air conditions/air quality were also regarded as factors of high importance in most of the countries. The factor regarded as *least important in all countries was the presence of other people*. Figure 2 show the assessment and importance of the aspects where respondents were asked about the importance.

WP3 Comfort, all case areas, all countries

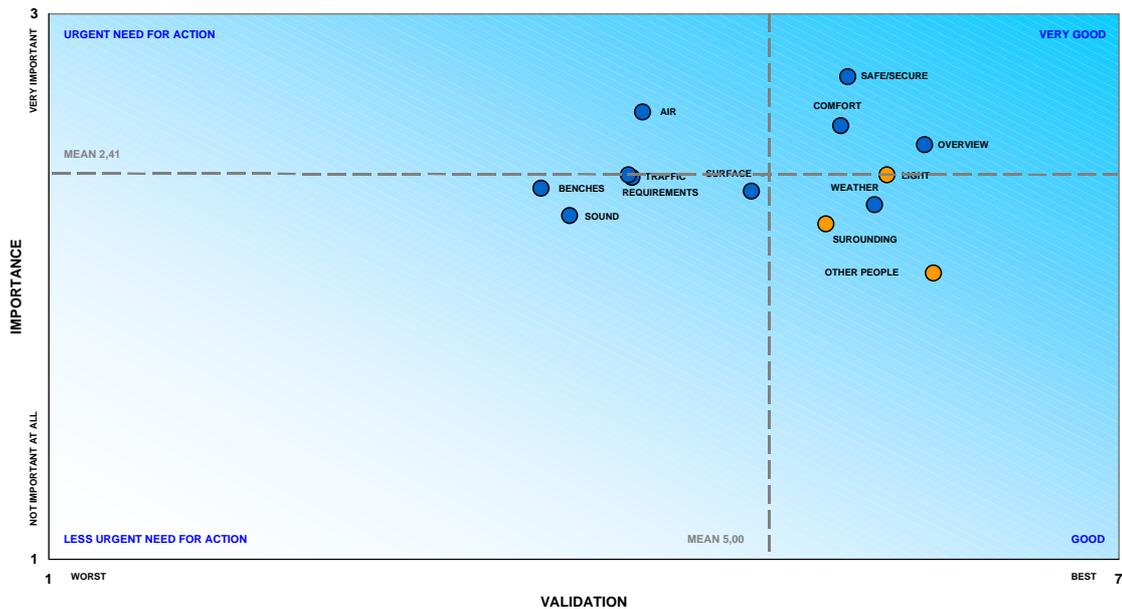


Figure 2: Pedestrian assessment and importance of selected aspects

Below we have listed some of the factors in the order of importance given by the respondents. The respondents assessed the different aspects of their walking environment on a scale 1-7 with 7 as the best value.

### Safe and secure

*Most important when walking is to feel safe and secure.* This gets the highest score totally and in each country. The only exceptions are Swiss men who put air quality as more important and Italian women who put comfort as high as safety.

On a scale 1-7 European pedestrians feel pretty safe with the mean score 5.5. They are rather confident in walking alone during daylight (6.4) and not afraid of whom they might meet (6.1). But they are not quite as confident in walking alone during dark hours (4.5) or in getting help if they should need it (4.5). So even though they feel quite secure at site and the time of the interview, this is what they stress the most.

Norwegian pedestrians seem to feel quite safe (6.3), while Belgian pedestrians give rather low scores on all questions concerning safety.

### Air quality

Next in pedestrians priority is the air conditions, being second or third on the list of importance in all countries. The pedestrians are only partly satisfied with the air quality when walking (4.3) and they tend to find the odours unpleasant.

## **Comfort**

Comfort is third on the list of pedestrian priorities, being second or third on the list of importance in all countries. Most people are satisfied with the pedestrian comfort with a mean score of 5.4. The factor analysis shows that the comfort feeling is strongly related to the weather conditions, this is also shown in the correlation and the regression analysis. When exploring the connection between the different elements of weather conditions and the comfort feeling, we find that the weather conditions during interview do not affect the feeling of comfort directly. *What affects the feeling of comfort is how the respondents assess the weather conditions.*

The interviews cover periods where the temperature varied between 0 and 33°C, there was snow, rain, clear sky, sunshine and darkness, calm and windy. To the question "*Do you find today's weather comfortable for walking?*" there is a tendency that temperatures between 16 and 22°C are regarded as the most comfortable for walking. Temperatures between 0 and 15°C are regarded a bit less comfortable than temperatures between 23 and 33°C. Breeze is regarded as more comfortable than strong wind, and sunshine is regarded as more comfortable than snow and rain.

## **Find the way**

Forth on the list of importance is to find the way and get an overview of the area. Most of the respondents were familiar with the area and found it easy to find their way (5.9). Those unfamiliar with the area were only partly satisfied with the information about destinations (4.7) and services (4.5), but found the information that was there relatively clear (5.3).

## **Ease to rest**

Meeting the requirements for rest, food, toilets etc was considered rather important, with a sufficient supply of seating being a little less important. They are somewhat pleased with the possibilities to rest and meet requirements for food and toilets (4.3). But *European pedestrians are not pleased with the supply of seating* (3.8), although mean values are above medium for Italy and Switzerland.

## **Visual comfort**

Interviews were conducted during three periods of the day, between the hours 11-15, 15-18 and 18-23. Light conditions were regarded to be of less importance in Norway and Finland, than by respondents in the other countries. Most pedestrians found the light a bit too bright and especially the Italian pedestrians. They did not experience unpleasant blending (5.8). Pedestrians are somewhat satisfied with the lighting to be able to spot uneven pavement (5.4) and for reading signs (5.3).

## **Traffic conditions**

The respondents find the traffic somewhat bothersome (4.3), more in France, Italy and Switzerland and less in Belgium, Finland and Norway. Traffic conditions may influence other factors like the air quality, the sound level and feeling of safety.

### **Ease to move**

Surface conditions are quite high up on the list of importance, given high scores in Italy, France and Belgium. The pavement is somewhat pleasant to walk on (4.9). Pedestrians find the trip easy (6.1) and feel free to choose their own speed (6.0). Most pedestrians do not find any problematic steps or differences in levels (5.6). Pedestrians seem to find the number of people present convenient and they find their surroundings rather a bit open than narrow.

### **Thermal comfort**

Most pedestrians find the weather comfortable for walking (5.6) and have about the right clothes and shoes for the conditions.

### **Acoustic comfort**

Pedestrians find the sound level somewhat unpleasant (3.9), but tend to find the sounds pleasant.

### **Appeal of surroundings**

Most people appreciate their surroundings (5.3) and do not find it important whether the surroundings are open or narrow. The pedestrians state that finding the way easily is important. At the same time we found that their answers imply a connection between these assessments, so to find the surroundings appealing, it should not be too easy to get an overview and find the way. This might imply that the little surprises of what is hidden around the next corner is an important part of attractiveness, either because of a not too simple layout or because of not being familiar with the area.

When running a factor analysis, odours were grouped together with overview and surroundings, meaning these factors were assessed in the same way in the different case areas. To be attractive, unpleasant odours should be avoided, but most people find odours somewhat unpleasant (3.7). The number of other people and presence of nature are other questions that might be related to the appeal of surroundings. It is a bit curious that pedestrians find *the presence of other people least important* in all the countries, at the same time as safety and security is their top priority.

### **Choice of route**

We asked the pedestrians who stated that they could have chosen different routes what were their main reason(s) for the choice on the current trip. The dominating answers were time use (38 %) and walking distance (33 %), while as many as 15 % mentioned the surroundings.

## **2.1 Hypothesis 1: Pedestrian Comfort is Hierarchical**

So which are the factors influencing the feeling of comfort? Running a correlation analysis the following factors influence the feeling of comfort mostly:

- Feeling safe and secure
- Pavement conditions

- Lighting conditions (during dark hours)
- Appealing surroundings
- Weather (how comfortable the person assess the weather)
- Traffic conditions

While the perception of some factors depends to a great extent on the actual walking environment, others depend also on individual preferences, see figure 3. How the weather is assessed depends very much on the person (to the left in figure 3), while we expect the assessment of traffic, lighting and surface to depend mainly on the actual situation (to the right). How safe and secure you feel and how you like the surroundings depend both on the environment and on your personality.

### Main factors influencing comfort feeling

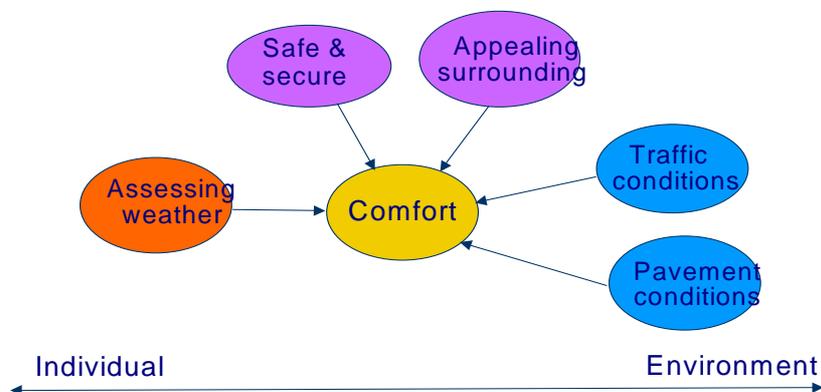


Figure 3: Main factors influencing the feeling of comfort when walking

Our initial hypothesis was that comfort is hierarchical, so that factors on a higher level do not influence the feeling of comfort before a minimum of comfort concerning factors on lower levels are fulfilled.

Concerning weather this seems to be correct. When the weather is perceived as bad (1 on a scale 1-7), only the presence of others affect the feeling of comfort is the (correlation and regression analyses), and this is not important when the weather is better. For all better assessments of the weather (2-7) the *surface* conditions affect the comfort feeling. As the respondents find the weather conditions better the more comfort factors correlate with the feeling of comfort. Places to sit and meeting requirements for food and toilets only affect the comfort feeling when weather is assessed good (6-7), which seems logical as these aspects possibly are more connected with the wish to stay rather than walking as mobility.

Looking at safety and security we find the opposite situation. Feeling safe and secure (6-7) only the surface condition and assessment of weather affect the feeling on comfort, while with lower assessment of safety and security more factors influence the feeling of comfort. Could this be so because the feeling of safety and security is the basic foundation for feeling comfort?

When we look at how the aspects found to affect the comfort feeling, correlate to each other at different levels of assessment, the data seem to indicate a hierarchy of factors concerning comfort:

Table 2: A hierarchical model of comfort factors

Ease to rest
Weather conditions
Ease to move
Surroundings: <ul style="list-style-type: none"> <li>• Traffic, odours, presence of nature</li> <li>• Sounds, air conditions, lighting</li> <li>• Appeal of surroundings</li> </ul>
Surface quality
Feeling safe and secure and presence of others

A comment in the Belgian report is that the overall feeling of safety and security has to be treated in the first place. But people, as well elderly as youngsters, seem not to be satisfied only with the basic needs. They ask for more beauty, quality, ease, identity and attractiveness of the environment. The question: “What is important to improve the situation for pedestrians?” was answered by nearly every second child with: *Let the beauty, nature, leisure and cleanliness come inside the city, so that people really want to get out and meet others in a valuable environment.*

Another comment, about the results of the Italian interviews, is that the pedestrians are focused on what media tell them is important, somewhat disconnected to their everyday experiences, and the influence of media is especially strong when people’s health is the target. Most pedestrians give rather positive assessment of their surroundings being “blind” to lacks in their every-day environment, but when brought to think about the matter they express their complaints. The list of importance can be looked upon as a result of a mainly cognitive process, while the feeling of comfort is a mainly emotional process. When being brought to think about the matter, air quality for example is regarded very important, while the condition of the pavement influences to a greater extent the immediate feeling of comfort. This might explain why the hierarchy of comfort factors does not quite correspond with the respondents’ lists of priorities.

## 2.2 Hypothesis 2: Pedestrian Comfort depends on the Individual

### Different types of European pedestrians

A factor analysis based on the Norwegian interviews revealed four different pedestrian types:

For the pedestrian seeking fresh *air, space and light*, it is important whether the surroundings are open or narrow:

- The typical pedestrian seeking air, space and light is an elderly woman going on a walk in the evening.
- We find that the Norwegian pedestrians in this group *give the highest average comfort score (5,48)*.
- Pedestrians seeking fresh air, space and light are found in Belgium, France, Italy, Norway and Switzerland.

For the pedestrian seeking *security* away from traffic the important factors are safety, noise level, comfort and traffic conditions:

- The typical security-seeking pedestrian is a busy, middle-aged woman on a shopping trip, and she likes to walk.
- The Norwegian security-seeking pedestrians give a medium comfort score (5,38).
- The pedestrians seeking security away from traffic are found in Belgium, France and Norway.

The pedestrian seeking *social pleasure* stresses the presence of others, the presence of places to sit and to be able to meet requirements, as well as the condition of the street surface. They can be divided in two groups:

- Pedestrians who emphasise the *presence of other people* as well as surface conditions and light conditions.
- Pedestrians who find the *presence of seating* and the possibility to meet needs for food, toilets and so on important. These pedestrians may value the possibility to sit down because they need the rest rather than for social pleasure.
- The typical social pedestrian is an elderly person doing shopping in the downtown area during the daytime.
- Norwegian pedestrians seeking social pleasure give a comfort score in between (5,35).
- The pedestrians seeking *social pleasure* are found in Norway, France and Italy.

For the *easy-going* pedestrian the weather is important as well as to find her way easily:

- The typical easy-going pedestrian is a younger person.
- The Norwegian easy-going pedestrians give the *lowest average comfort score (5,02)*.
- The easy-going pedestrians are found in Norway and Switzerland.

When we look at the respondents in all six European countries we find two main types of pedestrians:

- Pedestrians seeking *ease and social pleasure*: For them presence of other people is important as well as places to sit, requirements met, weather and light conditions, surface conditions, the open/narrowness and layout of the surroundings.
- Pedestrian seeking *security* away from traffic: The important factors are safety, noise level, comfort, air conditions and traffic conditions.

This corresponds with the two groups of female pedestrians interviewed in the survey. Looking only at the men, we find that they divide into more groups:

- Men stressing security: comfort, safety and security
- Men stressing traffic conditions and street environment: sound, traffic and air conditions as well as the open/narrowness of the streets
- Men stressing the social pleasure: presence of others, light and surface conditions and the open/narrowness of the streets
- Men stressing the ease and comfort: places to sit and requirements met, to find the way easily as well as weather conditions

This indicates that different aspects influence the feeling of comfort for different individuals. To make a good pedestrian environment, several aspects and different needs have to be considered at the same time.

### **Women evaluate comfort to be lower than men do**

Looking at the respondents we find that there are more women on the street, this was also confirmed by counts. Women are more often in a hurry when walking. They also accompany children and teenagers, go shopping and do errands, and combine their walk with a bus trip more often. More men walk alone, and they combine their walk with a car trip more often.

*Women feel less secure* when walking, especially alone *when dark*, but they are also less confident in walking alone in daylight and more anxious of whom to meet. There is no gender difference concerning getting help and presence of other people. Both the feeling of security and the presence of people are more important for women than for men.

Women are not as satisfied with surface conditions as men, but find it less important.

Both men and women find their surroundings quite appealing. There is a tendency that women would like more nature present and men less. Generally women are less satisfied with unpleasant sounds and odours, air quality, traffic conditions and lighting, and regard this more important than men do. Men and women have similar assessment concerning the sound level and how important this is.

It is interesting to see that when having a choice between different routes, women emphasise time and distance, traffic and light conditions, while more men mention the surroundings.

Women find the trip a bit more strenuous, although being a bit more satisfied with freedom to choose speed and absence of steps and differences in levels. Men are more satisfied with the overview and information about destinations and service, while women find it more important.

Men and women find the weather equally comfortable for walking and equally important for walking. Men feel more protected from weather than women do. Women are less satisfied with the supply of seating, toilets and meeting requirements for food etc., all regarded more important for women than for men.

*Except for surface conditions* women seem to regard all aspects as more important than men do. Several factors influence women's feeling of comfort, while safety/security, pavement surface and the appeal of surroundings seem to influence the comfort feeling for men. Women assess most aspects more negatively. They also assess their walking comfort lower than men do.

### **The importance of comfort factors increase with age**

Respondents are between 14 and 90 years old (youth age 14-29 42 %, adults age 30-59 35 %, elderly age 60-90 24 %). More elderly walked alone, went for a walk and walked in the area weekly. More adults were in a hurry and had never been in the area before, and more adults state that they like to walk. 25 % of young people walk together with youth. Although few, youth have the highest percentage stating they dislike walking or sometimes like to walk.

The younger you are the more secure and confident you feel when walking alone and especially in the dark, but at the same time more afraid of whom to meet. The youth are also more confident in getting help. *Elderly are less satisfied with different aspects of safety and security*, while the security feeling and presence of people are more important aspects the older you are. Surface conditions are more important the older you are, while elderly are more satisfied than adults and less than youth.

The older you are the more satisfied are you about the appeal of surroundings, and the more important are the openness or narrowness of the surroundings. The younger you are the more satisfied are you with the sound level, the sounds, odours and lighting to see the pavement, while adults are most critical to the air quality and traffic conditions. Air quality, sound level and traffic conditions are most important for adults. One reason for their concern might be their responsibility for the new generation. Or maybe they are more critical and setting higher standards because they have less time for walking.

The younger you are the easier do you find the trip, while adults feel free to choose speed and less hampered with level differences. Elderly are more satisfied than others with finding the way, being more important the older you are, and with the information about destinations and services.

Weather is a bit more important for youth who also feel more satisfied, while adults feel more protected from weather.

*The younger you are the less satisfied are you with seating.* Elderly regard places to sit and meeting requirements more important than other age groups, and are least satisfied with the meeting of requirements.

Except for air, noise and traffic, most aspects concerning walking are most important for elderly. Elderly feel less secure, but assess some aspects of walking rather positively. *The older you are the lower is the comfort feeling, while comfort is regarded more important the older you get.*

### **The comfort when walking is lower for people with mobility problems**

84 % of all the pedestrians we asked state to have no problems concerning outdoor walking. 10 % have minor problems, 4 % have some problems and 2 % state to have major problems concerning outdoor walking, with all age groups represented in all groups. Reported problems are mobility and strength (41 %), asthma and allergy (18 %), heart diseases (10 %), vision problems (8 %) and problems concerning orientation (4 %). Only a few of those who report problems use mobility aids like wheelchairs (2 %), rollators (2 %), crutches (3 %) and canes (13 %).

People with mobility problems assess *all aspects of security lower* than people without problems, especially feeling less confident alone *when dark* and less confident in *getting help*, and people with major problems assess the different aspects lower than people with minor problems. At the same time the security feeling is most important for persons with major problems.

For pavement conditions the assessment decreases and importance increases with the level of mobility problems.

The more serious problems the lower assessment of surroundings, nature, air quality, odours and light conditions, while sounds and traffic is assessed as less bothersome. Light conditions, noise level and traffic conditions are more important for people with mobility problems, while the air quality is not.

Persons with mobility problems find the trip harder, the differences in levels problematic and feel less free to choose speed, while they are rather satisfied with the overview and information in the area. Important is that people with mobility problems feel quite less protected from weather. And while the importance of meeting requirements seems to be similar for all groups, satisfaction decreases with the level of problems.

People with major mobility problems assess most aspects lower but regard most aspects except air quality more important than other groups, also the *comfort feeling is lower but important*.

### **2.3 Hypothesis 3: Pedestrian comfort depends on the situation**

We asked the respondents some questions about the current trip. Some were carrying heavy bags (1,9 %) went with a bike (3,6 %), roller-skates, skateboards and city bikes (0,9 %) or pushed a pram (2.8 %), while most people were just pedestrians (88 %). 1,6 % were wheelchair users and 1,9 % used mobility aids like crutches, canes and rollators. 17 % were going for a walk, while the other trips had different purposes like job, school, shopping, leisure activities and accompanying others. 42 % walked the whole journey, while others combined the trip with bike, buss, train, car or other means of transport.

59 % walked alone, 16 % together with adults, 13 % with youth, 9 % with children and 2 % with elderly. 2% were walking a pet. People accompanying children felt the lowest level of comfort (5.1), then people having company

(5.4) or walking alone (5.5), while persons walking a pet had the highest level of comfort (6.1).

More women (44 %) than men (36 %) are in a hurry. *People in a hurry* state to feel even a bit safer than people with more time, still they feel a little less confident in walking alone both day and night as well as in getting help.

People in a hurry are more bothered with noise, air quality and traffic conditions. Adults are displeased with these factors and more adults state they are in a hurry compared with elderly and youth. The surroundings appeal to people in a hurry although they tend to think there is too much vegetation and are less displeased with odours. People in a bit of a hurry seem to be most pleased with the lighting conditions. All these aspects are a bit more important when in a hurry.

It is not easy to get an overview when in a hurry, but they are quite pleased with the information given. People who are in a bit of a hurry are most pleased with the weather and the protection from weather. People in a hurry are a bit more satisfied with seating and less satisfied with the possibilities to meet other requirements, both more important for them.

People in a hurry seem to state that all aspects are more important for them. The more you hurry the *less comfort* and the more important do you state that it is. We also found a difference in the feeling of comfort depending on the company. The feeling of comfort seems to be influenced by different situations when walking.

## **2.4 Hypothesis 4: Pedestrian Comfort depends on the Environment**

The evaluation of the interviews and site mapping show many things in common and few differences. A comment in the Italian national report is that in general pedestrians give positive assessments about their surroundings. Being very much used to the situation, they seem to be rather blind for some negative aspects, which only become evident when they are extreme (for example very steep streets and total lack of public toilets). On the other hand, respondents criticise some aspects of urban life as noise and air pollution and traffic, although mapped parameters not fully support the attitudes of the residents. Unexpected was the better assessment of “feel safe/secure” and the stronger assessment of air pollution compared with noise pollution in the interviews.

### **City centres, residential areas and suburbs**

We looked at the respondents' answers depending on whether they were interviewed in a city centre, a residential area (in inner city or surrounding the centre) or in a suburban area. The feeling of safety and security is a bit higher in residential areas, where pedestrians are more confident walking alone when dark, not afraid of who they meet and more confident in getting help. *City centres have the lowest score for most security aspects*, except pedestrians are less confident in walking alone in daylight in the suburban areas.

Pedestrians in residential areas find the surroundings more appealing with sufficient presence of nature, but are less satisfied with the sounds, the sound level and traffic conditions. People in suburban areas are quite more pleased with the odours and the air quality, and pedestrians in city centres least pleased. Pedestrians in suburbs seem to be most pleased about lighting for seeing the pavement, but less so for reading signs.

Pedestrians in suburbs find the trip even easier without difficult steps or level differences and feel free to choose speed, but they are not satisfied with any aspects of signing in the area. They seem to feel less protected from weather. People in residential areas are especially dissatisfied with freedom to choose speed, steps and climbs, getting an overview and finding the way.

Pedestrians in residential areas are most pleased and the pedestrians in suburbs are least pleased with seating and meeting requirements for food and toilets, while these aspects are looked upon as most important in the city centres.

Feeling of *comfort gets higher scores in the suburbs*, then residential areas and lowest in city centres. It is looked upon as slightly more important in suburbs and slightly less important in residential areas.

While pedestrians in suburbs are pleased with the pedestrian facilities and the ease to move, there are other challenges as the feeling of belonging, security on streets, weather protection, seating and social meeting places.

Pedestrians in residential areas are pleased with the appeal of the surroundings and feel more secure. In older residential areas much of the challenge is connected to traffic conditions, narrow space or lack of space for pedestrians as well as steps and climb. Looking at respondents assessment and the importance they give different aspects, air quality and traffic conditions come up with urgent need for improvements in residential areas, with pavement conditions, sound level, seating and meeting requirements also in need of improvements but with a less urgent need for action.

Several more aspects need urgent action in city centres: Air quality, traffic conditions, seating and meeting requirements. Surface conditions and sound levels also need improvements but less urgent.

### **Traffic conditions**

In central areas, where the traffic volume is rather high, the interviewed people mostly saw the noise level, traffic volume and air quality being the worst cases as regards walking comfort. The importance of *light and sound conditions* is regarded highest on sites with heavier traffic. On the other hand, in areas with a large extent of separated walkways or low traffic volumes, these issues were correspondingly not considered to be problematic.

The pedestrians are very sensitive to the street lighting (sufficient and pleasant). When dark, pedestrians feel safer walking along a street with vehicle traffic than walking in pedestrian streets and walkways. Respondents

*in pedestrianised streets* are more concerned about the presence of others, places to sit down and fulfilling of other needs, than respondents in streets with car traffic are.

The respondents' assessments confirm that the comfort feeling depend on the traffic condition and the urban environment.

## **2.5 How to improve the Pedestrian Environment?**

This paper has shown the importance of planners being aware that pedestrians are not a uniform group, but individual people with different needs and desires. Making a better walking environment means taking into consideration the needs of the different pedestrians providing for different needs in the same street and sometimes also provide for parallel routes to give the possibility to choose. There seem to be specific challenges concerning comfort for women, elderly and persons with mobility problems, especially connected with the feeling of security in dark hours and being confident in getting help.

We have also seen, quite obviously, that the challenges concerning the pedestrian environment are different in city centres, residential areas and suburbs and in different traffic environments. However, the pedestrians interviewed in all six countries agreed that the feeling of safety and security was the most important factor for them when walking outdoors. The correlation analysis also gave the highest correlation between the feeling of safety and security and the feeling of comfort, indicating that the feeling of safety and security is the most basic condition for the feeling of pedestrian comfort. The ease to move, possibility to meet basic requirements and social meeting places were also important for different groups of pedestrians. From our point of view the missing public seating provisions with protection from weather and wind are more important than so far assumed. To make a good pedestrian environment, one should take all this into consideration.

The starting point of the PROMPT project; that if vulnerable pedestrians are used as a yardstick when planning the walking environment will be better for all pedestrians, seems to be confirmed at least regarding comfort. A better understanding of pedestrian comfort, as well as knowledge about universal design, may help to plan better pedestrian facilities in the city of tomorrow.

More information about the PROMPT project can be found on <http://prompt.vtt.fi>.

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