



Intra-urban daily mobility of disabled people for recreational and leisure purposes

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ABSTRACT

This paper presents findings from an empirical study of everyday trips made within urban space by disabled but working people, for recreational and leisure purposes. The study was conducted in the city of Bydgoszcz, Poland, while the subsequent analysis is based on the authors' inventory of selected public buildings and interviews. 450 individuals with disabilities, plus 150 non-disabled members of the same households, were sampled and surveyed across the city. The results indicate that, in general, there are great differences between people with disabilities and their able-bodied counterparts. Disabled inhabitants choose forms of recreation not involving substantial financial inputs. As fares, availability and accessibility have the strongest impact on leisure activities, the preferred forms of recreation among disabled people are meetings with relatives and friends, the spending of free time at home or on an allotment, or walking. The biggest differences in behaviour between the two categories of respondent are in turn found to arise in the case of participation in sporting activities.

In-depth research into the accessibility of recreation sites shows that some areas (such as the city centre) are mainly chosen by persons without serious mobility problems. Disabled people with a lower level of mobility (needing to use walking sticks, crutches, or wheelchairs) choose the attractive outskirts of the city where the opportunity for open-air recreation exists, or else spend their free time visiting relatives and friends. This attests to availability to some extent determining the spatial behaviour of persons with disabilities.

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'[T]ransport and mobilities geographers would do well to further advance mobility as a foundation concept in geography' (Shaw and Hesse, 2010, p. 308)

1. Introduction

Human mobility is the product of a number of factors that include age, health, and/or socio-economic status. Nevertheless, research into urban mobility is inclined to take perfect mobility for granted, first and foremost in line with the fact that motorisation has become more and more universal in the developed world. In consequence, all exceptions to the universal mobility rule tend to be treated as deviations, and are taken to relate to social groups (categories) finding themselves in a disadvantage situation (Nutley and Stringer, 1994). Examples would then be the poor, the young, pregnant women, the elderly and the disabled.

The category of mobility-impaired people obviously includes those with disabilities, and there is therefore an anticipation that disabled people will travel differently from those in other social

categories. Furthermore, the mobility in question is regarded as contextual, in that it is deeply embedded in health, social, economic, cultural, environmental, transport and other relationships.

In the light of the above, this paper has sought to determine and document characteristic features of intra-urban daily mobility¹ among people with impairments and in possession of a legal certificate confirming disability, in accordance with Polish law. People defined in this way are compared with non-disabled counterparts who serve in the capacity of a baseline group. As Preston and Rajé (2007, p. 160) write, 'the problems of the immobile socially excluded should not be analysed in isolation from the mobile included'.

The mobility in question was taken to be bound up with visits to recreational and leisure sites within urban space. Specifically, achievement of the outlined research goal involved the authors in a determination of selected objects' architectural availability, as well as in a search for accessibility² among different micro-areas of a city, a determination of the main directions of movement among disabled people and able-bodied members of the same households, and an identification of selected groups of features ultimately responsible for the mobility of people with disabilities.

¹ As opposed to non-urban, non-diurnal (e.g. weekly, yearly) mobility.

² Good contemporary discussions of accessibility, mobility and related concepts are to be found in Farrington (2007) and Preston and Rajé (2007).

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The paper is thus divided into: Section 1 – with a literature review; Section 2 – outlining the methodology applied; Section 3 – detailing the main results of the study; and Section 4 – offering conclusions.

2. Geographical research on disability, including the mobility of disabled people

Although geographical research into disability started in the US in the early 1970s, it was not until as late as in the 1990s that a growing number of papers appeared (in what Hall and Kearns, 2001 call the ‘second wave’). Indeed, the research reported in the literature over the past twenty years or so has made substantial progress in terms of broadening existing knowledge on disability, in a variety of geographical settings (Park et al., 1998; Kitchin, 2000). Since ‘there is now a burgeoning literature within the discipline of human geography’ (Butler and Parr, 1999, p. 6), only some can be mentioned here.

While Golledge (1993) made the point that disabled people occupy ‘transformed’ and ‘distorted’ spaces, Gleeson (1996) criticised his positivistic appreciation of space, and the creation of ‘worlds of disability’ from the materialist (Marxist) position. Imrie (1996a) also targeted criticism at ‘impoverished’ environments and the role of the geographer as ‘expert’ on the disabled – something that finally led Golledge (1997) to include more personal effects and a social vision of impairment.

While Imrie (1996b) analysed processes of disability in urban space. By presenting stereotypes regarding the perception of disabled people, he has been able to demonstrate marginalization of this social category. Examples of disadvantageous architectural and technical solutions create conditions for their social exclusion. The important contribution made by Gleeson (1999) has offered a comprehensive approach, with a socio-spatial model, evaluation of theory and models, analysis of social care policy, and an addressing of questions of accessibility.

In the late 1990s and early 2000s, geographers paid more attention to rights, social justice, equity, ethics and morality as they researched disability (Chouinard, 1997; Gleeson, 1997; Park et al., 1998; Kitchin, 1999a; Kitchin and Wilton, 2000; Valentine, 2003). Social exclusion and the necessity for disabled people to be included into societies have also been researched widely (Kitchin, 1998, 1999b, 2001; Anderson, 2001; Hall and Kearns, 2001; Hine and Mitchell, 2001; Kitchin and Law, 2001; Komardjaja, 2001; Hall et al., 2002; Barrett et al., 2003; Hall, 2004; Wilton, 2004; Yau et al., 2004; Casas, 2007; Imrie and Edwards, 2007). An extensive collection of papers adopting social-theory perspectives on the geography of disability (interests, theoretical orientations and empirical studies) in the English-speaking world has been edited by Butler and Parr (1999). In a similar vein, Butler and Bowlby (1997) consider disabled people’s experiences of public space, while Thomas (1999) explores experiences on the part of disabled women, and thus develops theory on disability from a feminist perspective. Aldred and Woodcock attempt to integrate ‘the social model of disability with an eco-social model of impairment’ through an examination of the role of transport, the extending of the social model of disability achieved in this way giving rise to a realisation of ‘how car-dominated transport systems can be understood as disabling populations larger than those conventionally recognised as “disabled”’ (Aldred and Woodcock, 2008, p. 485).

Contemporary geographical research into disability in turn revolves around three major topics: changing parameters of disability; the complicated relations between disabled people and modern technology; and the struggles disabled people engage into take their rightful place in the world. These growing interests of researchers are mirrored at conferences (sessions at the AAG and RGS/IBG, for example), in an increasing number of periodicals such as *Disability*

and *Society; Disability, Culture and Education; Disability, Handicap and Society* and many others, or in special issues of some of them, like *Environment and Planning D: Society and Space* (1997, 15, 4), for example.

The Polish literature on disability has the matter researched on various geographical scales (e.g. nationwide: Śleszyński, 2006, or urban: Filipek, 2006) and with varying scope (e.g. changes on the ‘protected’ labour market: Wichrowska, 2004; or architectural availability and the use made of services: Józefowicz, 2006, 2007). Since disability is an interdisciplinary research topic, non-geographers have also contributed to the development of our knowledge. For example, Łobożewicz (2000) reviewed tourism and recreation among disabled people, while Grabowska-Pałecka (2004) analysed their access to historical sites, and Gałkowski (1999) and Gorzycka (1999) the availability of urban infrastructure to them. Studies have also been made of the accessibility of selected functions (e.g. Marchewka, 2001), and healthcare facilities (Urbanowicz and Burda-Świercz, 2006).

Nevertheless, while it may have a long tradition (e.g. from Park et al., 1998 onwards), research on the mobility of the disabled (as compared to, say, the elderly) is in an absolute minority when it comes to urban space. Moreover, the majority of the research that has been done is rooted in social theory and therefore founded upon qualitative methods in the main (Hall and Kearns, 2001). To our knowledge, little research has been undertaken by way of the application of quantitative or model-based analyses (Matthews et al., 2003; Casas, 2007; Schmöcker et al., 2008 being among the few examples). The cited research detailed in Matthews et al. (2003) involved the development, testing and application of a GIS-based system by which to model access for wheelchair users in urban environments. The aforementioned Schmöcker et al. (2008) paper in turn considered mode-choice decisions made by older or disabled people as they went on shopping trips, the aim being a determination of the policies that can best meet mobility needs.

When it comes to qualitative research, the number of papers is much greater. Imrie (2000) points to badly designed infrastructure as a reason for limited mobility among the disabled (notably narrow and uneven pavements, steep stairs and an unsatisfactory number of low-floor vehicles). British research in turn confirms the way in which disability or ill health can lead to an unwillingness to travel, as a result of pain, fatigue or effort, while the absence of accessible destinations can reduce the number of trips taken (Oxley and Richards, 1995). In similar vein, Hine and Mitchell (2001) examine ‘data collected from different qualitative studies which have explored travel experiences and needs’ by public disadvantage transport users, including impaired people. Public space access has been researched in relation to mental health services (Parr, 1997), employment (Kitchin et al., 1998), the education of children and young people (Kitchin and Mulcahy, no date), family planning services (Anderson and Kitchin, 2000), and public toilets (Kitchin and Law, 2001). An interesting initiative of a public space inventory for the disabled has led to the mapping and critical evaluation thereof (Kitchin, 1999c).

Research points to the need for as convenient a public transport situation as possible to be put in place, and social consultation with disabled users would seem to be necessary at every level of spatial planning (Barrett et al., 2003). The local trips taken by disabled people, and their access to means of transport, have both been analysed by Porter (2000). According to that author, mobility research on those vulnerable to social exclusion (including the disabled) had focused excessively on access to transport, when this is only in fact part of a much wider system (Porter, 2000). An important problem restricting accessibility reflects the social barriers erected against certain social groups and giving rise to verbal violence, hostility or negative reactions in public places (Imrie, 2000). As Knowles (2006, p.422) has noticed, ‘Mobility-impaired people (...) have always experienced accessibility difficulties but these have worsened with the dispersal of activity sites’. No doubt accessibility problems and limitations on mobility can indeed lead

to impairment and social exclusion (for a discussion see e.g. Church et al., 2000; Kenyon et al., 2002; SEU, 2003; Lucas, 2004; Preston and Rajé, 2007; Ureta, 2008). Methods for identifying and measuring transport-based social exclusion (a deprivation index, cumulative accessibility, and space–time prisms) have been provided by Casas et al. (2009).

Transport geography literature has also contributed to our knowledge of disability. So, Gant (1992, p. 88) 'identifies the different needs of the home-based disabled and presents a simplified user-based model' for the customised transport services. In his later papers, Gant (1997a,b) examines the pedestrianisation of town centres, mobility and movement patterns of disabled people identifying important contrasts related to health circumstances and degree of mobility impairment.

However, a matter of particular interest has been the *Shopmobility* schemes (there were 234 schemes in operation in the UK by 2000), which have affected personal mobility, influenced accessibility and determined levels of personal comfort of disabled people, all jointly with community and public transport services. *Shopmobility* has been designed to provide 'disabled people with the opportunity to travel from their own homes to their destination, and to maintain their independence once they arrive' (Gant and Smith, 1998, p. 280). Local schemes provide a loan of modern and 'well-maintained electrically powered scooters and wheelchairs, and manual wheelchairs, to help people who have limited mobility', including disablement, 'to shop and use other facilities within the shopping centre' (Gant, 2002, p. 123). Also some related local services such as training, booking, personal escort, dedicated car parking provision, etc. have been evaluated in nationwide audit and presented by Gant (2002).

Another (if non-geographical) example of improvement of functional capacity for people with disabilities is the Travel Chain Enabler which has been designed in a Swedish city of Lund. It is a promising pilot instrument for assessment of urban public bus transport accessibility (Iwarsson et al., 2000).

3. Methodology

3.1. Study area

The city of Bydgoszcz is the administrative capital of a region in central Poland whose 174.5 km² area is inhabited by c. 373,000 people. This makes the city Poland's eighth largest, and one whose status as an important node for national routes results in the presence of a characteristic pattern of city roads (Fig. 1). This is to say that the built-up area and city roads are belt-shaped and concentric in nature. The characteristic feature here is substantial latitudinal extent (of 20 km), as compared with a relatively small distance between the northern and southern fringes (10 km). The transport pattern also arises out of the location of the city at the confluence of two rivers: the eastern limits here are set by the Wisła (Vistula) River, while the Brda crosses the city from W–E. This combination of location and elongate latitudinal shape are what determine the distribution of facilities in Bydgoszcz. It is common for a need to make use of the latter to be associated with a need to overcome relatively long distances.

From the point of view of public-transport users, a very important role is played by the main change nodes (circles). Fundamental transport problems in fact arise out of the lack of a satisfactory number of bridges and bypasses (hence the necessity for transfers via the city centre). Another characteristic feature is the existence of many forest areas within the city limits. These have an important role to play in recreation, but simultaneously confine spatial development. Many large housing estates are located far from the centre.

From the point of view of the analysis of daily mobility, the overall area of Bydgoszcz has here been divided into the 110 transport micro-areas (*mikrorejony*) first distinguished by researchers of the Bydgoszcz ATR Academy in 1995. The micro-areas were created in line with the criteria of: (1) homogeneous spatial organisation; (2) area being inversely proportional to the density of housing; (3) borders of micro-areas being spatial barriers either natural or artificial; and (4) areas being concordant with spatial planning units. The consequence has been for intensively built-up areas (with services and housing) to be divided up rather finely, while extensively developed areas (of forest, allotments, the airport, and the large ZACHEM chemical plant) are included within just a few large units (Fig. 1).

3.2. Data collection

The data collected by the Central Statistical Office do not embrace disability. And while rather aggregated data can be found in the Polish National Census of 2002, these can at best serve as background information. Basic transport statistics are available from the Urban Roads and Public Transport Board.

In the face of these shortfalls, the majority of data here came from inventory research of cultural and sport objects adapted for persons with disabilities, or else from standardised interviews carried out in mid-2008, the respondents being disabled adults plus their counterparts without disabilities in the same households. The questions were similar for both categories and related to place of origin and destination of outbound trips, means of transport, journey time, and forms of leisure time spent. The questionnaire used also embraced demographic features of respondents such as gender, age, education, and disability (degree, cause, etc.).

Snowball sampling, a method sometimes used in geographical research on social categories for which a good sampling frame does not exist, was applied to reach disabled people. Employees on so-called 'protected labour work'³ in the city of Bydgoszcz were treated as the basic group. According to the National Census of 2002, disabled people of economically active ages (males 18–64, and females 18–59 years old) account for 59.3% of the disabled total (34,405 people of working age). 450 of these were interviewed,⁴ hence a sample of 1.3% (plus, for comparative purposes, 150 non-disabled members of the same households).

The second source of information was the authors' inventory of public objects playing an important role for disabled people (museums, cinemas, theatre, concert hall, opera, art gallery, swimming pools, sport halls, stadiums). Altogether 15 characteristics of architectural adjustment to meet the needs of the category being researched were introduced.

3.3. Sample characteristics

The sample of disabled but working people (referred to as 'disabled' or 'with impairment' later on in this paper) can be divided by gender and age (Fig. 2). Nearly half have just a slight degree of impairment⁵ (Fig. 3). For the purposes of research, eight kinds of conditions giving rise to disability can be distinguished. These are diseases of the organs of movement, hearing, seeing, the cardio-

³ A legal term coined for work employing people with disabilities in especially adjusted posts, creating particular conditions for job, healthcare and rehabilitation. In turn, work of such status enjoys some financial preferences such as concessions, tax exemptions and subsidies from the state budget, all according to the Polish law.

⁴ Therefore, the sample refers to working (and not all disabled) people only who are presumably less impaired than average. In no way are the disabled a homogeneous category. Therefore, severely disabled people needing the help of accompanying persons should not be among the disabled but working people. The research sample has been selected due to difficulties with reaching non-working respondents.

⁵ Under Polish law, there are three degrees of impairment: slight, moderate and substantial.



Fig. 1. The network of main roads in the city of Bydgoszcz.

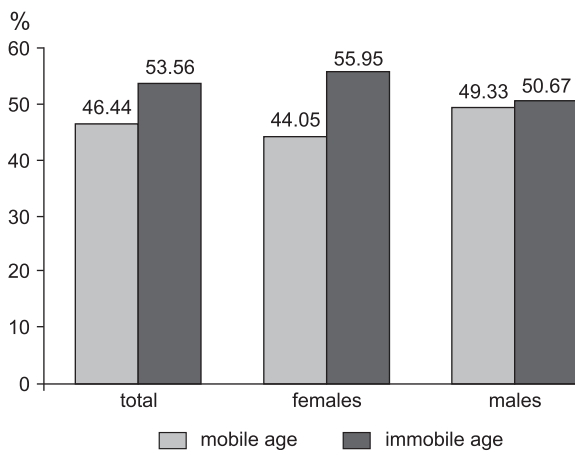


Fig. 2. Economically active disabled people by gender and age.

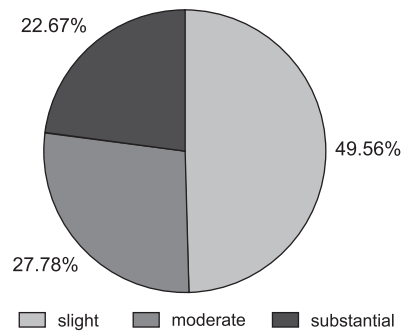


Fig. 3. Respondents categorised by degree of impairment.

vascular system, the digestive system, neurological diseases, remaining categories, and multi-organ diseases. No fewer than 35% of the respondents have problems with moving, and more than 31% have multi-organ reasons for impairment (Fig. 4).

From among all the disabled people studied, over one-third use one orthopaedic device or another, be this crutches (above 22%) or wheelchairs (above 11%). A majority of the wheelchair-users

studied are those with deficiencies of movement organs, or multi-organ conditions. Orthopaedic devices are in general used more frequently by persons with substantial impairment (above 64%). Among respondents with moderate impairment, every tenth person moves using a wheelchair, and more than 25% need crutches or walking sticks. Over 75% of disabled people with slight impairments do not use crutches or a wheelchair.

Males are more likely than females to use orthopaedic devices to enable them to move. In the case of crutches and walking sticks

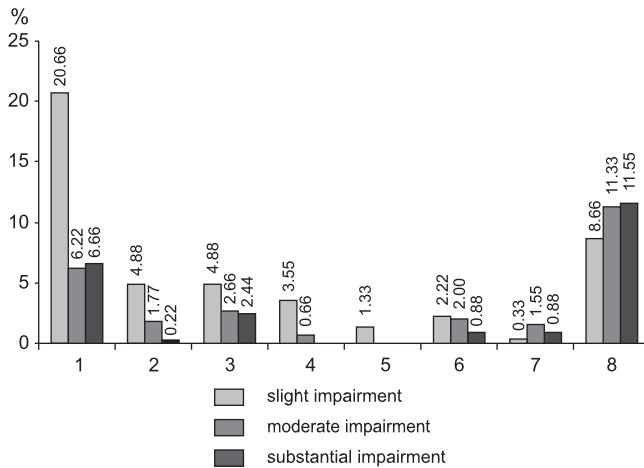


Fig. 4. Reasons for and degrees of impairment. Disabled people having problems with: 1 – moving, 2 – hearing, 3 – sight, 4 – the cardiovascular system, 5 – the digestive system, 6 – neurological diseases, 7 – other non-classified conditions, including intellectually disabled, 8 – multi-organ impairments.

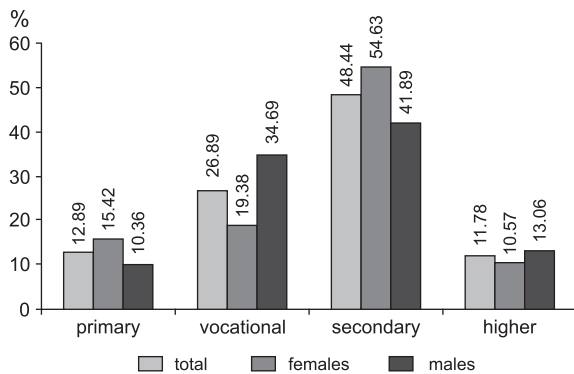


Fig. 5. The educational level reached by disabled people, according to gender.

the difference between males and females is of nearly 5%, and in the case of wheelchairs a little over 1%.

There are differences in educational level between the males and females researched (Fig. 5). About 42% of disabled people possess secondary qualifications. Females are more frequent among those with primary and secondary qualification levels, while males predominate in the group with vocational education. The qualification levels of disabled people probably reflect an educational system that is the legacy of the formerly communist country, in which vocational schools are directed more towards males than females (Satoła, 2006). Thus, males terminate their education at vocational level while females finish either at primary or at secondary level. Every second poorly-educated person in the sample has a substantial impairment. Among more skilled respondents it is people with slight impairment that predominate.

3.4. Research methods

Traditionally, research on spatial interaction and the accessibility of a given place (area) in relation to all other places makes use of models of gravity and potential. In computing the strength of the interaction between various urban micro-areas, use has been made of a general model of potential in the following form:

$$V_i = k(M_j/d_{ij}),$$

where V_i is the potential in micro-area i (expressed as a percentage of the total for the city), k is a constant (average size of interaction

– number of trips per person), M_j is mass (number of trips to micro-area j from other micro-areas), d_{ij} is the real travel time distance between micro-areas i and j .

Principal component analysis was used in the isolation of the most important variables (among the 33) that influence daily mobility of disabled people. Arbitrarily, but in accordance with the method of percentage of variance explained by a variable, principal components should each explain above 5% of the total variation. Varimax rotation and an interpretation of principal components on the basis of coefficients of determination have been applied.

4. Results

Free time and recreation are known to be of great importance, and all the more so in the case of disabled people, for whom it plays an additional role in social and health rehabilitation. Therapeutic rehabilitation is a professional activity seeking to meet the needs of people afflicted by an illness or impairment that limits their full usage of free time. This kind of recreation is also ‘revitalizing’, working jointly with rehabilitation to improve the health situation (Kraus and Shank, 1992). Besides organised journeys to leisure and rehabilitation centres, it also takes the form of participation in sporting activity. In Poland, recreation for disabled persons in the sense of therapeutic recreation hardly exists at all or is at a very initial stage (Janiszewski, 1988; Wolańska, 2000). This is mainly due to financial limitations and architectural barriers.

Accessibility and distance play crucial roles where decision-making regarding the form of recreation for disabled people is concerned (Cooper, 1981). Free-time activities are limited by work and other duties (as in the case of non-disabled people), but also by disability. Disabled people encounter a great many barriers of a social, financial and architectural nature (Barnes and Mercer, 2008).

4.1. The architectural availability of recreational outlets

A majority of cultural facilities are poorly adjusted to the needs of disabled people (Table 1). From among 16 main public cultural objects researched, only three complied in regard to over 80% of the desired features and another three 50–79% of them. All the best-adjusted are recently constructed ones, such as Cinema City, Multikino and Opera Nova, while the remaining three (i.e. the Museum of Diplomacy and Polish Refugees, the Polish Theatre and the Pomeranian Concert Hall) are partly available to disabled people. These facilities do not meet requirements as regards ramps, lifts, banisters, lower thresholds, colour labels, and sound signalling. Preponderant among the least-adjusted buildings are the museums. An average adjustment of cultural facilities to meet the requirements of disabled people is as shown in Fig. 6.

A similar inventory comprising 22 sports facilities (10 swimming pools, 5 sport halls, and 7 stadiums) shows the level of architectural availability in regard to passive and active usage by disabled persons. The majority of Bydgoszcz sporting venues meet less than half of the requirements set (Table 2). This group includes all the stadiums and a majority of the sport halls (with one exception). Found to be partly adjusted to the requirements of disabled people are all but four of the swimming pools. A majority of

Table 1 Adjustment level of cultural facilities in the city of Bydgoszcz.

Adjustment level	Features complying	Facilities (number)	Facilities (%)
Good	≥80%	3	18.75
Partial	50–79%	3	18.75
Poor	<50%	10	62.50
Total		16	100

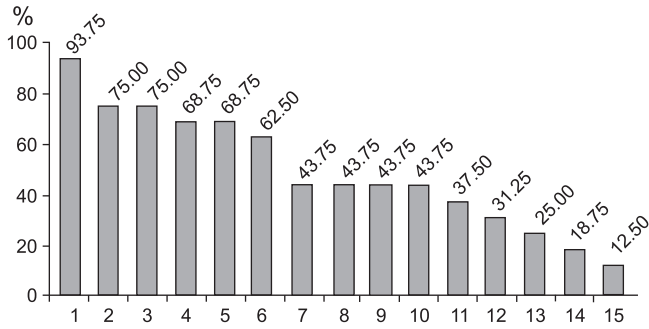


Fig. 6. Adjustment of cultural facilities to the needs of disabled people, in line with relevant architectural features: 1 – paths, 2 – manoeuvre areas, 3 – signage, 4 – doormats, 5 – doors, 6 – kerbs, 7 – parking areas, 8 – banisters, 9 – toilets, 10 – furniture, 11 – thresholds, 12 – colours, 13 – ramps, 14 – sounds, 15 – lifts.

Table 2
Adjustment level of sporting objects in the city of Bydgoszcz.

Adjustment level	Features complying	Objects in active recreation (number)	Objects in active recreation (%)	Objects in passive recreation (number)	Objects in passive recreation (%)
Good	≥80%	1	4.55	1	4.55
Partial	50–79%	6	27.27	7	31.81
Poor	<50%	15	68.18	14	63.64
Total		22	100	22	100

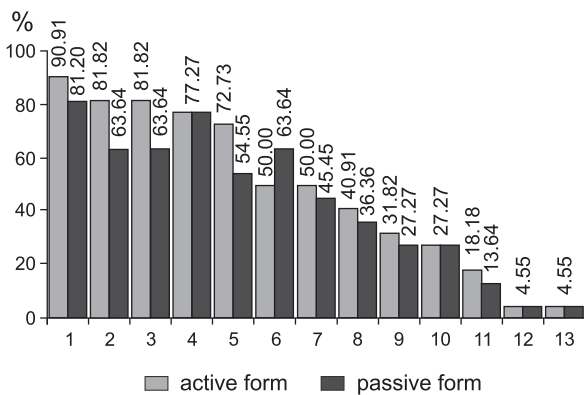


Fig. 7. Adjustment of sporting facilities to the needs of disabled people, in line with relevant architectural features: 1 – paths, 2 – manoeuvre areas, 3 – doors, 4 – signage, 5 – doormats, 6 – kerbs, 7 – thresholds, 8 – furniture, 9 – toilets, 10 – ramps, 11 – lifts, 12 – parking areas, 13 – sounds.

buildings have wide corridors, wide entrance doors and manoeuvring areas for wheelchairs (Fig. 7). Not a single sporting venue has banisters and/or colour labels. As in the case of the cultural facilities, it is the newly-constructed sporting facilities that offer the fewest physical barriers to disabled people. This is mainly due to new construction law requiring that public outlets be adjusted to meet the needs of people who are disabled or suffering from impairments. In general, poor access to the built environment seems to be a much more common problem (Kitchin, 1999c, 2001).

4.2. Respondents' free-time behaviour

The coefficient of daily mobility (ratio of number of journeys related to the number of inhabitants researched) for recreational and leisure trips taken by people with disabilities is 0.53, as compared with their counterparts without disabilities is 0.32 only.

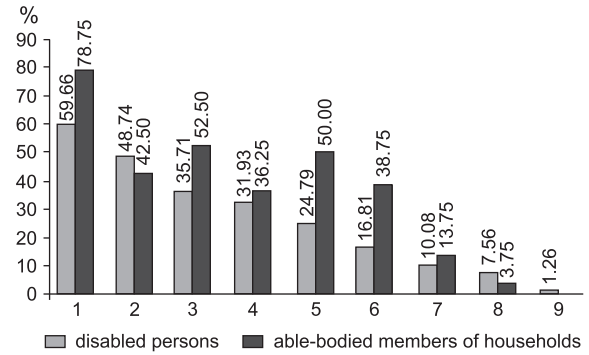


Fig. 8. Declared form in which free time is spent: 1 – meeting relatives and friends, 2 – at home or on an allotment, 3 – walking, 4 – shopping, 5 – visiting a cinema, 6 – sporting activities, 7 – visiting a theatre, 8 – visiting an opera house or concert hall, 9 – other.

A majority of disabled respondents spent their free time meeting relatives and friends (59.66%, Fig. 8). However, this is a lower value than in the late 1990s when this form of activity was declared by 84% of disabled people (Ostrowska et al., 2001, p. 108). In our research, every second respondent spent time with relatives at least once a week, and every third – once a month. Every second has a slight impairment. Most frequently among the latter are people with moving problems (42.85%) and multi-organ conditions (20.55%). Over 30% of these need crutches, walking sticks, or wheelchairs.

Non-disabled members of the same households are more likely to declare that they spend their free time with relatives and friends.

Every second person with disabilities (Fig. 8) confirms spending his/her free time at home or at an allotment. The impairment level is similar to the above mentioned. Over half of the respondents declare some activities on an allotment or at home daily, or at least once a week. This is in line with previous Polish research (Filipek, 2006; Ostrowska et al., 2001). Home is also the main place for disabled Britons to spend their spare time (CSO, 2000).

In the case of non-disabled respondents, 42% declare this form by which free time may be spent.

The third form of spending free time is walking (35.71% of respondents), in what is again a confirmation of earlier research (Ostrowska et al., 2001). These are mainly people with slight impairments, be these moving problems, multi-organ diseases, or eyesight problems. Every fourth person uses crutches or a wheelchair. This form of activity is rarer than previous ones: only 37% declare that they walk at least once a week, and 18% once a month. Only every tenth respondent walks daily.

52.5% of able-bodied household members walk. In an absolute majority these respondents are better-educated females.

A specific form by which free time can be spent is shopping. While shopping may not be a recreation for many, shopping centres offer more and more leisure functions through visits to cafés, restaurants, cinemas or fitness clubs. People with disabilities thus resemble their non-disabled counterparts in considering shopping a form of recreation (above 30%), and this is indeed being facilitated by the ever-growing number of shopping centres. Among disabled respondents it is people with slight impairments (moving and sight problems) that predominate. Every third person needs one orthopaedic device or other. Half of this group does shopping once a week, and every fourth – once a month. In Poland-wide research carried out by Ostrowska et al. (2001, p. 108), this form of spending free time was declared by 40% of disabled persons. Similar behaviour has been observed in the US, where 56% of disabled inhabitants spend their time shopping for weekly groceries (Kaye, 1998).

Among non-disabled counterparts, it is mainly women that resort to this form of recreation (75.86%, Fig. 8), and in the majority these are younger women.

None of the above mentioned forms of spending free time involve more substantial financial inputs, hence they are very common among disabled and able-bodied people alike. A quite different situation applies in the case of other activities, like going to the cinema, sporting activities, or so-called 'higher-culture' (classical concerts, visits to the opera house, theatre performances). The latter involve higher financial inputs: buying tickets, purchasing cards and outfits, sometimes a near-necessity that a means of transport be at the person's disposal. While films are presented at various times, concerts or performances usually finish late at night, making use of a private car or taxi almost inevitable.

Cinemas are visited by every fourth disabled person studied, and this represents a very marked advance when set against the situation described in research from the late 1990s. In 1999, only 4–5% of disabled persons in Poland declared that they engaged in this kind of activity (Ostrowska et al., 2001, p. 108). In the US, in contrast, 42% of disabled respondents go to movies (Barnes and Mercer, 2008, p. 68). Among disabled Bydgoszcz audience members there is a dominance of younger males. Every second person in this category has slight impairment, and his/her disability is connected with mobility. It is most frequent for disabled people to take in a film at the cinema once a month, though every fifth person in the category declares that a visit take place once a week. For travelling, 44.06% of disabled respondents use a car and 32.2% means of public transport.

Among non-disabled members of households, every second declares that he/she visits the cinema. Within this total, 62.5% of individuals are female. The main means of transport is a car, as used by 70% of respondents.

The greatest differences between the two categories researched when it comes to the spending of free time are those observed in the case of sporting activity (Fig. 8). This seems to be important, since sport plays a particularly major role in the process of social rehabilitation and recreation (Tepper-Doll, 1991). Unfortunately, only 16.8% of disabled people (mainly males) declare that they engage in this form of recreation.

Half of the disabled people active in sport are subject to slight impairment, while a further 40% experience substantial impairment. Every third person has a sight problem, every fifth a problem with moving. Two-thirds of the respondents in this category do not use orthopaedic devices. Physically-active disabled people engage in sport once a week (in 40% of cases), or once a month (32.5%). Respondents choose places located near to their places of residence – every fourth persons engages in walking as means of accessing their sporting activity. Only relatively limited interest in sporting activity is displayed by disabled people in the US, over two-thirds there not taking part in such activity at all (Barnes and Mercer, 2008, p. 68). In the Polish situation, limited interest may reflect a shortage of funds, but also architectural barriers and a limited supply of sporting offers addressed to disabled people. Practically the only form of such interest to materialise without any specific organisation is a visit to a swimming pool or – in summer – a cycling or walking trip. The majority of sporting activities (e.g. fitness, gymnastics or yoga) need some form of organisation (the booking of a hall, for example), and a knowledge of rehabilitation, to say nothing of the wider interest of larger group of people with similar dysfunction.

Non-disabled members of households use sporting activities much more frequently (38.75% of respondents) but a majority in this group too are males. Like disabled people, they mostly train once a week, albeit choosing more distant venues and travelling there by car.

Proposals concerning 'higher culture' are responded to by only 17% of disabled people (a level comparable with that in the case

of sporting activities). Nevertheless, it is a better result than found in research by Ostrowska et al. (2001). In 1999, this form of activity was declared by only 2.7% of females and just 1.2% of males. The greater share of active disabled people in the city of Bydgoszcz can be explained by reference to recent cultural change, as well as the relatively large number of cultural venues, such as cinemas, theatre, concert hall, museums, and an art gallery. As in the US, organised concerts are taken part in by every fourth disabled person (Barnes and Mercer, 2008, p. 68). In the city of Bydgoszcz, every tenth disabled person declares that he/she participates in theatre performances. An average audience member is a female with a slight impairment and moving problems. 66.66% of people taking part in this form of recreation use some walking devices. Half of the disabled attend performances once a month, mainly driving a car as they do so (58.33%). The opera or concert hall is visited by an even smaller number of disabled people (7.56% altogether). An average disabled music lover has features similar to a theatregoer.

Non-disabled members of households visit 'higher-culture' outlets equally seldom (17.5% altogether) – not making use of the rich range of culture the city has to offer. An average audience member travels there by car (75%).

4.3. Accessibility of transport micro-areas and journeys to recreational and leisure venues

The value for the gravity potential of micro-area *i* is a measure of its accessibility from all other micro-areas. A majority (54.55%) of transport micro-areas indicate some interaction (positive value for potential) in the form of journeys by disabled people to recreational or leisure venues (Table 3, Fig. 9).

The highest value for gravity potential (15.25%) is observed in the case of the northern micro-area with the largest open-air recreational complex – the Myślęcinek Forest Park of Culture and Leisure. Opened in the 1970s, the Park is located almost 3 km from the city centre. An area there of over 800 ha supports a garden of Polish fauna, a botanic garden, a horse recreation centre, a ski slope, an ecological recreation centre, a children's entertainment park, fishing ponds, a pier and restaurants. The Park has relatively convenient public transport links (tram and buses) to the city and nearby car parking areas. More distant areas can be reached via the Park steam railway (www.myslecinek.pl). Disabled people reach the Park by car (48.38%), public transport (c. 30%), or bicycle (almost 13%). An average trip takes half an hour, and respondents visit the Park once a week (in 45.16% of cases), or once a month (in 38.7% of cases). This form of recreation is preferred by those with secondary education, with a slight impairment (51.6%), mainly reflecting moving problems (35.5%). More than one person in three uses some orthopaedic device or other.

The area chosen second most often is the city centre core. Respondents travelling to the centre visit relatives and friends (57.1%), or the opera or concert hall (14.3%). Every third disabled person walks along the main shopping road (Gdańska Street).

Table 3
Micro-areas and their potential values for journeys by disabled people to recreational and leisure venues.

Value for potential (%)	Micro-areas (number)	Micro-areas (%)
0	50	45.45
0.1–1.99	45	40.91
2.0–3.99	10	9.09
4.0–5.99	3	2.73
6.0–7.99	1	0.91
8.0–15.25	1	0.91
Total	110	100.00

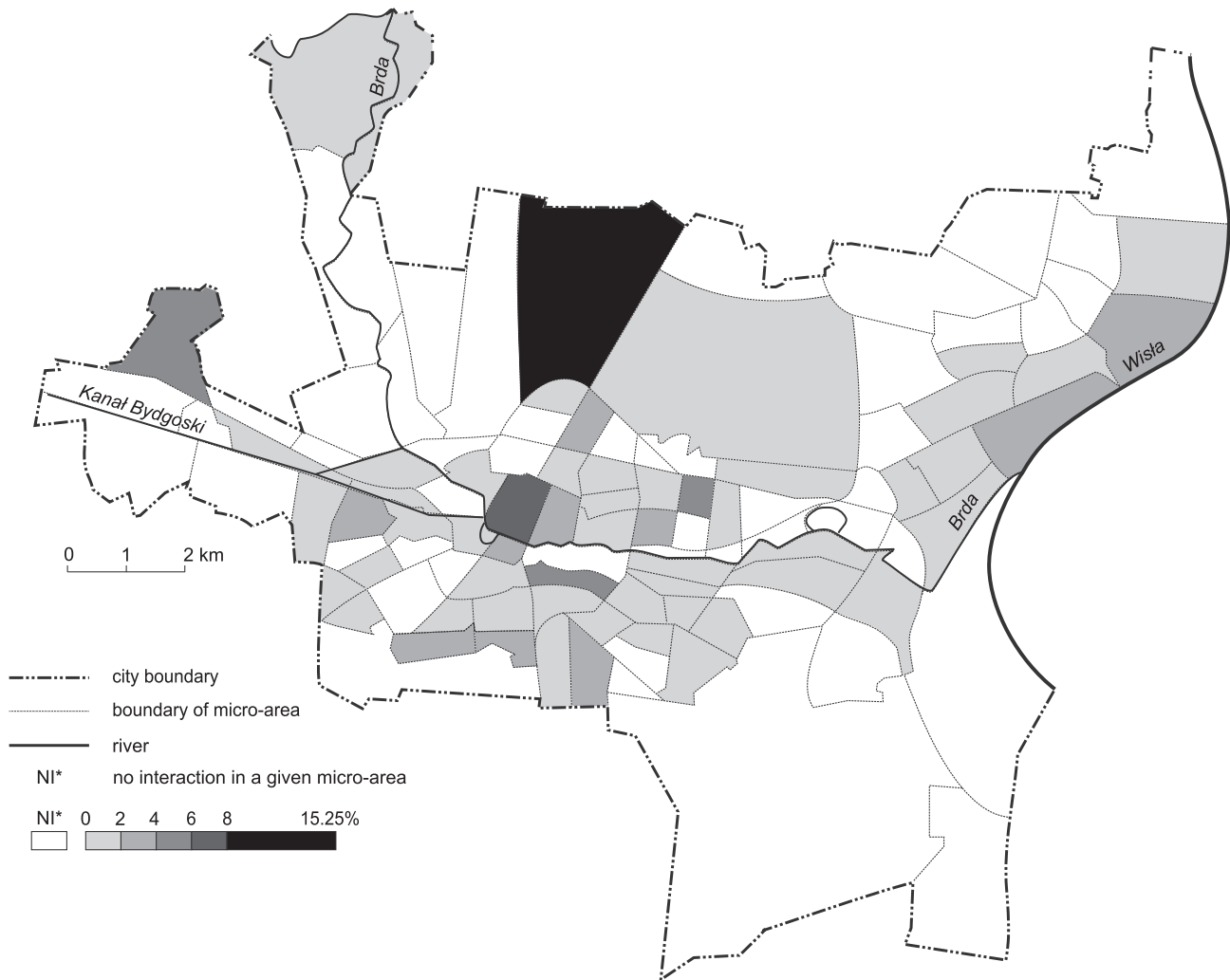


Fig. 9. Gravity potential – journeys of disabled people to recreational and leisure venues.

Two-thirds of the respondents in this case are poorly educated. An absolute majority have either a moderate or a slight impairment. These are mainly people moving without orthopaedic devices whose average age is c. 42 years. 85.7% of them use means of public transport to access the city centre.

Relatively good access (potential value 4–5.99%) is also enjoyed by micro-areas located near large housing estates. Respondents visiting those places spend free time either with their families, or at home or on an allotment. Above 58% of the disabled in this category use their free time for shopping, and c. 42% for walks close to their place of residence. Every second has a substantial impairment reflecting problems with moving. However, most in this category do not use orthopaedic devices and are relatively young.

Micro-areas with lower potential values (3–3.99%) are located around the city. In the western part there is the Osowa Góra housing estate whose disabled people declared that meeting family and friends was a favoured activity. Two other micro-areas are located close to the city centre, with respondents travelling there to visit cultural outlets (Cinema City or the theatre), or meet relatives and friends. Notwithstanding the fact that every second person admits to experiencing moderate impairment, a majority do not use any devices to support their walking. Two further micro-areas, located further from the centre, are attractive places for walking, for shopping, and for spending free time at home or on an allotment. Respondents use various means of transport in relation to the area's location.

Seven micro-areas with potential values in the range 2–2.99% are spread across urban space, albeit with all but one being located at a distance from the city centre. A majority of respondents meet relatives and friends, walk, or take a rest on a garden plot or by shopping. All micro-areas have good conditions for open-air recreation (walking areas, a forest, or a city park). Ten further micro-areas with a lower value for potential are located similarly to the above mentioned group. The way respondents spend free time is also analogous.

Finally, the lowest value for potential (below 1%) is characteristic of what are with one exception intra-urban micro-areas. These mainly embrace housing estates, forest areas in the northern part of the city, and other areas with allotments.

What is interesting is that gravity potential for journeys to recreational venues as divided into disabled females and males suggests differences in behaviour that are present, but are certainly not substantial. A majority of the interaction micro-areas are marked by a low level of accessibility.

The results of the accessibility analysis carried out for non-disabled members of the same households show distinct differences in respondents' behaviour. In the case of a majority (86.36%) of the micro-areas there is no interaction (Table 4, Fig. 10).

Within the remaining 15 micro-areas, the best accessibility (20.22%) is enjoyed by the city centre core. Non-disabled people spend their free time walking through the 19th century centre, meeting relatives and friends, and visiting the nearby Multikino

Table 4

Micro-areas and their potential values for journeys of able-bodied members of households to recreational and leisure venues.

Value for potential (%)	Micro-areas (number)	Micro-areas (%)
0	95	86.36
0.1–1.99	2	1.82
2.0–3.99	5	4.54
4.0–5.99	2	1.82
6.0–7.99	2	1.82
8.0–20.22	4	3.64
Total	110	100.00

cinema complex. Most frequent means of transport are car (41.66%) and bicycle (c. 25%). Half of the respondents claim to visit this area once a week. This form of recreation is preferred by people educated to secondary and higher level.

The second micro-area with a high value for potential (15.73%) is located in the southern part of the city, close to the airport where forest and allotments are located. All respondents declare that they visit relatives and friends, shop together, or walk, as free-time forms of recreation. A majority of them (75%) use a bicycle as a means of transport.

Accessibility at the level of 12% is enjoyed by two micro-areas: the Forest Park of Culture and Leisure, and forested areas in the western part of the city in Osowa Góra housing district. The later is accessed on foot.

Relatively good accessibility (6.74%) also characterises two other micro-areas: the first one is in the western part of the city and is called Prądy, while the second is the eastern part of the city centre. The forms of recreation referred to in the first case include visiting relatives and friends, walking, spending free time on an allotment (accessed by car or bicycle), and in the second – meeting relatives but also sporting activity.

Other micro-areas are spread around the city (Fig. 10), and the forms of activity are similar to the above mentioned: visiting relatives, walking but also visiting shopping centres, recreation on an allotment, or participation in sporting activity. Micro-areas with the lowest positive values for potential are also spread across urban space and embrace various activities.

4.4. Trips within micro-areas and passenger flows

Journeys between micro-areas represent one issue, but a further one concerns what analysis of intra-micro-area journeys and their spatial distribution reveals about differences between the two categories researched. It is much more frequent for disabled people to spend their free time in home areas. Overall, this applies to every fifth recreational journey. Within this category, internal trips embrace almost every fourth micro-area, and are spread out all over the city (Fig. 11). Some are located in the city centre, while others are on the outskirts.

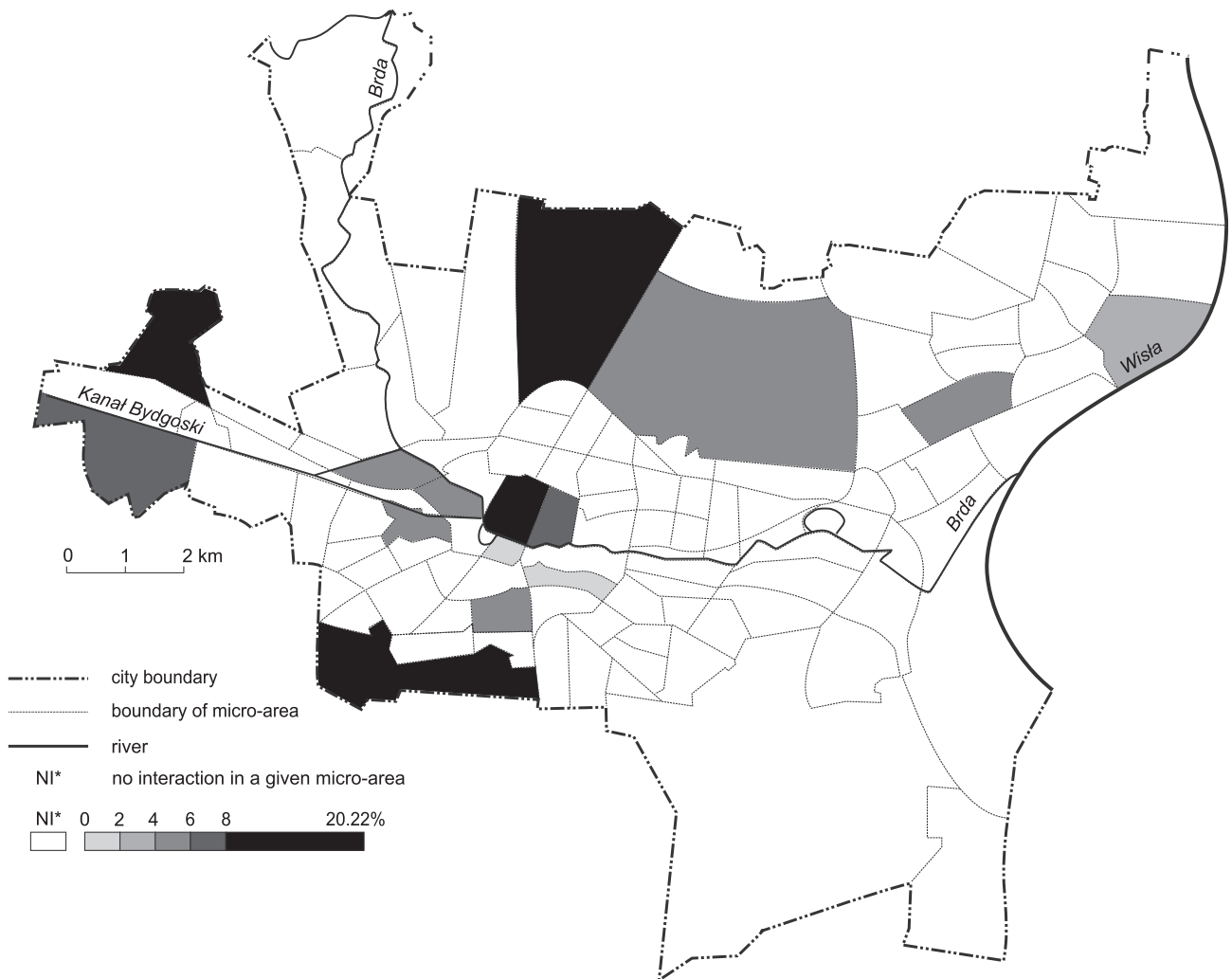


Fig. 10. Gravity potential – journeys of able-bodied members of households to recreational and leisure venues.



Fig. 11. Intra-micro-area journeys by disabled people to recreational and leisure venues.

Most intra-area trips were characteristic of the western district of the Osowa Góra housing estate, which is located far from the centre separated by a forested area, and only connected relatively weakly with remaining parts of the city. Non-motorised inhabitants are served by just a single bus line. It is therefore most probably this situation that influences decision-making as regards the way free time is spent. The second largest micro-area with internal trips takes in the vicinity of the Gdańska shopping street. This is an attractive part of the city founded on garden-city principles. Besides green areas, there are also musical objects, such as a concert hall and academy of music, as well as many services. Disabled inhabitants of the nearby housing estate of Bartodzieje spent their free-time close to their residence (a common local recreation centre).

It was much less frequent for non-disabled members of households to spend their free time near to the place of residence. Internal trips occur in 2.72% of micro-areas only (Fig. 12). In total, they account for just 4.08% of all journeys of able-bodied members of households taken to recreational or leisure venues. In this category, it is the inhabitants of the distant large eastern housing estate of Fordon that are most frequent, followed by the aforementioned western housing estate of Osowa Góra, plus the attractive city centre.

To be observed when account is taken of the distribution of passenger flows are certain similarities in the spatial behaviour of disabled persons and their non-disabled counterparts. In both categories, it is possible to observe movements over relatively large distances (in any case beyond the micro-areas adjacent to

the original one). In the case of disabled persons there are three micro-areas that generate a large number of trips (Fig. 13).

The most common transfers noted are to the micro-area embracing the Forest Park of Culture and Leisure. Respondents from various parts of the city commute there, especially where they originate in large housing estates, even if they are located on the southern bank of the River Brda, which does constitute some sort of spatial barrier. This is due to good public transport connections, and an attractive fare structure that allows for a change of means of transport in the course of a journey. These facts speak for some interdependence between the choice of destination and the transport pattern of the city.

In the case of non-disabled members of households, such a concentration of passenger flows into one area is not observed (Fig. 14). Only the SW micro-area – as a location for many family allotments, concentrates flows from the other two areas. A similar situation applies in a southern micro-area embracing allotments. The remaining areas (the Forest Park of Culture and Leisure as well as the city core) are destinations for a larger number of flows, as well as being viewed and utilised in ways that are similar for both categories of respondent.

4.5. General modal split for journeys to recreational and leisure venues

Aldred and Woodcock (2008, p. 492) complain that ‘for many disabled people [in the UK] private cars are the only form of



Fig. 12. Intra-micro-area journeys by able-bodied members of households to recreational and leisure venues.

Table 5
Modal split for journeys to recreational and leisure venues.

Main mode by distance travelled	Disabled persons (%) N = 238	Non-disabled persons (%) N = 49
Walk	25.21	8.16
Cycle	5.04	24.49
Driving a car	12.61	28.57
Passenger in a car	25.63	16.33
Tram	14.71	8.16
Bus	11.76	8.16
Taxi	3.36	2.04
Other (PKS coach)	1.68	4.08
Total	100.00	100.00

accessible transport, and that restrictions on car use are negative for disabled people'. A similar conclusion on the hegemony of the car was drawn much earlier by Morris and Snelson (1994). In the Bydgoszcz context, however, such reliance on cars is not visible, and public urban transport (trams and buses) and walking play important roles in mobility of the disabled, with the exceptions described before. One can suppose the difference is mainly of a financial nature: rather few disabled people in the city can afford to purchase a car (although a car is used as well). What is similar in the case of the UK and the city of Bydgoszcz, is the relatively minor or even zero role played by transport that is active (other than

Table 6
Eigenvalues for the two principal components extracted for the journeys of disabled persons to recreational and leisure venues.

Component	Eigenvalue	% of total	Accumulated eigenvalue	Accumulated % of total variance explained
I	23.23862	70.42006	23.23862	70.42006
II	4.46390	13.52696	27.70251	83.94701

walking) and green, for example cycling not to mention electric scooters, rollerblades, skateboards, etc.

When Bydgoszcz disabled people and their able-bodied counterparts are compared, the differences in the overall breakdown by mode for journeys to recreational and leisure venues are very visible (Table 5). The car and bicycle are used much more by non-disabled persons, while walking plays a rather marginal role.

4.6. Characteristics of respondents travelling to recreational and leisure venues

Principal components analysis was used in distinguishing the group of original variables influencing the daily mobility of disabled persons and their non-disabled counterparts. The method offers relatively full reduction of data and their transformation to

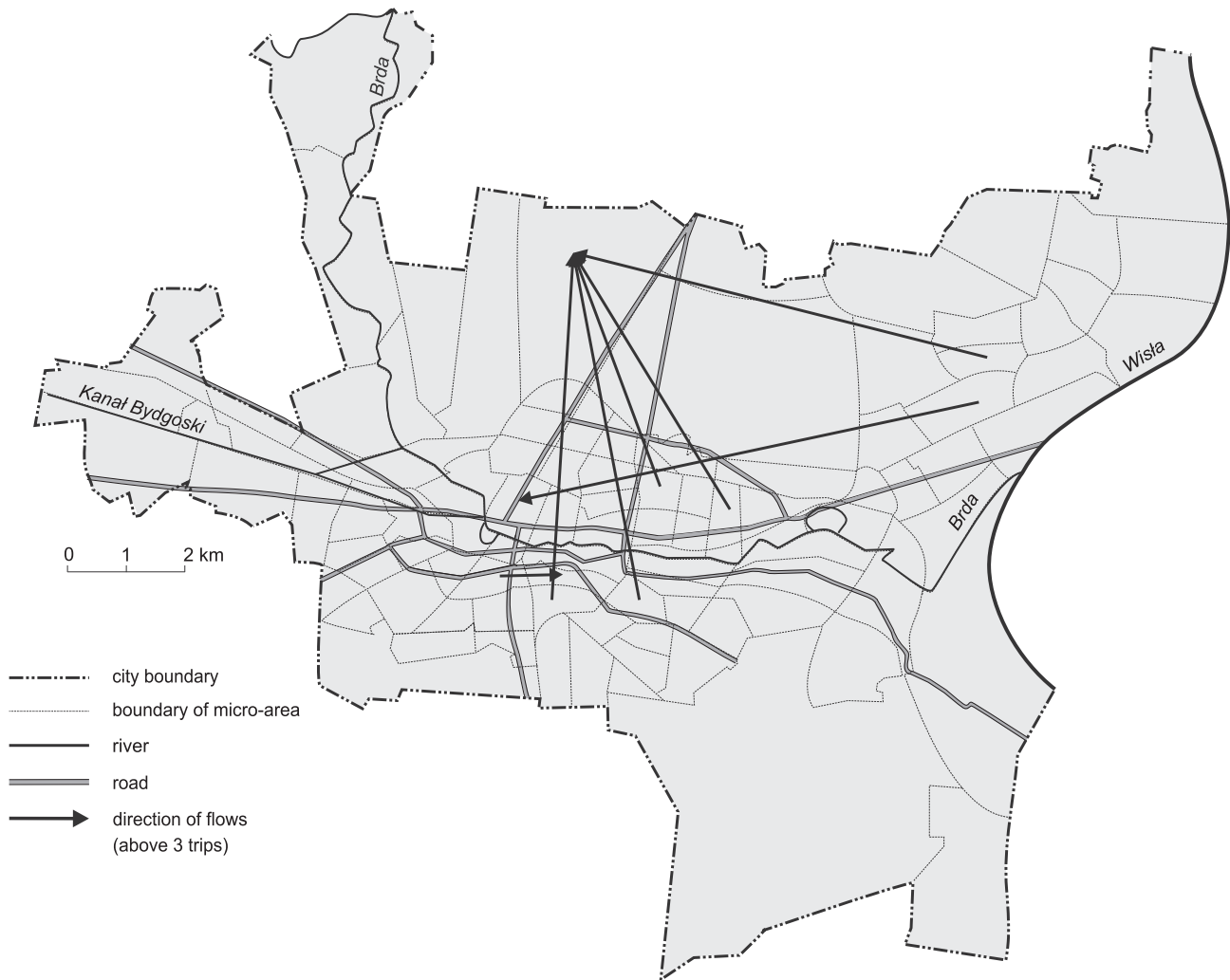


Fig. 13. Passenger flows – journeys made by disabled people to recreational and leisure venues.

new orthogonal variables with a simultaneously low level of information loss.

In our analysis involving disabled people two principal components (in accordance with the 5% criterion of variance explained) are capable of being extracted. These explain 83.95% of total variability (Table 6).

The first component accounts for 70.4% of the variance and is significantly correlated with 21 original variables (Table 7). Such a large number of variables may cause some difficulties with the interpretation of the first principal component. However, taking into account the highest values of the determination coefficient, we can say it characterises people with a permanent certificate attesting to a slight degree of impairment, with moving difficulties, but not using orthopaedic devices. Among the reasons for disability are multi-organ diseases. Respondents are travelling by public transport (tram – P_{30} : 0.84), or by car (as passengers – P_{29} : 0.83, and as drivers – P_{28} : 0.65).

The highest value noted for the first principal component (8.8, Fig. 15) is in the micro-area embracing the Forest Park of Culture and Leisure with its typical recreational function. It is a disabled-friendly area. Paved paths, the opportunity to walk on flat terrain without barriers (e.g. kerbs), a large number of places to rest (benches) – all of these features make the Park an attractive place of recreation for disabled inhabitants also. This is important, since the first component *i.a.* characterises people moving

with crutches and walking sticks (P_{22} : 0.83), or using wheelchairs (P_{23} : 0.57). In the Park, there is also a special botanic path for people with sight problems (P_{16} : 0.61) where the plants are described in Braille (<http://www.mysleciniek.pl>). Open-air recreation does not automatically require substantial financial inputs (except access costs). A nearby large parking area is free for disabled people. Thanks to the tram line, the Park is also relatively well linked in with the remaining parts of the city (which can explain the high values of correlation coefficients of transport variables).

Relatively high values for the first principal component are also observed in another four micro-areas of the city centre (Fig. 15). These are attractive areas of the city with walking places (several parks, embankments along the River Brda), along the Gdańska shopping street, or on the revitalised Mill Island, which offers a number of cultural facilities (theatre, opera house, cinema and art gallery), and services (cafés, restaurants and shops).

In every fifth micro-area a low value for the first principal component (below 1) can be observed. Areas of this kind are spread throughout urban space, albeit with a domination of housing estates. Moreover, there are many similarities with areas of internal trips – a phenomenon that can be explained by the fact that poorly- or averagely-educated people choose a form and place of recreation near their place of residence. A similar case applies to people with mobility difficulties.



Fig. 14. Passenger flows – journeys of able-bodied members of households to recreational and leisure venues.

The second principal component accounts for 13.5% of variance (Table 6) and is correlated significantly with eight original variables in essence capable of being categorised as transport- or health-related (Table 7). Positive values for the second component are observed in the case of 19% of micro-areas spread all over the city. However, a majority of micro-areas have very low values, with the one exception of the southern housing estate of Glinki (respondents meeting relatives and friends, or walking around).

In the case of non-disabled members of households, 16 original variables describing daily mobility have been taken into account. In analysis, three principal components have been extracted, which explain 79.59% of total variability (Table 8).

The first principal component with a value of 8.62 explains four times as much variability as the next one and is correlated significantly with three original variables. The first component characterises the behaviour of younger respondents travelling by tram or as car passengers (Table 9).

Positive values are observed in six micro-areas only (5.45% of the total). Again the highest value of the first principal component (Fig. 16) is in a micro-area embracing the Forest Park of Culture and Leisure. A high correlation coefficient for the first component and a variable describing trams can be explained by a relatively convenient location of the micro-area within the urban transport network. A wide choice as regards the spending of free time makes

this an attractive area for all age categories. Physically active young inhabitants can spend their free time at a year-round sports and recreation centre (with golf academy, ski slope, climbing wall, rent-a-bicycle, rollerblading, skateboarding, horse-riding and a family entertainment park).

The second highest value is in the micro-area of the city centre. Respondents taking rest there can visit Multikino, a shopping centre, and a large number of smaller shops. Furthermore, the adjacent micro-area embraces a large shopping centre called Focus Park. This well-connected area is an attractive place for walking. Other micro-areas with positive values for the first component are located not far from the city centre (Fig. 16).

The second principal component explains over 14% of total variability and is correlated significantly with the two variables of a transport nature (Tables 8 and 9). This component characterises non-disabled counterparts travelling by bus or taxi to leisure or recreational venues. The vast majority (94.54%) of areas have negative values for the second principal component, however. Positive values are to be noted in areas of the city centre, Old Town, and nearby urban transport change nodes.

Finally, the third principal component explains over 7% of total variability and is correlated significantly with one original variable. It characterises daily mobility of able-bodied members of households travelling by bicycle to leisure and recreational venues.

Table 7
Classification of variables for principal components extraction – journeys of disabled persons to recreational and leisure venues (arranged in line with values for loading).

Component	Variable	Variable characteristic (number)	Component loading	Coefficient of determination
I	P ₁₃	Respondents with permanent certificate of disability	0.97308	0.95
	P ₂₄	Respondents not using orthopaedic devices	0.96769	0.94
	P ₃	Respondents of mobile working age (18–44 years old)	0.96004	0.92
	P ₁₁	Respondents with slight impairment	0.95984	0.92
	P ₇	Respondents with secondary education	0.95715	0.92
	P ₁₄	Respondents with moving difficulties	0.95684	0.92
	P ₂	Respondents – males	0.95586	0.91
	P ₁₂	Respondents with temporary certificate of disability	0.95501	0.91
	P ₄	Respondents of non-mobile working age (females 45–59, males 45–64 years old)	0.95232	0.91
	P ₁	Respondents – females	0.92627	0.86
	P ₃₀	Respondents travelling by tram	0.91399	0.84
	P ₂₂	Respondents using crutches or walking sticks	0.90931	0.83
	P ₂₉	Respondents – car passengers	0.90851	0.83
	P ₆	Respondents with vocational education	0.90481	0.82
	P ₉	Respondents with substantial impairment	0.85687	0.73
	P ₁₀	Respondents with moderate impairment	0.85484	0.73
	P ₂₈	Respondents – car drivers	0.80672	0.65
	P ₈	Respondents with higher education	0.79789	0.64
	P ₁₆	Respondents with sight conditions	0.77971	0.61
	P ₂₃	Respondents using a wheelchair	0.75633	0.57
	P ₂₁	Respondents with multi-organ conditions	0.74089	0.55
II	P ₂₇	Respondents travelling by motorcycle	0.988739	0.98
	P ₃₃	Respondents travelling in another way	0.94437	0.89
	P ₁₈	Respondents with digestive system conditions	0.910974	0.83
	P ₃₂	Respondents travelling by taxi	0.839423	0.70
	P ₁₇	Respondents with cardiovascular system conditions	0.806767	0.65
	P ₁₉	Respondents with neurological conditions	0.767618	0.59
	P ₁₅	Number of respondents with hearing conditions	0.72994	0.53
	P ₂₆	Respondents travelling by bicycle	0.727215	0.53

Table 8
Eigenvalues for the three principal components extracted for journeys of non-disabled members of households to recreation and leisure venues.

Component	Eigenvalue	% of total	Accumulated eigenvalue	Accumulated % of total variance explained
I	8.619546	57.46364	8.61955	57.46364
II	2.156254	14.37503	10.77580	71.83867
III	1.159983	7.73322	11.93578	79.57189

Table 9
Classification of variables for principal components extraction – journeys of non-disabled members of households to recreational and leisure venues (according to values of loadings).

Component	Variable	Variable characteristic (number)	Component loading	Coefficient of determination
I	P ₃₀	Respondents travelling by tram	0.946636	0.90
	P ₂₉	Respondents – car passengers	0.932666	0.87
	P ₃	Respondents of mobile working age (18–44 years old)	0.740123	0.55
II	P ₃₁	Respondents travelling by bus	0.931507	0.87
	P ₃₂	Respondents travelling by taxi	0.728632	0.53
III	P ₂₆	Respondents travelling by bicycle	0.922452	0.85

Positive values for the third component are present in over 9% of micro-areas, above all those separated from the city centre and partly neglected by public transport services.

5. Conclusions

Intra-urban daily mobility of people with disabilities and their able-bodied counterparts is revealed to be a multi-dimensional phenomenon. There are great differences between the two categories where recreational and leisure sites are concerned. It emerges from the analysis that, in the present context, transport is important, but in no way the only factor to be taken into account. Below are the most important findings from our study.

A comparison of the spatial behaviour characterising disabled people and their non-disabled counterparts reveals lower values for the coefficients of daily mobility for both categories, as compared with the case concerning journeys to places of work and healthcare. Lower values may suggest insufficient attention paid by respondents to what may broadly be termed recreation.

As van Acker et al. (2010, p. 234) note, travel behaviour is the resultant of ‘three kinds of variables referring to a spatial component (...), a socio-economic component (...) and a personality component’. When queries from theories of transport geography and social psychology are combined, some regularities are visible. For example, a majority of people choose forms of recreation not involving substantial financial inputs. Among the forms of recreation indicated most frequently are meetings with relatives and friends, as well as the spending of free time at home or at an allotment. These forms are frequently used by disabled persons of poor or average-level education, and one in three of them has a moving problem. Among their non-disabled counterparts there are averagely- or well-educated people.

Among the active forms by which disabled people spend their free time, the most common is walking, which is engaged in by every third respondent. Most of these are females in middle age. Weekly shopping is also indicated frequently as a form of spending free time. Much less frequently, disabled inhabitants and their non-disabled fellow household members indicate participation in cultural events by way of a visit to the cinema, theatre performances, concerts or sporting events. Such means of

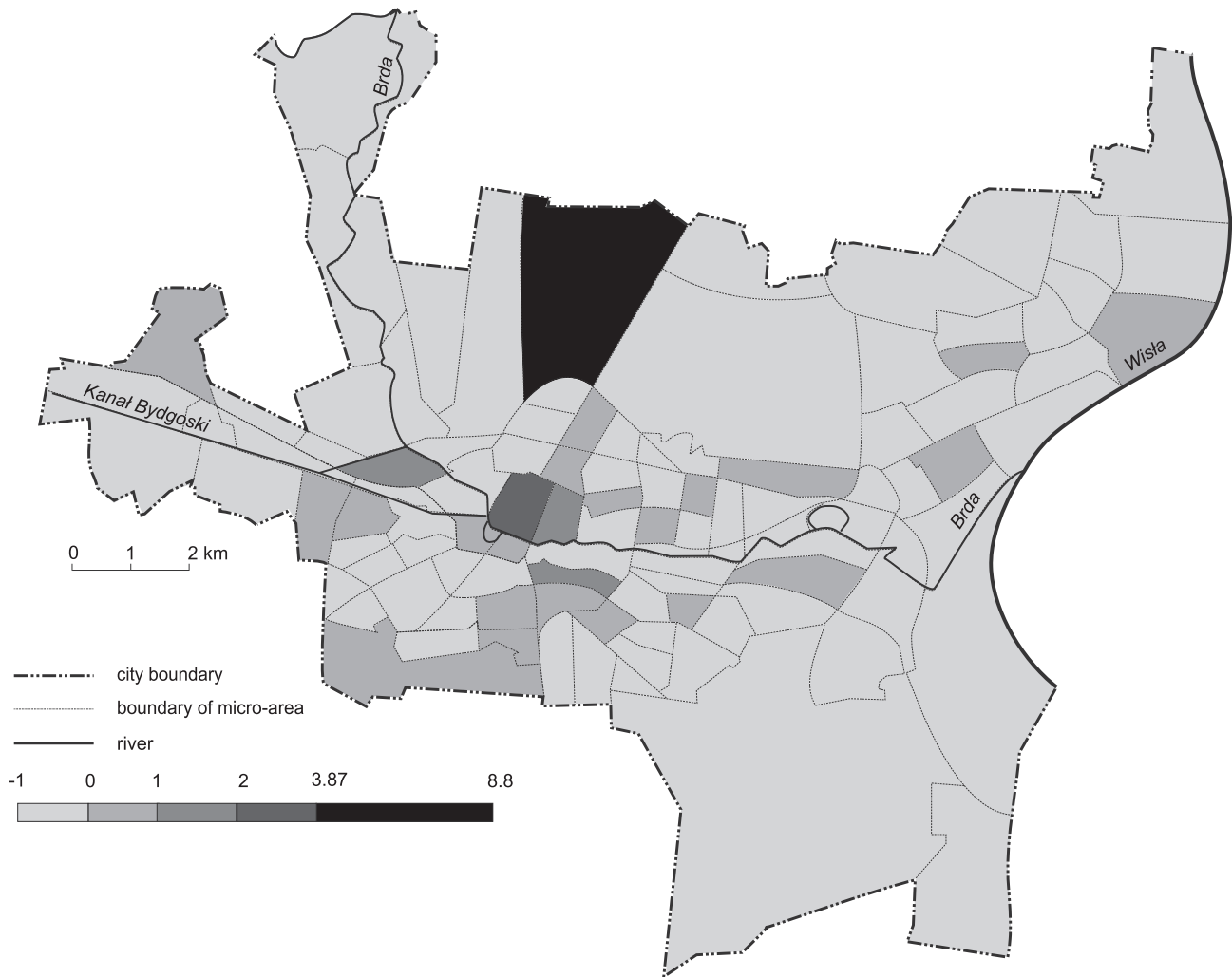


Fig. 15. Spatial distribution of the first principal component – journeys of disabled people to recreational and leisure venues.

spending time frequently require an escort person (especially in the case of a visitor in a wheelchair), as well as earlier booking for the purpose of the relevant service. This has the effect of excluding spontaneous behaviour and limits opportunity of choice (e.g. place).

The most major differences in behaviour between the two categories researched relate to participation in sporting activities. Despite the fact that the physical activity in question represents a form of rehabilitation, people with a disability certificate are only half as likely to take part in it as are their non-disabled counterparts.

Research into the accessibility of recreational venues shows that a majority of transport micro-areas are well-prepared to receive disabled people. However, in-depth analysis indicates that some areas (such as the city centre) are mainly chosen by persons without serious mobility problems (respondents without orthopaedic devices). Disabled people with a lower level of mobility (using walking sticks, crutches, or wheelchairs) choose attractive outskirts of the city, where the opportunity for open-air recreation is on offer (at the Forest Park of Culture and Leisure, city parks or allotments). Otherwise, they may spend free time visiting relatives and friends. This speaks for the idea that it is accessibility and availability that to some extent determine the spatial behaviour of disabled persons. Better-educated people more frequently take part in cultural events and visit inner-city micro-areas in which most cultural facilities are located.

Analysis of accessibility in relation to gender reveals slight differences in behaviour of disabled females and males. Spatial interactions are in a similar number of micro-areas, and high values for gravity potential are mainly in the same areas (the Forest Park and Osowa Góra housing estate). However, in the case of disabled women – as opposed to men, inner-city areas are seen to enjoy fuller accessibility. This can be explained by reference to the preferred forms of spending free time: females more often declare attendance at theatre performances, concerts and opera shows, and the facilities making such services available are located mainly in the city centre.

In the case of able-bodied members of households, a visible difference lies in their choice of inner-city micro-areas that are less accessible to disabled people. This may be caused by the unsatisfactory quality of infrastructure (uneven paved surfaces in the Old Town area,⁶ subways inconvenient for walking, difficulties in finding parking spaces, unadjusted tram rolling stock), that is unsuitable for disabled persons. As a result, the latter prefer recreational and leisure venues elsewhere.

⁶ It is not a Polish specificity. For example, in the UK 65% of disabled people 'are dissatisfied with pavement maintenance and half say they would go out more if walking conditions improved' (Aldred and Woodcock, 2008, p. 490). Outdoor environment barriers have been analysed by Wennberg et al. (2010).

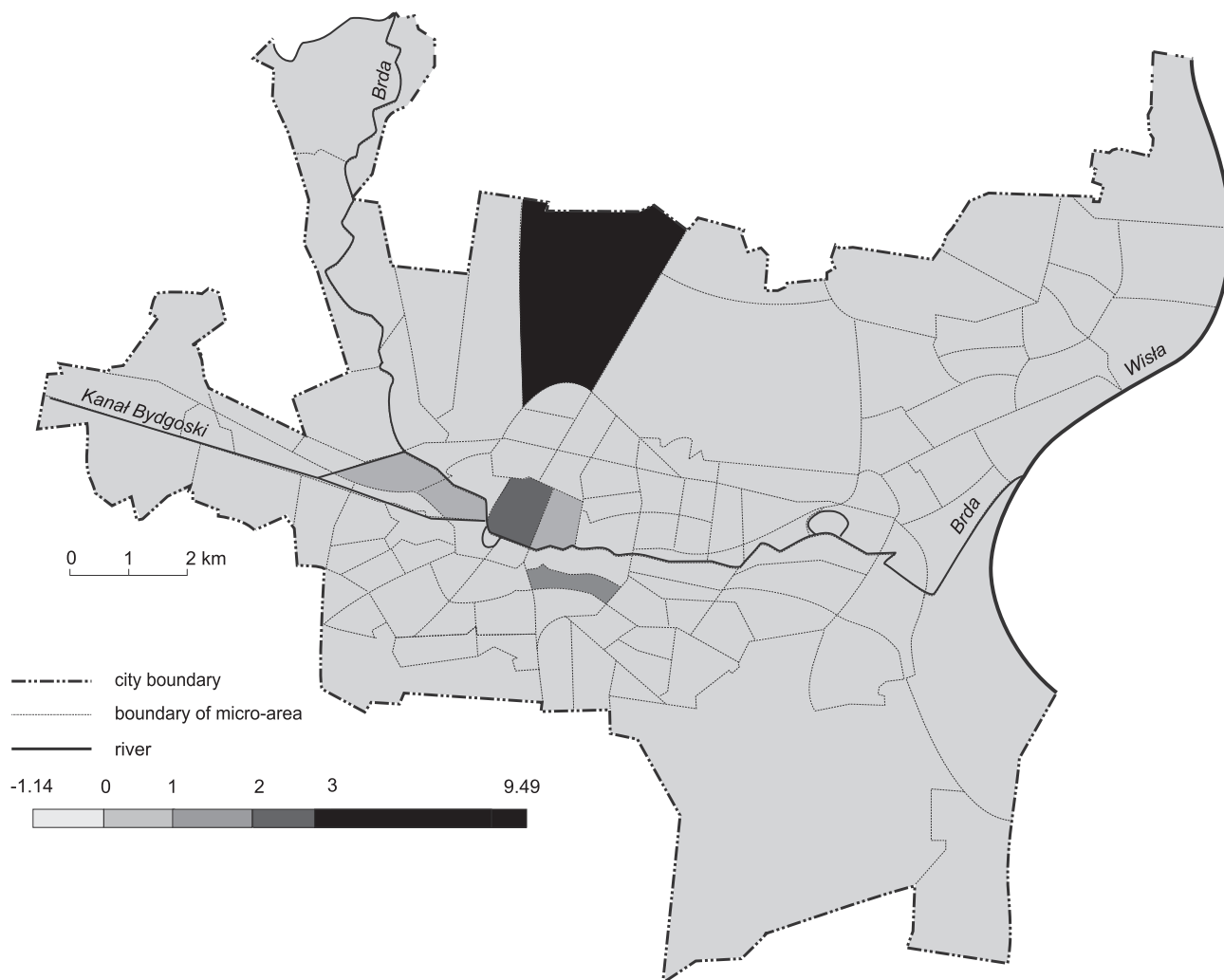


Fig. 16. Spatial distribution of the first principal component – journeys of able-bodied members of households to recreational and leisure venues.

An analysis of intra-micro-area trips and passenger flows also shows certain regularities. Disabled people choose forms of recreation not involving trips to other areas much more frequently, as is confirmed by the forms of spending free time (activities at home, or meeting relatives and friends). Such a passive form of leisure may be the result of health-related, financial or organisational barriers. In the case of disabled inhabitants of the city centre, a decision as regards the spending of free time in the immediate vicinity can be a result of areas' attractiveness, while in the case of inhabitants of the city outskirts it can reflect transport difficulties and parking problems elsewhere. On the other hand, a majority (over 95%) of non-disabled counterparts move outside their home micro-area for recreational and leisure purposes.

Internal trips occur in micro-areas distant from the city centre and in an attractive micro-area of the city centre itself. Passenger flows of disabled people show trips generated towards the Forest Park, to which respondents commute even from distant areas, three of which are well situated vis-à-vis the public transport system.

In the case of these people's non-disabled counterparts, some dispersion of trips occurs. Most frequently respondents of this category commute to micro-areas in which allotments are located.

A question which emerges is the relative applicability of the empirical findings in other geographical contexts. Giving an answer is partly problematic since this study approach is unique. Moreover, the concept of daily mobility refers to movements of

people on a variety of spatial and temporal scales. As Shaw and Hesse (2010, p. 309) note, daily mobility 'is simultaneously bizarre and exotic, trivial and quotidian [everyday], and what emerges is an understanding that daily mobility is based on both apparently automatic sequences of behaviour *and* rational decision-making'.

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