Limb POWER

Living life without limbs

The impact of using a prosthesis on participation in sport and physical activity

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Contents

Executive summary

This research consulted with people who have undergone an amputation or were born with a limb impairment, to explore their motivations and barriers to participating in sport and physical activity. With a specific focus on the role of prosthetic sockets and prosthetic components when taking part in sport or being physically active.

LimbPower spoke to 249 amputees and people with limb impairments as part of this research. The majority of the sample have lower body limb impairments, caused primarily through accident or trauma.

The findings highlighted some useful insights about people with limb impairments current and future participation in sport and physical activity:

- Nearly 8 in 10 people surveyed (78%) have taken part in some form of exercise, physical activity or sport in the last 12 months.
- The most popular current sports and activities are swimming, walking, cycling, going to the gym and fitness classes.
- Prostheses were 'always' used to take part in four of the five top activities most of the time, with the exception being swimming.
- Over 8 in 10 respondents (83%) would like to take part in more sport and physical activity in the future.

The study also examined the role of prostheses and prosthetic sockets on sports participation. The findings identified that there are a number of aspects of wearing a prosthesis that can impact on a person's engagement in sport and physical activity:

- The two most common barriers to taking part in sport and physical activity are prosthesis limitations and socket fit or comfort.
- The aspects of wearing a prosthesis that have the greatest impact on sport and physical activity participation are socket comfort, socket fit and functionality.
- Groups most impacted by various aspects of wearing a prosthesis are women, above-knee amputees and those that do not currently own a prosthesis specifically for sport use.
- Sports that most people felt prohibited from taking part in because of their prosthesis are running, climbing and rugby.

Executive summary (continued)

It is hoped that this research will support practitioners and key providers to work collaboratively in the following areas:

- Identifying and prioritising where specific improvements should be made to assistive technology to support sports participation.
- Identifying where users need to be made more aware of the wider capabilities of the technology they already have access to.
- Adapting and improving delivery of sports and activities where demand is currently being restricted by wearing a prostheses.

Overall, these survey results provide a clearer understanding about people's attitudes towards sport and physical activity. LimbPower will use this insight to work with and advise key providers on how to deliver more appealing and suitable sport and activity opportunities for amputees and people with limb impairments.

Background and approach

Established in 2009, LimbPower supports amputees and individuals with limb impairments to reach their full potential.

Our mission is to engage people with limb impairments in regular participation in physical activity, sports and the arts, to improve their quality of life and aid lifelong rehabilitation.

In 2016, we conducted a sport and physical activity survey with **249 amputees and people with limb impairments**. The survey covered a wide range of topics including people's current and future participation in sport and activity, and their motivations and barriers to being active.

A number of questions included within the survey were designed to explore the impact of prostheses on a person's participation in sport and physical activity. Some of these questions were adapted from the **Trinity Amputation and Prosthesis Experience Scales Revised** (TAPES-R) (Gallagher & MacLachlan, 2011).

Questions from the TAPES-R were applied to a sport and physical activity context.

All bespoke and adapted questions in this survey were developed in consultation with a working group of limb impairment and prosthetic experts.

The survey was made available for respondents to complete online or in paper format. Data collection took place from February to June 2016. The survey was distributed directly to LimbPower contacts and members, and indirectly through disabled people's organisations and NHS disablement services centres.

A short report detailing the general results around current sport and activity participation, future demand, and people's motivations and barriers is available to download from **www.limbpower.com**.

Sample information

Who we spoke to

A total of 249 amputees and people with limb impairments completed the survey. The sample was recruited from various sources including disabled people's organisations and NHS disablement services centres.

Chart 1: Sample gender

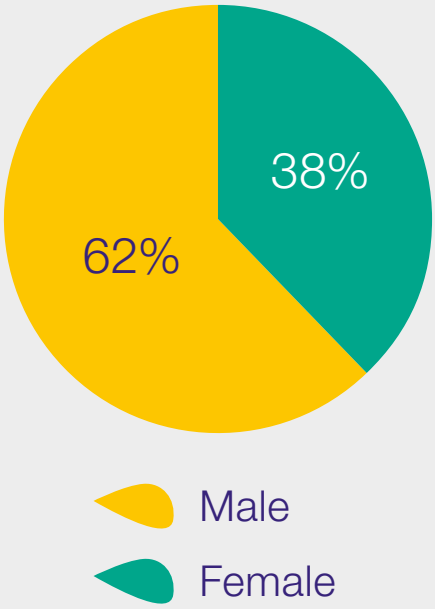


Chart 2: Sample age groups

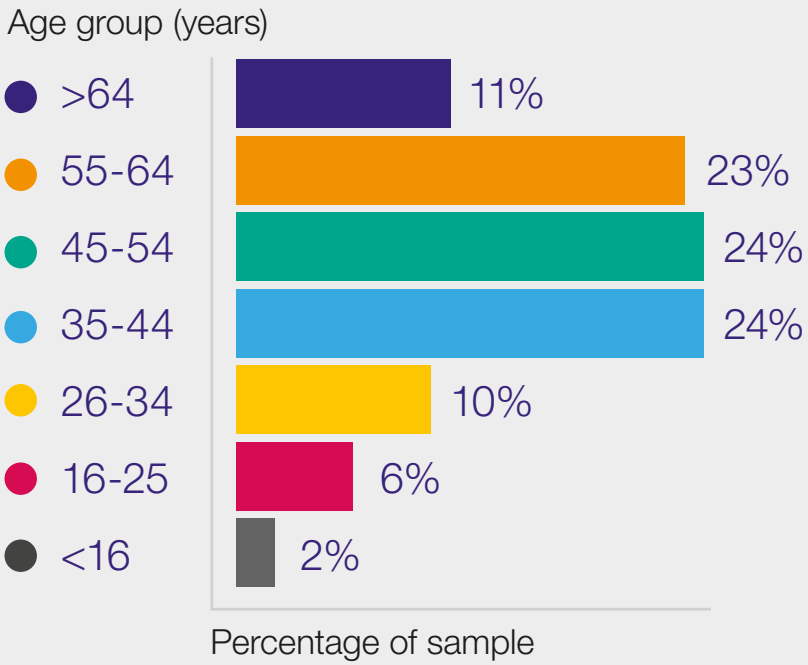
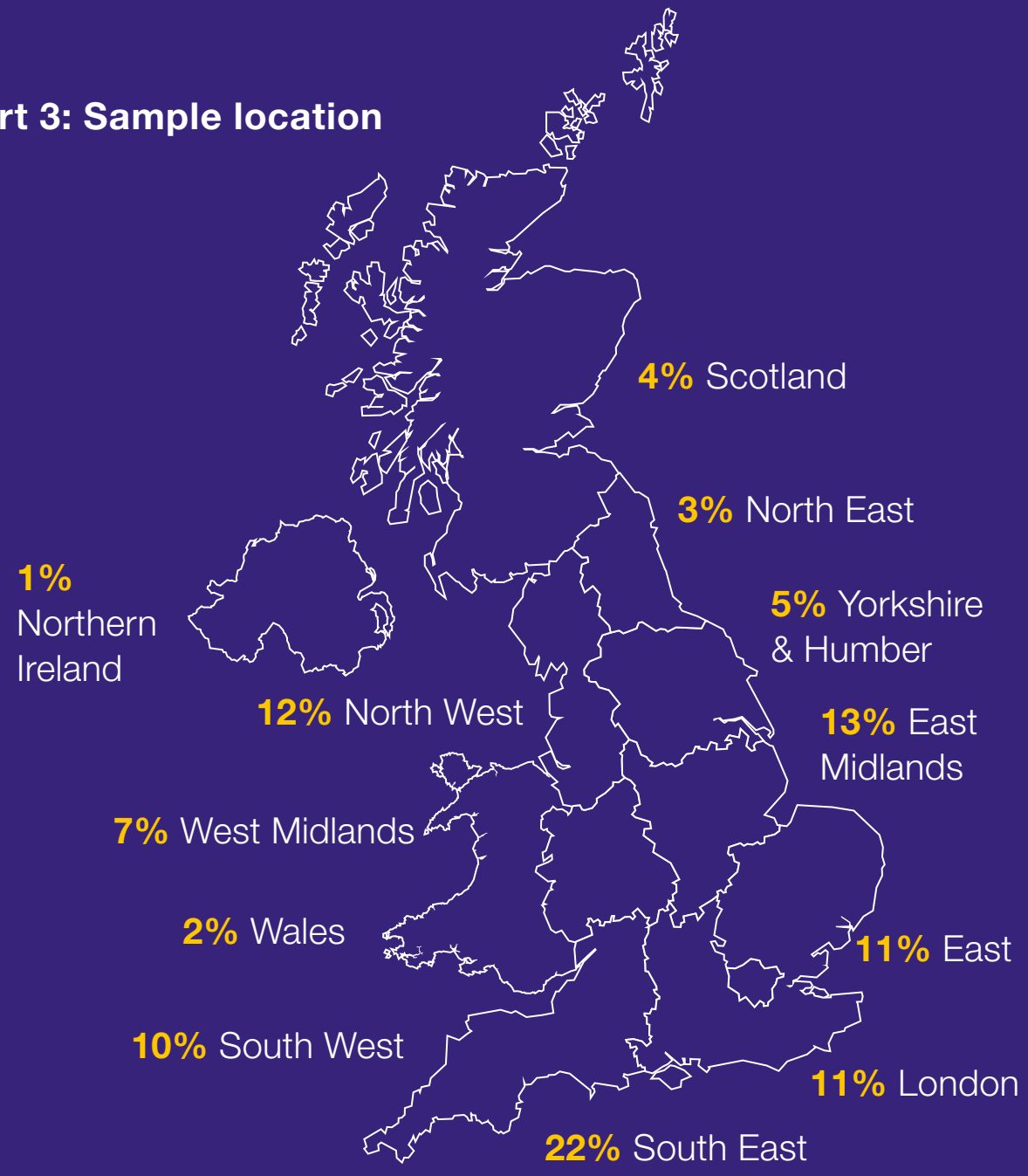


Chart 3: Sample location



Impairment information

The questions and list of answer options used to determine type and cause of limb impairment was adapted from the TAPES-R.

Chart 4: Type of amputation or limb impairment

- **46%** Below-knee
- **9%** Through-knee
- **24%** Above-knee
- **8%** Upper body
- **8%** Multiple amputation/limb impairments
- **5%** Other

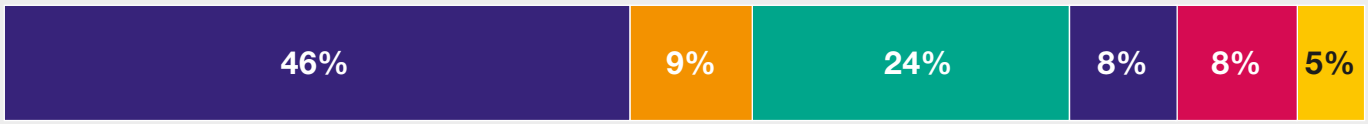


Chart 5: Cause of amputation or limb impairment

- **51%** Accident
- **10%** Peripheral vascular disorder
- **8%** Congenital
- **7%** Diabetes
- **5%** Cancer
- **18%** Other

Chart 4 shows that 79% of respondents have a lower body limb impairment. While 8% of people surveyed have an upper-body limb impairment, 8% have multiple types of limb loss and 5% have some other form of limb impairment.

These figures are somewhat in line with the last publicly available version of the **Amputee Statistical Database UK 2004-2005**. It reported that around half of amputation referrals to prosthetic centres are at trans-tibial level (below knee), with a further third at trans femoral level (above-knee).

Chart 5 shows the causes of amputation or limb impairment within the sample. Over half of respondent amputations (51%) were the result of accident or trauma. Peripheral vascular disorder (restricted blood flow) 10%, diabetes 7% and cancer 5% were much less prevalent causes of amputation. A small number of respondents surveyed (8%) have a congenital limb impairment.

Evidence suggests this sample is heavily biased towards people whose amputation was the **result of accident or trauma**, with relatively few caused by Peripheral vascular disorder (restricted blood flow). In contrast Dillingham, Pezzin and MacKenzie (2002) reported that **82%** of upper and lower body amputations are caused by vascular conditions, while only **17%** are due to trauma. Similarly, the **Amputee Statistical Database UK 2004-2005** found that **71%** of lower-limb amputation referrals were due to dysvascularity, **42%** of which were as a result of diabetes.

Whilst the sample may be biased towards people with an amputation through trauma, it should be considered that this population is also a more active population and generally younger. Amputations through peripheral vascular disease or diabetes are much more common in an older population (Peach G, Griffin M, Jones KG, et al. 2012).

Use of assistive technology

Prosthetic use

79% of respondents are currently using a prosthesis as part of daily life.

The length of time respondents have been using a prosthesis for ranged from 0 to 924 months (77 years), with the average duration of usage being 13 years and 7 months.

87% of respondents currently have their prosthesis(es) supplied through the NHS, and over one third of users (**36%**) have at least one prosthesis specifically for sport use. The relatively high levels of active people within the sample is likely to have contributed to the large proportion of people in the sample with a sport specific prosthesis.

Some people surveyed also use other assistive equipment as part of daily life:

- **57%** of respondents use crutches in some situations
- **53%** of respondents use a wheelchair in some situations
- **21%** of respondents use an orthesis in some situations

Results and discussion

Current sport and physical activity participation

78%

Nearly 8 in 10 people surveyed have taken part in exercise, physical activities or sport in the last 12 months.

The percentage of active respondents in this sample was very high compared to national estimates of sports participation among the disabled population. **Sport England's Active People Survey 10** Q4 (2016) reports that only a quarter (**24%**) of people with a physical impairment are active at least once a month.

Participation levels of amputees in sport vary widely across recent international studies.

Some studies found participation as high as **61%**, whilst others reported as low as **11%** participation (Bragaru et al. 2011).

EFDS Disabled People's Lifestyle survey (2013) showed that **56%** of people with limb loss were likely to have exercise as a hobby compared to **46%** of disabled people overall.

There are a couple of factors that are likely to have contributed to the high levels of activity found within the current sample.

Firstly, the criteria for being active was much broader compared to that used in **Sport England's Active People Survey** (APS).

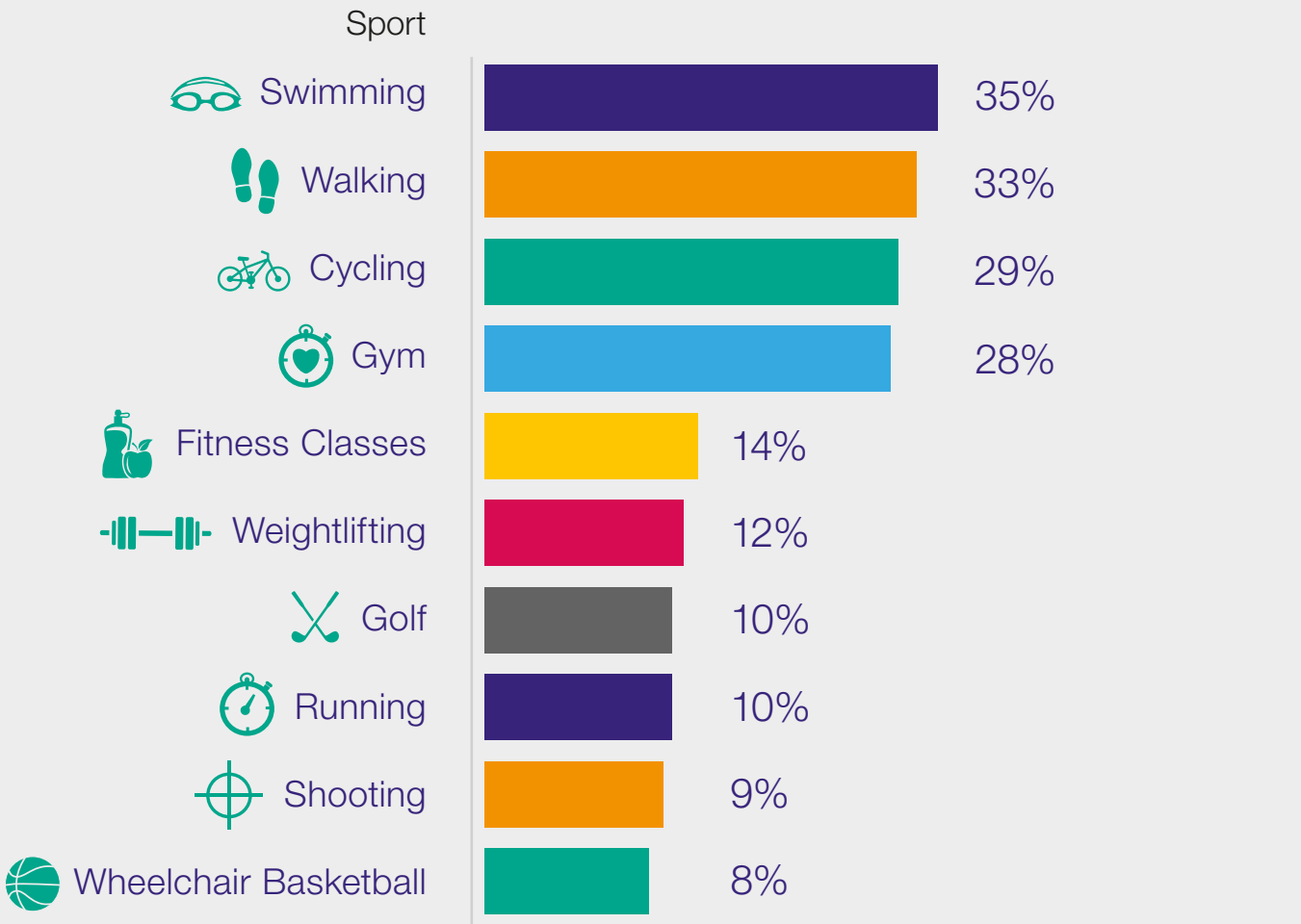
The LimbPower survey considered activity over the last 12 months, compared to 28 days in APS. Also, the interpretation of what constitutes an activity was made as broad and unrestrictive as possible in the LimbPower survey. Whilst the difference in activity criteria will have contributed to higher participation levels, it must also be recognised that the sampling for this survey was likely biased towards a more active section of the amputee population.

Popular sports and activities

Respondents who are currently active were asked to identify all the sports and physical activities they have taken part in over the past 12 months. They were presented with a multiple response list of 43 activities with an option to include others.

Chart 6 shows the ten most popular current sports and activities. The top five sports and activities active respondents currently take part in are swimming, walking, cycling, going to the gym and fitness classes.

Chart 6: Top ten current sports and activities



Percentage of total sample (249)

Use of a prosthesis in current sports and activities

Respondents were asked to provide information on prosthesis use for each of the activities they participated in. They identified whether they '**always**', '**sometimes**' or '**never**' use a prosthesis when taking part in each activity.

Chart 7: Use of a prosthesis for top five current sports and activities

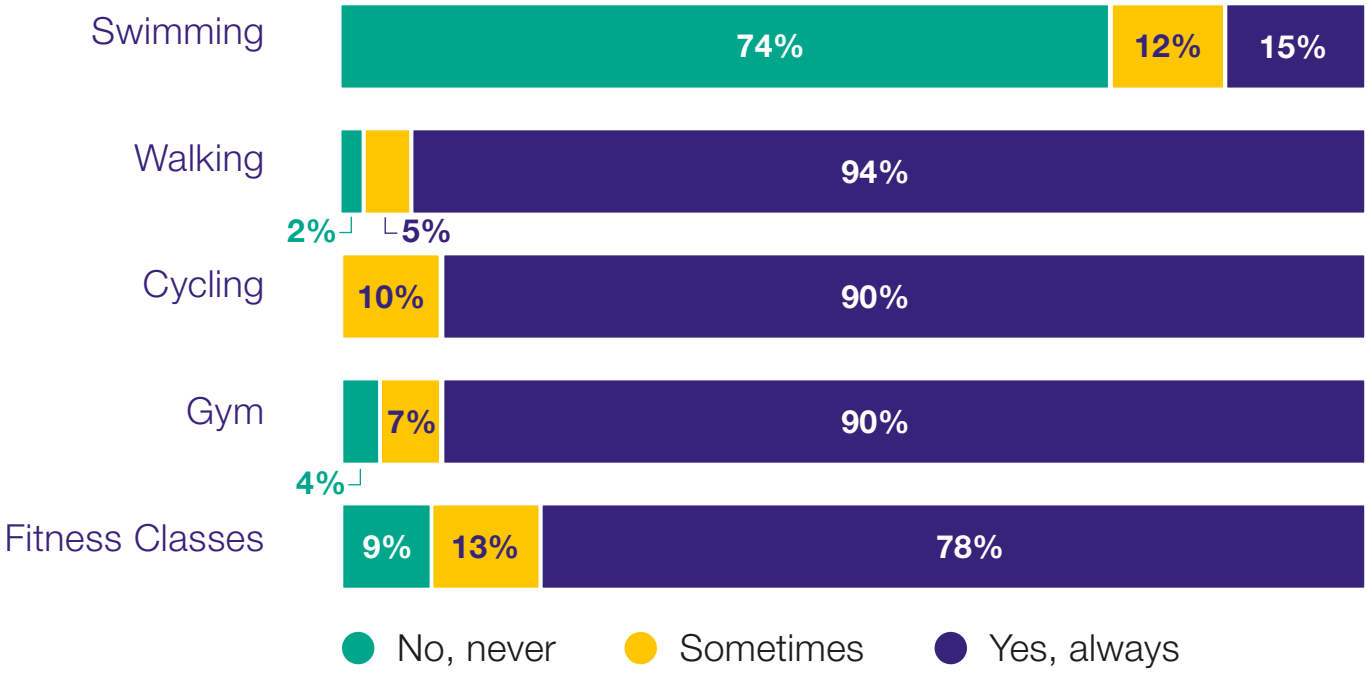


Chart 7 shows the use of prostheses when taking part in the five most popular sports and activities. Over 90% of respondents always use a prosthesis when taking part in walking, cycling and gym. Slightly fewer people (78%) always use a prosthesis when participating in fitness classes, with a further 13% sometimes using one. Use of a prosthesis was much rarer for the most popular activity swimming. Nearly three quarters (74%) of respondents stated that they never use a prosthesis when swimming.

Impact of using a prosthesis on participation

Barriers to participation

To explore the barriers to participation for amputees and people with limb impairments, respondents were asked **'what stops you taking part in sport and physical activity?'** and they were provided with a wide list of multiple response options. These included barriers relating to health, provision, expense and lifestyle factors.

The top two most common barriers of participation identified were:

- **Prosthesis limitations –** 28% of respondents ('My prosthesis limits me from playing some or all sport/activities')
- **Socket fit or comfort –** 22% of respondents ('My socket fit or comfort limits me from playing some or all sports/activities')

These barriers identified by the sample reflect similar findings from previous research that examined physical activity barriers for the amputee population.

In Kars et al. (2009), **42%** of respondents complained about their prosthesis, the majority of whom (80%) found this hindered their participation in sport.

Table 1 shows a breakdown of prosthesis limitations and socket fit or comfort as barriers to participation, for a number of groups within the sample. The ranking columns indicate how highly 'prosthesis limitation' and 'socket fit or comfort' ranked as barriers to participation in sport and physical activity for each group.

Table 1: How 'prosthesis limitations' and 'socket fit or comfort' were ranked as barriers to participation by group

	Prosthesis limitations		Socket fit or comfort	
Sample groups	Ranking	%	Ranking	%
Overall	**1**	**27.80%**	**2**	**22.22%**
Aged under 36	1	18.20%	1	18.20%
Aged 36 to 54	1	26.10%	2	23.50%
Aged over 54	1	35.70%	3	22.60%
Male	1	26.10%	4	17.60%
Female	1	30.90%	2	29.80%
Below-knee amputee	1	28.10%	2	23.70%
Above-knee amputee	1	35.00%	2	28.30%
Accident/trauma amputation cause	1	35.90%	2	25.00%
Other amputation cause	1	19.20%	1	19.20%
0-2 years prosthesis use	4	19.20%	4	19.20%
3-10 years prosthesis use	1	35.40%	2	29.20%
11+ years prosthesis use	1	38.60%	3	20.00%
Use of a sport specific prosthesis	1	23.40%	2	21.90%
No use of sport specific prosthesis	1	40.50%	2	33.30%
Wheelchair user	1	27.50%	3	21.80%
Not a wheelchair user	1	28.30%	2	22.60%
Sport/physical activity participant	1	30.70%	2	22.90%
Inactive respondent	5	17.90%	7	16.10%

Table 1 confirms that '**prosthesis limitations**' remains the most common barrier amongst the majority of the groups. With the exception of inactive respondents and those that have been using a prosthesis for two years or less. '**Socket fit or comfort**' is one of the most common barriers to participation for all groups, with the exception of inactive respondents. For inactive people the most common barriers to participation were 'other health conditions', 'fear of injury' and 'not knowing how to find out about suitable opportunities'.

Impact of wearing a prosthesis

Including prosthesis limitations and socket fit/comfort within a question around general barriers provides a useful benchmark in the context of other barriers to participation.

However, broadly talking about the limitations of prostheses may be too simplistic. There are many aspects to wearing a prosthesis, and we need to understand which of these has the most impact on people's participation in sport and physical activity.

A list of six prosthesis aspects was taken from the **TAPES-R**, these included: shape, appearance, weight, usefulness, functionality and reliability of the prosthesis. This list was then supplemented after consultation with the expert working group, with three more relevant aspects of wearing a prosthesis:

- **Socket fit**
- **Socket comfort**
- **Prosthesis suspension**

Respondents were asked to indicate on a scale of **0 to 4**, where 0 is not at all, and 4 is a lot, the extent to which each of the prosthesis aspects **impacts upon their participation in sport and physical activity**.

Chart 8: Impact of aspects of wearing a prosthesis on sport and physical activity participation

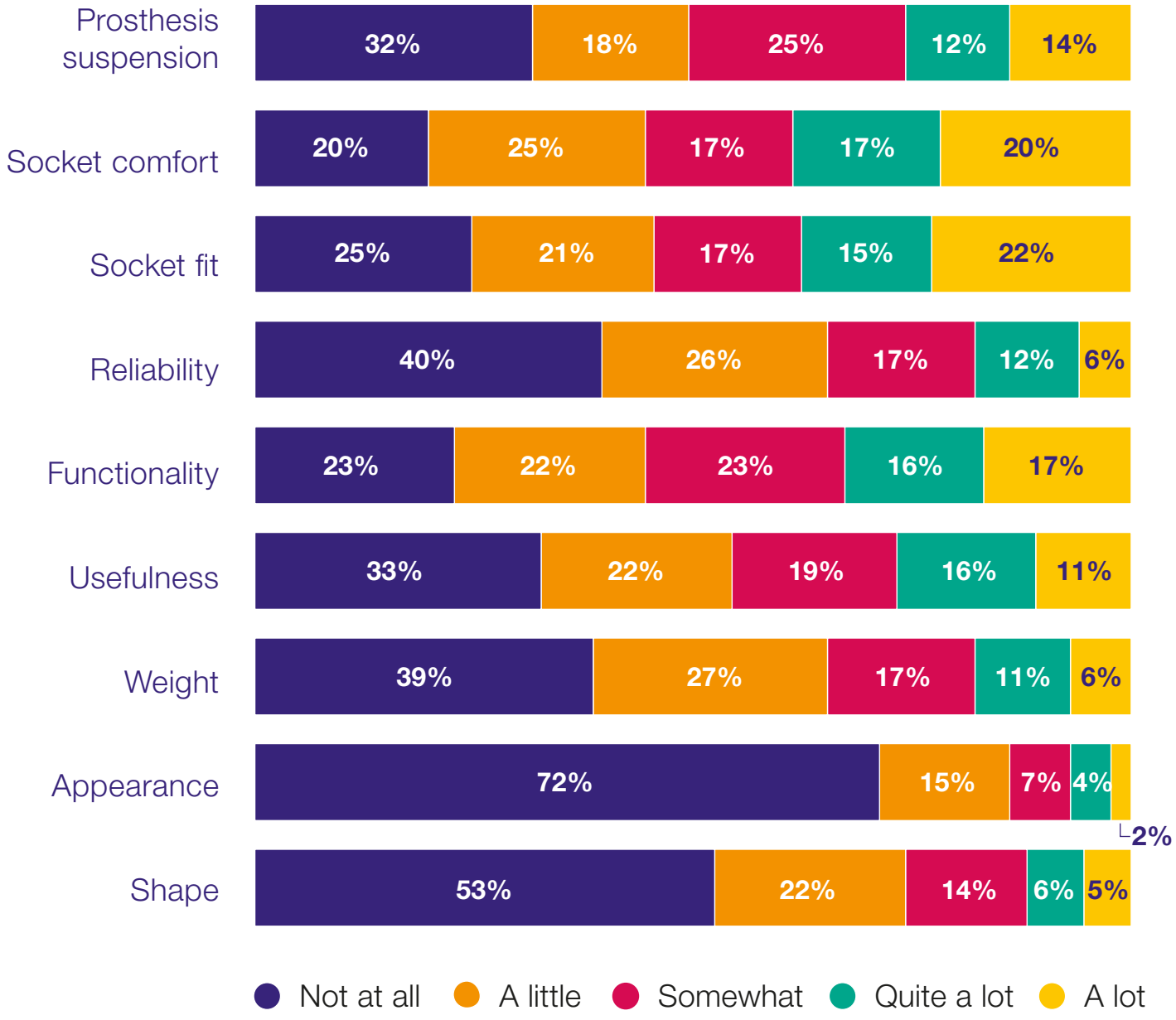


Chart 8 shows that the most impactful aspect of wearing a prosthesis was '**socket comfort**'. **8 in 10 people** (80%) stated that socket comfort had an impact on their sport and physical activity participation. **37%** of those people felt that socket comfort impacted them '**quite a lot/a lot**'.

The second most impactful aspect was **'socket fit'**, with three quarters of people (**75%**) stating that it had an impact on their participation. Similarly, **37%** of these people felt that socket fit impacted them '**quite a lot/a lot**'.

The third most impactful aspect was **'functionality of prostheses'**. **77%** of respondents stated that functionality of prostheses had an impact on participation, **33%** felt this impact was '**quite a lot/a lot**'.

These results examining the impact of different aspects of wearing a prosthesis appear to contradict the results of general barriers to participation in this survey. The most common general barrier to taking part in sport was identified as '**prosthesis limitations**', followed by '**socket fit or comfort**'.

However, the question did not enable respondents to assign any value to the magnitude of these barriers. Looking at each aspect of a prosthesis separately and allowing respondents to assign a value to the strength of its impact may suggest that, while attributes of the prosthesis itself (i.e. **reliability**, **functionality**, **usefulness**) may be more common barriers among amputees, socket comfort and fit could be stronger barriers.

We can also use the data from these questions to attempt to understand which groups are impacted the most by aspects of wearing a prosthesis. To do this an **aggregate average** of '**quite a lot/a lot**' and '**not at all**' impact has been calculated across each aspect of wearing a prosthesis.

Table 2 shows the aggregate impact percentage for different groups in the sample. A number of groups stand out as being impacted more by the various aspects of wearing a prosthesis.

Table 2: Aggregate impact of wearing a prosthesis by group

	'Not at all' aggregate %	'Quite a lot/a lot' aggregate %	Average aggregate
Overall	**37.27%**	**23.43%**	**1.39**
Aged under 36	33.44%	23.54%	1.52
Aged 36 to 54	36.41%	23.43%	1.38
Aged over 54	39.93%	23.43%	1.33
Male	41.77%	18.40%	1.19
Female	29.42%	31.72%	1.70
Below-knee amputee	42.40%	20.76%	1.22
Above-knee amputee	35.92%	27.84%	1.55
Accident/trauma amputation cause	36.19%	23.88%	1.42
Other amputation case	38.09%	23.17%	1.36
0-2 years prosthesis use	35.36%	25.46%	1.46
3-10 years prosthesis use	40.39%	21.17%	1.28
11+ years prosthesis use	37.10%	23.30%	1.39
Use of a sport specific prosthesis	41.74%	17.17%	1.17
No use of a sport specific prosthesis	34.58%	27.78%	1.52
Wheelchair user	31.50%	25.98%	1.53
Not a wheelchair user	44.59%	20.42%	1.20
Sport/physical activity participant	39.58%	22.64%	1.35
Inactive respondent	27.74%	26.71%	1.58

Women are much more likely to be impacted by different aspects of wearing a prosthesis (**32% 'quite a lot/a lot'**) compared to men (**18% 'quite a lot/a lot'**). Those without a sport specific prosthesis are more likely to be impacted (**28% 'quite a lot/a lot'**), compared to those who have a sport specific prosthesis (**17% 'quite a lot/a lot'**). Above-knee amputees are also more likely to be impacted by aspects of wearing a prosthesis when taking part in sport and physical activity (**28% 'quite a lot/a lot'**).

Sports and activities prohibited by prosthesis or limb impairment

Respondents were asked:

'Does having an amputation/limb impairment, with the use of a prosthesis, stop you from taking part in any sports or physical activities?'

They were provided with a multiple response list of **43 activities** with the option to select others or none.

Chart 9: Top ten activities prohibited by prosthesis or limb impairment

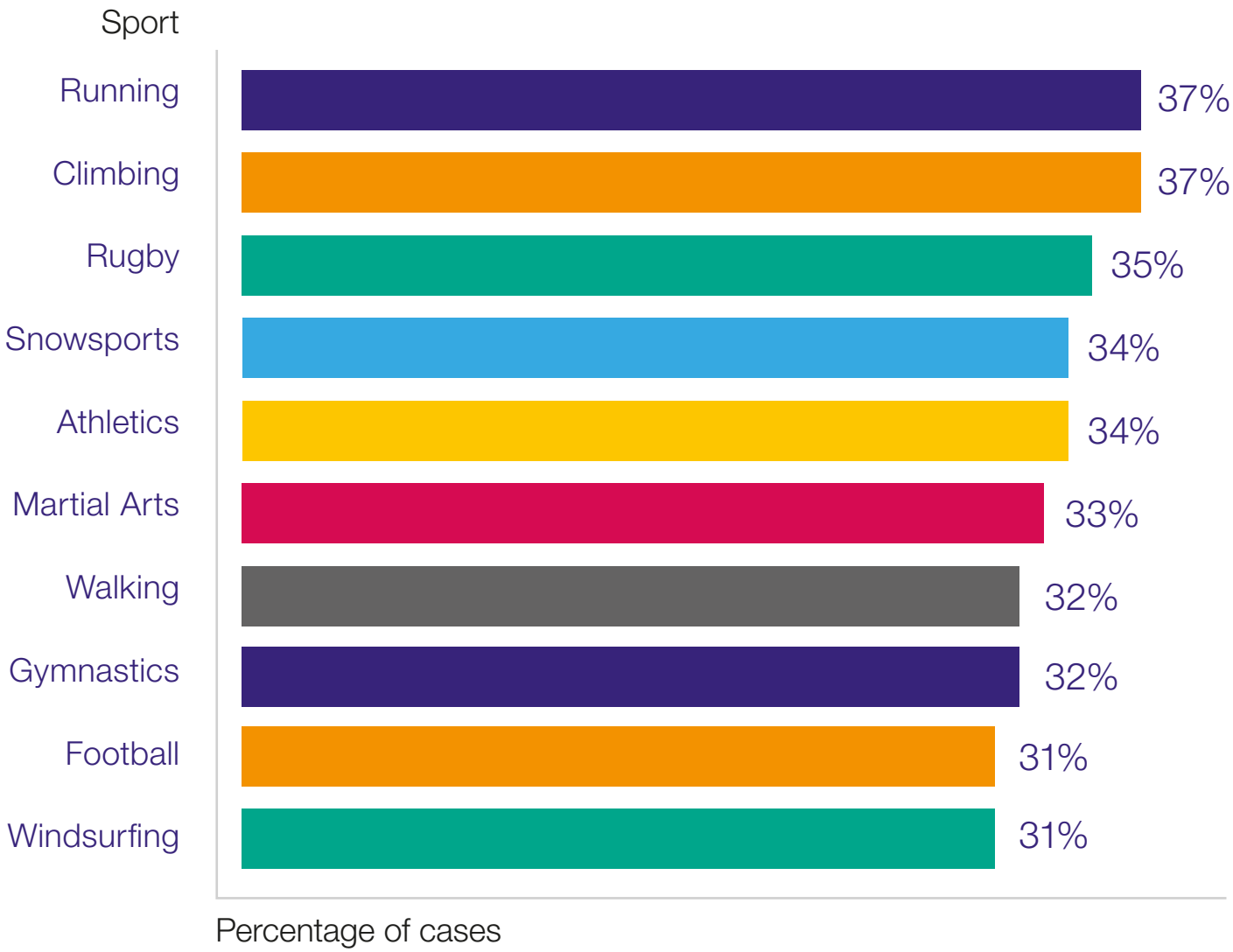


Chart 9 shows the ten most common activities that people feel they are prohibited from taking part in by their prosthesis or limb impairment. The top three activities people feel prohibited in are **running** (37%), **climbing** (37%) and **rugby** (35%).

There are however some potential issues with analysing the data collected from the question in this way. Some people may feel their prosthesis or limb impairment prohibits them from taking part in an activity, but they don't want to participate in it anyway. Similarly, people may not have stated that they felt their prosthesis or limb impairment prohibits them doing an activity because they have no interest in taking part in said activity.

Therefore it is useful to isolate those that are interested in doing each activity separately. As we can then analyse the percentage of these people that felt that they were prohibited in participating in a specific activity due to their prosthesis or limb impairment. Due to the limited size of the survey sample, we are only able to examine the top ten sports and activities people are interested in taking up in the future (none of these respondents currently participate in said activity).

Table 3: Sports people would like to do, but are concerned prosthesis would prohibit participation

Top 10 future sports and activities	Percentage of respondents who feel prohibited by their prosthesis
Archery	14.63%
Cycling	45.45%
Swimming	26.19%
Canoeing/Kayaking	17.07%
Running/Jogging	50.00%
Gym	28.21%
Snowsports	58.33%
Dancing	48.57%
Climbing	61.29%
Fitness classes	43.75%

The results in **Table 3** show the proportion of people interested in a sport or activity, who feel they are prohibited from taking part by their prosthesis or limb impairment. In three of the top ten activities (**climbing, snowsports and running/jogging**) **50%** or more people felt they were prohibited from taking part because of their prosthesis or limb impairment.

Conclusions

This research contributes to our understanding of the impact prostheses can have on a person's participation in sport and physical activity. It has been established within this research that both prosthesis limitations, and the fit and comfort of the prosthesis at the socket, can be a major barrier. Also, there are many sports and activities that amputees and people with limb impairments feel they are not able to take part in because they wear a prostheses.

It is hoped that this research will support practitioners to work collaboratively in the following areas:

- **Identifying and prioritising where specific improvements should be made to assistive technology to support sports participation.**
- **Identifying where users need to be made more aware of the wider capabilities of the technology they already have access to.**
- **Adapting and improving delivery of sports and activities where demand is currently being restricted by wearing a prostheses.**

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