



Executive dysfunction after brain injury

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Introduction

Executive dysfunction is a term for the range of cognitive, emotional and behavioural difficulties which often occur after injury to the frontal lobes of the brain. Impairment of executive functions is common after acquired brain injury and has a profound effect on many aspects of everyday life.

This factsheet explains what executive functions are, why they are so important and which part of the brain is responsible for controlling them. It then provides an overview of the causes, effects, assessment and rehabilitation of executive dysfunction. Some general coping strategies are also suggested to help brain injury survivors to compensate for impairments. The factsheet is intended to give brain injury survivors and their carers a better understanding of the nature of their difficulties.

What are executive functions?

Executive functioning is an umbrella term for many abilities including:

- Planning and organisation
- Monitoring performance
- Solving unusual problems
- Learning rules
- Making decisions
- Initiating appropriate behaviour
- Controlling emotions
- Flexible thinking
- Multi-tasking
- Self-awareness
- Social behaviour
- Motivation
- Inhibiting inappropriate behaviour
- Concentrating and taking in information

Most of us take these abilities for granted and we effortlessly perform extremely complex tasks all the time in our everyday lives. Let us consider, for example, the role of some executive functions in a 'simple' activity like cooking a meal:

Motivation - Wanting to make a nice meal and making the decision to start doing it.



Planning and organisation - Getting all the ingredients and thinking about the right times to start them cooking so they will be ready at the same time.

Monitoring performance - Checking the food is cooking properly and the water isn't boiling over.

Flexible thinking - Lowering the heat if the food is cooking too quickly or leaving it longer if it is not cooked.

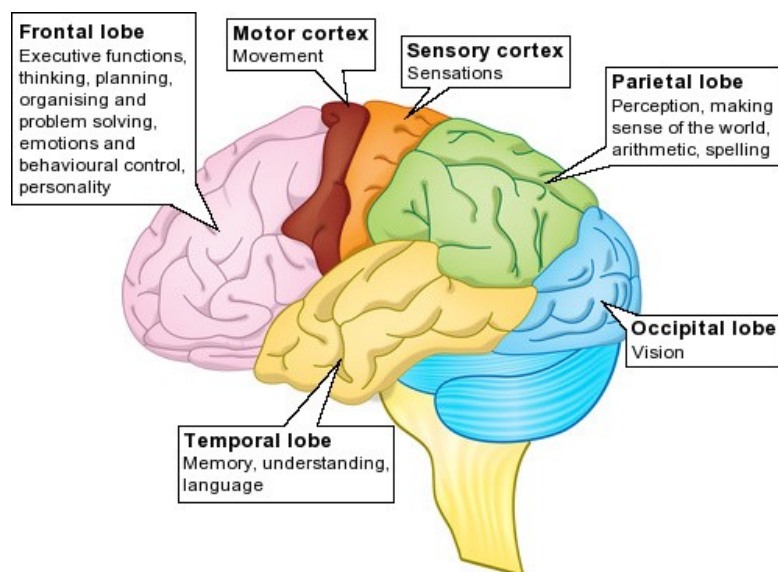
Multi-tasking – Washing the laundry and putting it out to dry, while still remembering to attend to the food at the right times.

These complex skills require advanced brain functions. The brain areas involved are described in the next section.

Which part of the brain controls executive functions?

Executive functions are controlled by the frontal lobes of the brain. The frontal lobes are connected with many other brain areas and co-ordinate the activities of these other regions. They can be thought of as the conductor of the brain's orchestra. Injury to the frontal lobes is the most common cause of executive dysfunction. Occasionally, damage to other brain areas which are connected to the frontal lobes can also impair executive functions.

The frontal lobes cover a large part of the front of the brain, directly behind the forehead. The diagram below shows their location:





The frontal lobes can be damaged by any form of acquired brain injury, such as stroke, tumour, encephalitis and meningitis. They are particularly vulnerable to traumatic brain injury, due to their location at the front of the brain and their large size. Even a blow to the back of the head can cause frontal lobe injury because the brain is knocked back and forth in the skull and the frontal lobes bang against bony ridges above the eyes.

What is executive dysfunction?

The importance of executive functions is shown by the difficulties caused when they don't work properly. Since the executive functions are involved in even the most routine activities, frontal lobe injuries can lead to deficits in cognitive (thinking) skills, personality and social behaviour. The most common effects of executive dysfunction are summarised in the table below:

Difficulties with motivation and organisation	<ul style="list-style-type: none">• Loss of 'get up and go', which can be mistaken for laziness• Problems with thinking ahead and carrying out the sequence of steps needed to complete a task
Rigid thinking	<ul style="list-style-type: none">• Difficulty in evaluating the result of actions and reduced ability to change behaviour or switch between tasks if needed
Poor problem solving	<ul style="list-style-type: none">• Finding it hard to anticipate consequences• Decreased ability to make accurate judgements or find solutions if things are going wrong
Impulsivity	<ul style="list-style-type: none">• Acting too quickly and impulsively without fully thinking through the consequences, for example, spending more money than can be afforded
Mood disturbances	<ul style="list-style-type: none">• Difficulty in controlling emotions which may lead to outbursts of emotion such as anger or crying• Rapid mood changes may occur, for example, switching from happiness to sadness for no apparent reason
Difficulties in social situations	<ul style="list-style-type: none">• Reduced ability to engage in social interactions• Finding it hard to initiate, participate in, or pay attention to conversations• Poor judgement in social situations, which may lead to saying or doing inappropriate things
Memory/attention problems	<ul style="list-style-type: none">• Finding it harder to concentrate• Difficulty with learning new information• Decreased memory for past or current events, which may lead to disorientation



You may hear different names for these symptoms. They are commonly referred to as executive dysfunction but many people use the term 'dysexecutive syndrome' or simply 'frontal lobe problems'. They are sometimes referred to as a syndrome because several of the symptoms usually occur together.

It is important to remember that not everyone with executive dysfunction experiences all of these problems. The symptoms can range from subtle effects, which only close friends and family members may notice, to extreme and problematic behaviour.

The effects of executive dysfunction on day-to-day life

It is often hard for people with frontal lobe injuries to explain the difficulties they are experiencing, often because they may be unaware that their behaviour is inappropriate. Their behaviour may appear to be very anti-social and can be misunderstood as depression, lack of motivation, selfishness, or aggression. Relationships with others may be negatively affected as a result.

Executive functioning problems may also have a significant emotional impact and can lead to feelings of frustration, exhaustion, embarrassment and isolation. It can also be very difficult to return to work due to problems with multi-tasking, organisation and motivation. An inability to prioritise and complete tasks also makes working life difficult.

It is important to be aware of the fact that these behaviours occur as a result of brain injury and are not intentional. Specialised input from rehabilitation specialists, such as neuropsychologists and occupational therapists, can help to compensate for the problems. The following sections of this factsheet provide an overview of assessment and rehabilitation, before providing some practical coping strategies.

Assessing executive dysfunction

The initial assessment of executive functioning after brain injury will usually be carried out by a clinical neuropsychologist. The assessment provides detailed information about an individual's cognitive, emotional and behavioural deficits. The results can then assist in planning rehabilitation strategies to manage the problems.

During an assessment, the neuropsychologist will consider the following questions:

- What are the main problems for the individual and their family?
- How do the problems affect functioning in everyday life?
- What are the person's goals and can they go back to work/college/school?



- To what extent are the executive deficits related to other problems in areas such as language, memory and perception?
- How do the person's abilities compare with others of the same age, background, gender and with injury to a similar area of the brain?
- How are the person with brain injury and their family coping?
- What kind of rehabilitation should be offered?

Neuropsychological assessments involve a range of different standardised tests, which are designed to measure different aspects of cognitive functioning. Some of these tests are in a questionnaire, puzzle or game format, while others take place in a real-world environment. It is very important that the tests are completed without prior knowledge or preparation in order for them to accurately reflect an individual's abilities. For that reason, no details of specific tests are included here.

It is important to remember that there are no passes or failures in the assessments. They simply provide an indication of areas that need help and rehabilitation, so there is no need for people to worry about their performance but simply to complete the tasks as best they can.

Rehabilitation of executive dysfunction

Rehabilitation of executive dysfunction can be challenging and requires an individualised approach to treatment. The rehabilitation programme for each patient will depend on their goals, the nature of their difficulties, self-awareness, readiness to engage in treatment, level of social support and presence of other issues such as mood disturbances.

An important part of the rehabilitation process is educating the person about the effects of their injury. This can help increase the person's insight and understanding of what has happened. For that reason, reading this factsheet or other Headway information materials may be helpful for both survivors and their family members.

If you feel that you or someone you know would benefit from rehabilitation then the first step is to ask a GP if a referral is available, preferably to a neuropsychologist initially. If there are no NHS referrals available then it may be possible to visit someone in private practice.

For more information on this subject see the Headway booklet *Rehabilitation after brain injury*, or visit the website at www.headway.org.uk/rehabilitation-after-brain-injury.aspx. Also, the Headway helpline can talk you through the referral process and signpost you to organisations that can help. Contact details are at the end of this factsheet.



Coping strategies for brain injury survivors

Because executive functions are such a vital part of our everyday lives, it is important to find 'survival strategies' when problems arise. Here are a few suggestions of strategies that may help if you have difficulties yourself:

Planning

- Allow yourself plenty of time to plan activities and record your plans, using as many aids as you find helpful (such as calendars, diaries, electronic timing devices, mobile phones and pagers).
- When planning your day, week, or a particular activity use a step-by-step approach, dividing the activity into manageable 'chunks'.
- Use checklists and tick off each part of the activity that you have accomplished. This will help you to stay on track.
- Mentally rehearse your plans.
- Discuss your plans for the day with others. They can help you to write down a step-by-step checklist of the different actions for that day.
- Similar strategies can be used for longer term planning, such as appointments you need to make. Discussing your plans with others will make you more likely to remember and the other person can remind you of things if necessary.
- Step-by-step checklists can be placed in key locations in the house in order to remind you of the different sequences to go through to do a task, such as preparing a meal.
- Prepare a weekly routine for tasks like shopping, washing and tidying the house. Knowing that, for example, Monday is shopping day, will make you more motivated to get the task done.
- Try to develop back up plans in advance, rather than when problems arise.

Many strategies for overcoming memory problems can also be helpful for difficulties with planning. See the Headway factsheet *Coping with memory problems – practical strategies* for more information.

Mood

- If you feel unable to manage your emotions, it may help to talk to your doctor about this. They may be able to refer you to a form of therapy that will work for you, such as cognitive behavioural therapy (CBT).
- It may be helpful for others to make allowances for the difficulties you may experience in controlling your mood. When you feel very upset, it may be better for the other person to try to calm the situation in the short term and discuss it with you later.



- Others may need to make allowances for changes in your behaviour and personality. It is important for them to remember that the changes are a result of the injury and not because you are being lazy, self-centred or difficult.

Social difficulties

- Trusted friends or family members could help you by reminding you of what may be the most appropriate thing to do or say if you are struggling in social situations.
- It may help to mentally prepare for social situations and to think about any difficult situations that have occurred before in similar environments.

Executive dysfunction from a carer's point of view

Caring for a person with executive deficits can be a full-time job and living with personality and behaviour changes in a relative or friend can be very distressing.

Problems that carers may experience include:

- Stress, anxiety or depression
- Increased responsibility
- Strained relationships
- Reduced communication with partner
- Restricted leisure/social life
- Reduced sexual and emotional intimacy with a partner
- Feeling tired and frustrated

It is important for family members, carers and friends to access support for their practical and emotional needs. Input from the rehabilitation team can help and some people find peer support groups for carers useful. Headway's Groups and Branches offer valuable support for both survivors and family members. It is also important to see a GP, who will be able to refer to local counselling and therapy services where they are available.

For further information see the Headway booklet *Caring for someone with a brain injury*, which can be obtained free-of-charge from the Headway helpline. The helpline can also provide support and refer to local Groups and Branches.



Conclusion

The frontal lobes are commonly affected by acquired brain injury. Damage to the frontal lobes is likely to cause symptoms which are collectively termed executive dysfunction.

The diverse ways executive difficulties present themselves mean that assessment and rehabilitation are not straightforward. However, with appropriate rehabilitation and the use of coping strategies, many people can make good recoveries and learn to manage their difficulties.

To discuss any issues raised in this factsheet, or to find details of our local groups and branches, please contact the Headway helpline free of charge on 0808 800 2244 (Monday - Friday, 9am-5pm) or by email at helpline@headway.org.uk.

You can also find more information and contact details of groups and branches on our website at www.headway.org.uk/supporting-you.

Acknowledgements

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Helpline: 0808 800 2244
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