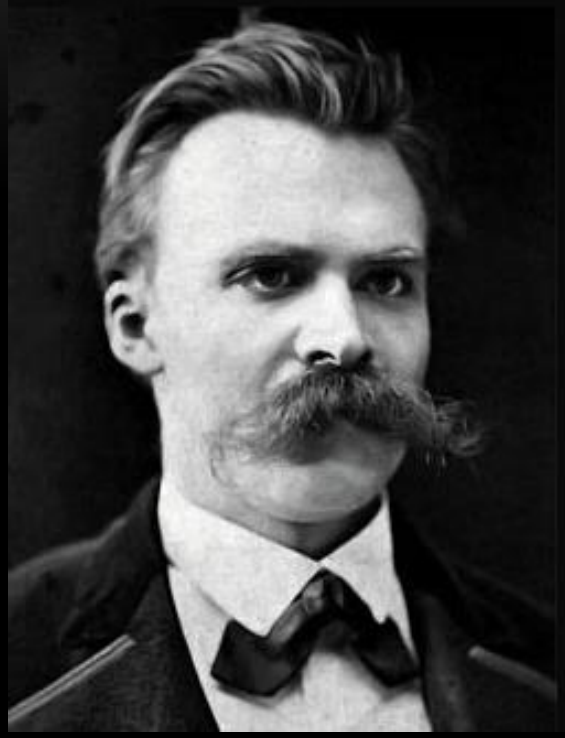


The strongest have their moments of fatigue.

(Friedrich Nietzsche)

A new (better?) measure of fatigue:

The Dutch Multifactor Fatigue Scale

Anne M. Buunk
A. Visser-Keizer, PhD
Professor J.M. Spikman

university of groningen

umcg

A new (better!) measure of fatigue:

The Dutch Multifactor Fatigue Scale

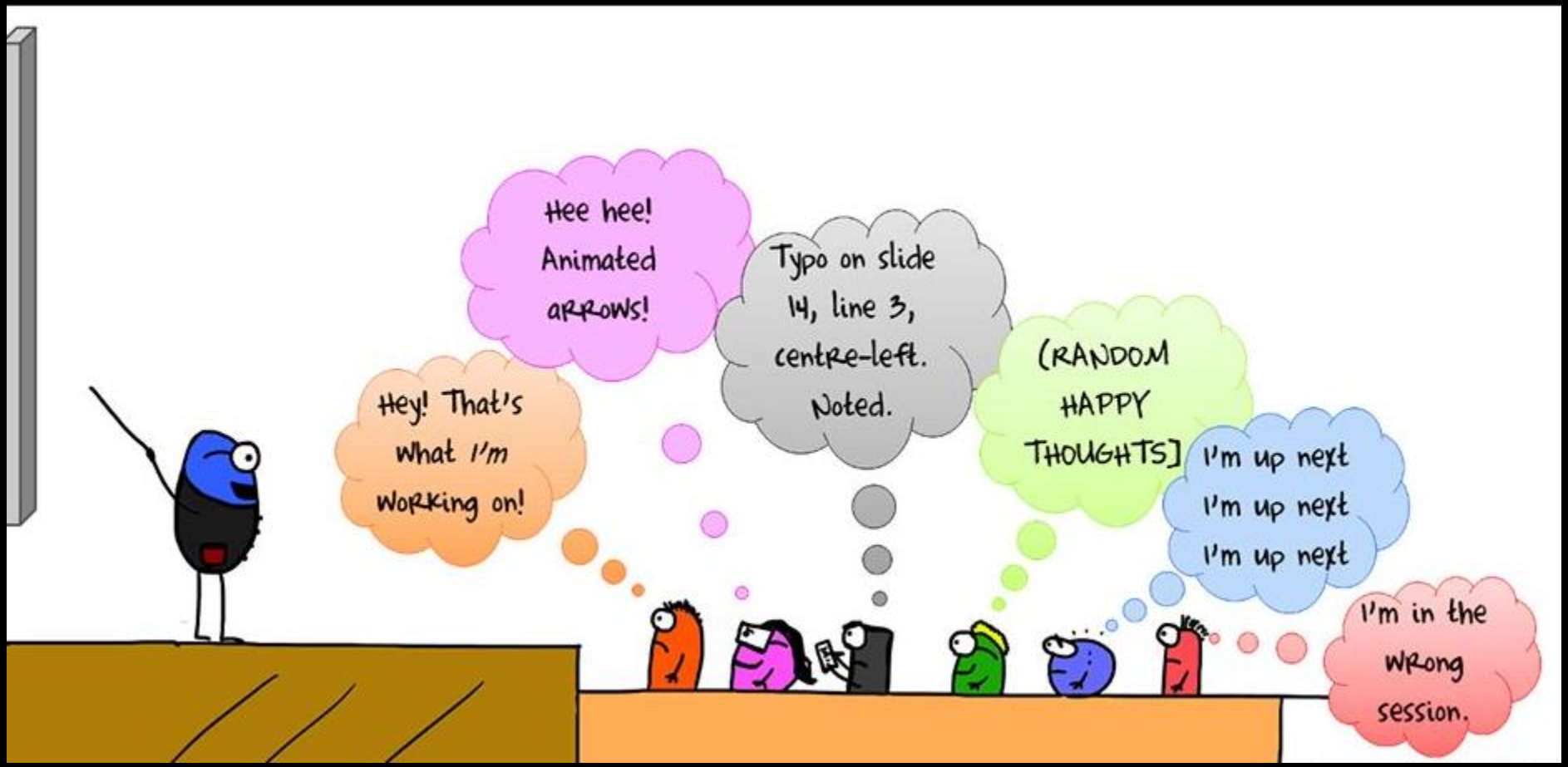
Rationale

Development of the DMFS

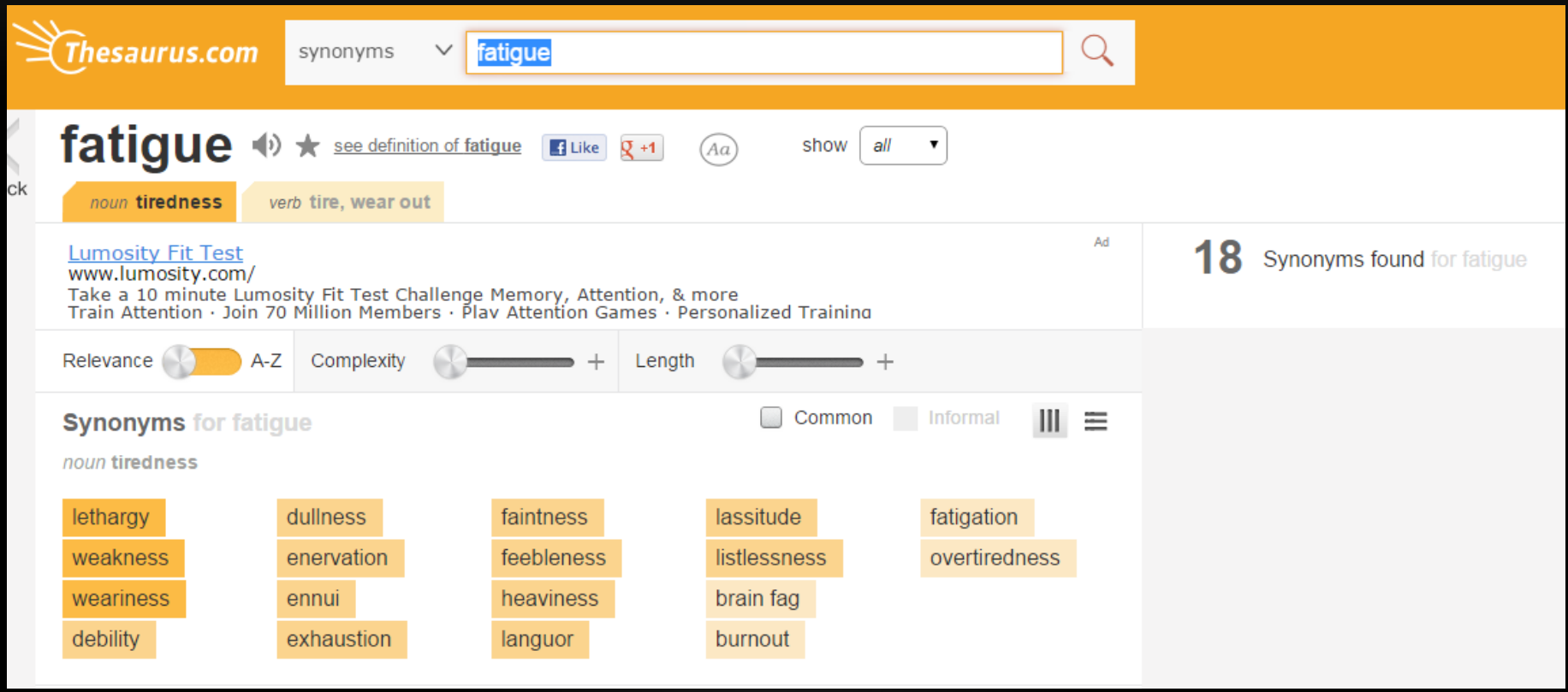
Properties of the DMFS

Fatigue after subarachnoid hemorrhage

Discussion



Fatigue?


Thesaurus.com
synonyms
fatigue
fatigue
see definition of fatigue
Like
+1
Aa
show
all
noun tiredness
verb tire, wear out
Lumosity Fit Test
www.lumosity.com/
Take a 10 minute Lumosity Fit Test Challenge Memory, Attention, & more
Train Attention · Join 70 Million Members · Play Attention Games · Personalized Training
Ad
18 Synonyms found for fatigue
Relevance
A-Z
Complexity
Length
Synonyms for fatigue
Common
Informal
noun tiredness
lethargy
dullness
faintness
lassitude
fatigation
weakness
enervation
feebleness
listlessness
overtiredness
weariness
ennui
heaviness
brain fag
debility
exhaustion
languor
burnout

George Beard (1869):

Neurasthenia

“a medical condition with symptoms of fatigue, anxiety, headache, impotence, neuralgia and depression, as a result of exhaustion of the central nervous system's energy reserves.”

Bogousslavsky (2001)

"Reversible decrease or loss of abilities

associated with a heightened sensation of physical and mental strain

even without conspicuous effort

due to an overwhelming feeling of exhaustion

which leads to an inability to sustain even routine activities"

De Groot et al. (2003)

“Normal” fatigue

General tiredness

Result of overexertion

Ameliorated by rest

More acute, rapid onset

“Pathological” fatigue

Weariness

Unrelated to previous exertion

Not ameliorated by rest

More chronic

Multiple or unknown causes

Abnormal, excessive

Objective and subjective fatigue

Objective: observable and measureable decline in performance in a physical or mental task

Subjective: feeling of early exhaustion, weariness, aversion to effort

(Staub & Bogousslavsky, 2001)

Objective and subjective fatigue

Objective: observable and measureable decline in performance in a physical or mental task

Subjective: feeling of early exhaustion, weariness, aversion to effort

(Staub & Bogousslavsky, 2001)

Fatigue after stroke

Between 30% and 76% of all patients (Stein et al., 1996; Ingles et al., 1999; Staub&Bogousslavsky, 2001)

Persists over time (van der Werf et al., 2001)

Not related to time post-stroke, severity or lesion location (de Groot et al., 2003)

Perceived as major problem (Glader et al., 2002; Ingles et al., 1999)

Related to mood? (Mead et al., 2011; van der Werf et al., 2001; Staub&Bogousslavsky, 2001)

Do you use self-report measures to assess fatigue?

Fatigue Severity Scale Questionnaire

Instructions: Circle the number that best represents your response to each question.
Scoring range: 1=strongly disagree with the statement to 7=strongly agree with the statement.

During the past week, I have found that:	Score						
1. My motivation is lower when I am fatigued.	1	2	3	4	5	6	7
2. Exercise brings on my fatigue.	1	2	3	4	5	6	7
3. I am easily fatigued.	1	2	3	4	5	6	7
4. Fatigue interferes with my physical functioning.	1	2	3	4	5	6	7
5. Fatigue causes frequent problems for me.	1	2	3	4	5	6	7
6. My fatigue prevents sustained physical functioning.	1	2	3	4	5	6	7
7. Fatigue interferes with carrying out certain duties and responsibilities.	1	2	3	4	5	6	7
8. Fatigue is among my three most disabling symptoms.	1	2	3	4	5	6	7
9. Fatigue interferes with my work, family, or social life.	1	2	3	4	5	6	7

Fatigue Severity Scale Questionnaire

Instructions: Circle the number that best represents your response to each question.
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4. Fatigue interferes with my physical functioning.	**1**	2	3	4	5	6	7
5. Fatigue causes frequent problems for me.	**1**	2	3	4	5	6	7
6. My fatigue prevents sustained physical functioning.	**1**	2	3	4	5	6	7
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9. Fatigue interferes with my work, family, or social life.	**1**	2	3	4	5	6	7

Measures of fatigue

Fatigue severity scale (FSS)

Fatigue Assessment Scale

Fatigue Impact Scale (FIS)

Yes/no question

Multidimensional Fatigue Symptom Inventory (MFIS)

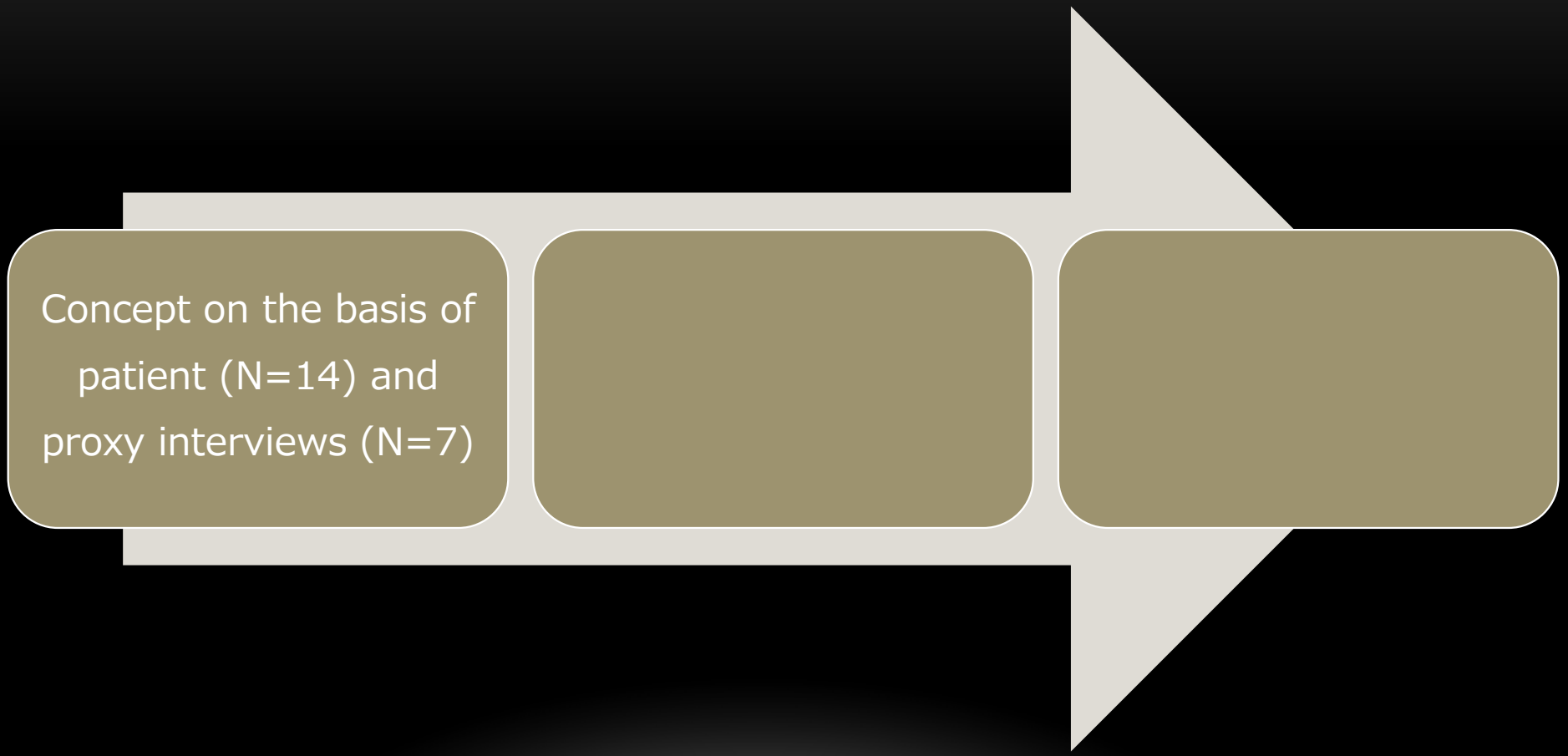
Checklist Individual Strength (CIS)

SF36 (vitality subscale)

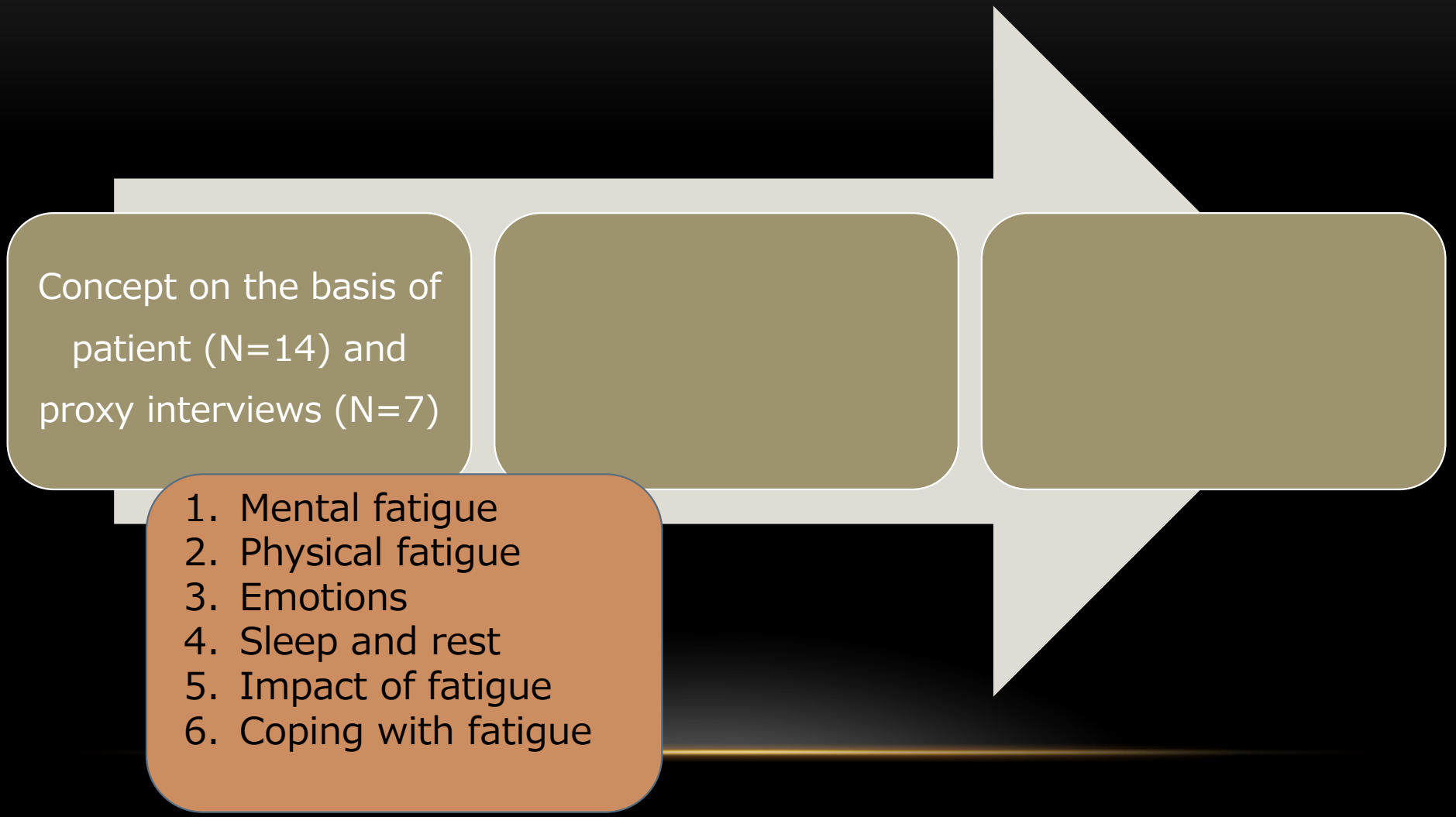
Profile of Mood States (POMS)

- Unidimensional
- For non-neurological populations
- No items covering characteristics of fatigue post ABI
  - Post-stroke fatigue → DIFFERENT!

Dutch Multifactor Fatigue Scale



Dutch Multifactor Fatigue Scale



De Groot et al. (2003)

Mental fatigue

Table 2: Proposed Criteria for Poststroke Fatigue

The following symptoms should be present every day or nearly every day during a 2-week period in the past month:

Significant fatigue (defined as overwhelming feelings of exhaustion or tiredness), diminished energy or increased need to rest, disproportionate to any recent exertion levels, plus any 3 of the following:

- Experience of sleep or rest as unrefreshing or nonrestorative
- Disrupted balance between motivation (preserved) and effectiveness (decreased)
- Perceived need to struggle to overcome inactivity
- Difficulty completing or sustaining daily tasks attributed to feeling fatigued
- Postexertional malaise lasting several hours
- Marked concern about feeling fatigued

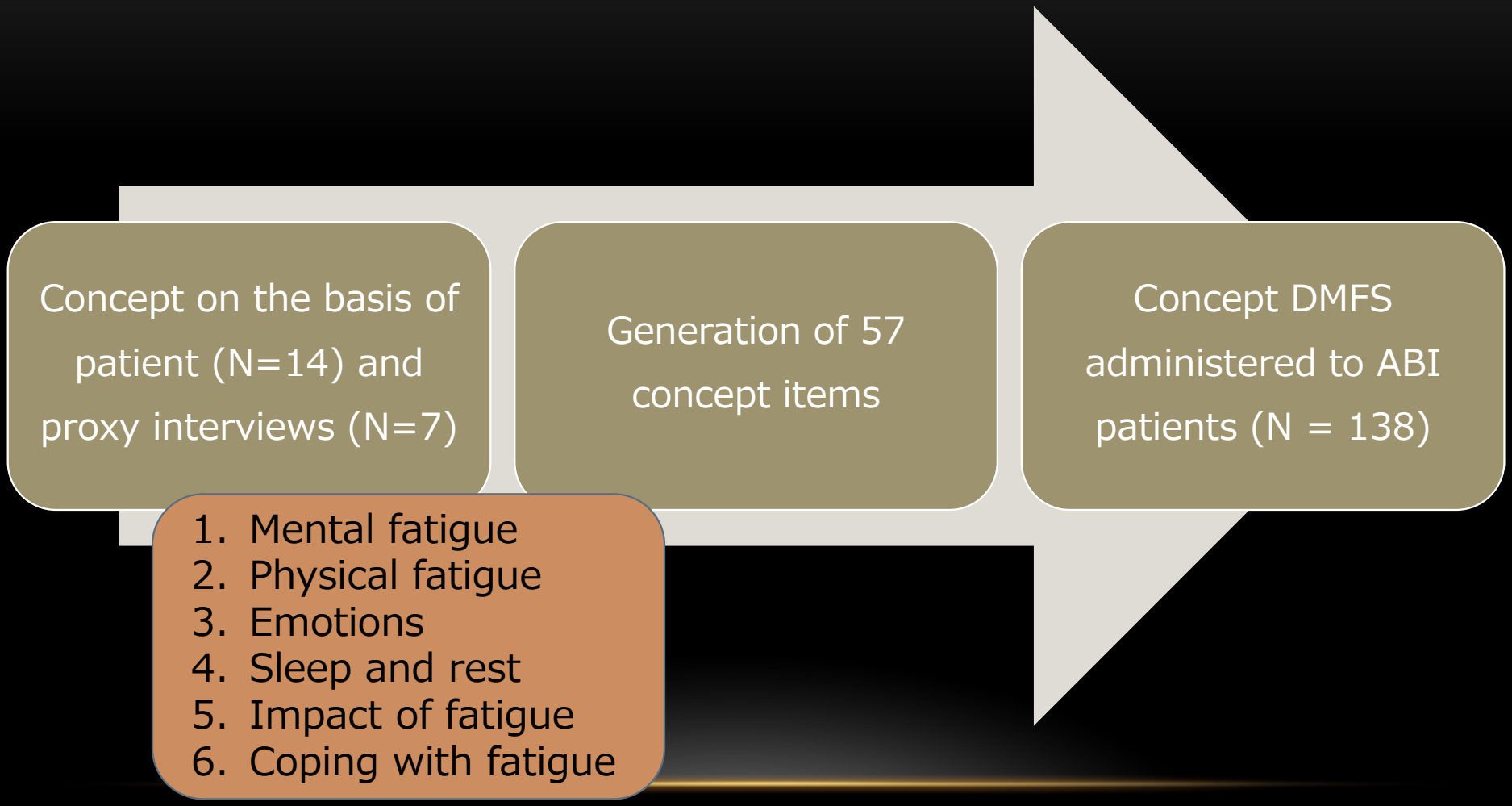
NOTE. Modified from Cella et al[43] and Portenoy and Itri.[44]

Coping

Consequences

Sleep and rest

Dutch Multifactor Fatigue Scale



"Fatigue affects my whole life"

Impact

α=.91

Mental

α=.86

"When I'm too tired, I suddenly can't think any more"

"I avoid becoming overtired"

Coping

α=.69

Physical

α=.77

Consequences

α=.83

"When I'm tired, I say things I regret afterwards"

"I am in good physical condition"

DMFS

- Mental fatigue
- Physical fatigue
- Impact of fatigue
  - frequency, severity, impact daily life.
- Signs and consequences
  - comorbid signs and complaints
- Coping with fatigue

Mental fatigue most distinctive for ABI

(Visser-Keizer et al. 2015).

DMFS

I can follow conversations without getting tired

- Physical fatigue
- Impact of fatigue
  - frequency, severity, impact daily life.
- Signs and consequences
  - comorbid signs and complaints
- Coping with fatigue

Mental fatigue most distinctive for ABI

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DMFS

I can follow conversations without getting tired

My body aches when fatigued

- Impact of fatigue
  - frequency, severity, impact daily life.
- Signs and consequences
  - comorbid signs and complaints
- Coping with fatigue

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DMFS

I can follow conversations without getting tired

My body aches when fatigued

When I am too fatigued, all of a sudden, I can't go further

- frequency, severity, impact daily life.
- Signs and consequences
  - comorbid signs and complaints
- Coping with fatigue

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DMFS

I can follow conversations without getting tired

My body aches when fatigued

When I am too fatigued, all of a sudden, I can't go further

- frequency, severity, impact daily life.

When fatigued, I get a headache

- comorbid signs and complaints
- Coping with fatigue

Mental fatigue most distinctive for ABI

(Visser-Keizer et al. 2015).

DMFS

I can follow conversations without getting tired

My body aches when fatigued

When I am too fatigued, all of a sudden, I can't go further

- frequency, severity, impact daily life.

When fatigued, I get a headache

s

- comorbid signs and complaints

I finish what I am doing, even if I am tired

Mental fatigue most distinctive for ABI

(Visser-Keizer et al. 2015).

DMFS scores

- Five subscale scores (**no** total score)
- Higher scores indicate more fatigue
- Preliminary norms for ABI patients

Table 5 Comparison of means and SDs of DMFS subscales between brain injury groups (n=134)

DMFS Scale	Ischemic Stroke (n=55)	Hemorrhagic Stroke (n=22)	TBI (n=35)	Other ABIs (n=22)	Statistics
Impact of fatigue (range, 11–55)	38.7±11.7	37.0±11.2	39.7±7.3	39.5±8.7	$F_{3,53}=0.8$
Mental fatigue (range, 7–35)	25.9±7.1	26.4±5.0	29.4±4.6	28.1±5.2	$F_{3,59}=3.2$*
Signs and Direct consequences of fatigue (range, 9–45)	28.8±8.4	28.1±9.0	32.3±5.6	30.7±5.3	$F_{3,58}=2.5$
Physical fatigue (range, 6–30)	19.0±6.0	16.4±5.2	17.9±5.2	19.5±4.7	$F_{3,59}=1.7$
Coping with fatigue (range, 5–25)	14.8±4.5	15.9±4.3	16.1±4.4	15.5±4.0	$F_{3,57}=0.7$

NOTE. Values are mean ± SD.

* $P<.05$.

ORIGINAL RESEARCH

Dutch Multifactor Fatigue Scale: A New Scale to Measure the Different Aspects of Fatigue After Acquired Brain Injury

Annemarie C. Visser-Keizer, PhD,[a,b] Antoinette Hogenkamp, MSc,[a,c]
Herma J. Westerhof-Evers, MSc,[a,d] Iris J.L. Egberink, PhD,[e] Jacoba M. Spikman, PhD[b,e]

From the [a]Center for Rehabilitation and [b]Department of Neurology, University Medical Center Groningen, Groningen; [c]Center for Child Psychiatry and Learning Disabilities, Groningen; [d]Department of Clinical and Developmental Neuropsychology and [e]Department of Psychometrics and Statistics, University of Groningen, Groningen, The Netherlands.

- Mental fatigue in patients with TBI > stroke patients
- Younger age = higher mental fatigue
- Females = more consequences and difficulties coping
- Higher physical fatigue = less activities
- Better coping = more activities

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- Mental fatigue in patients with TBI > stroke patients
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- Higher physical fatigue = less activities
- Better coping = more activities

Rehabilitation!

Kutlubeav & Mead (2011)

Reduced physical activity

Physical de-conditioning

Exertional fatigue

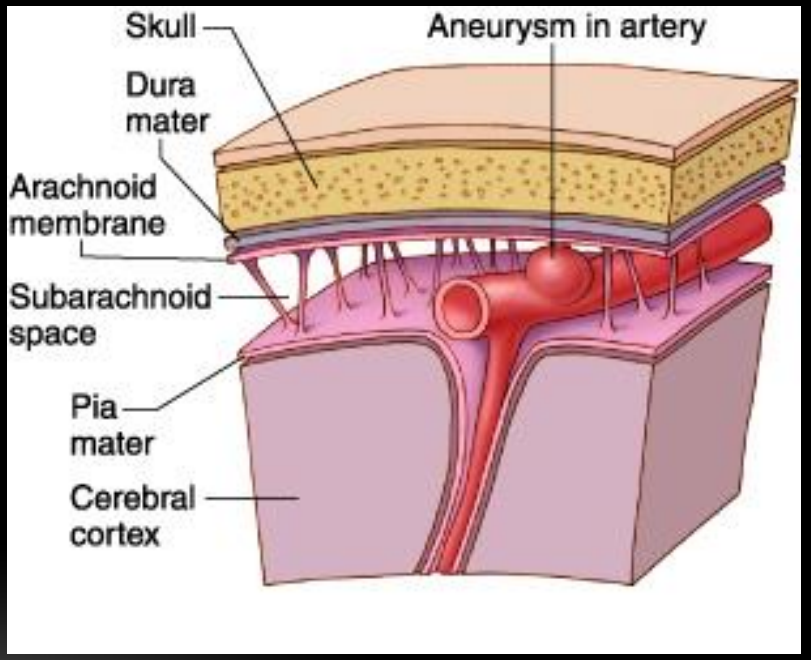
Avoidance of physical activity

Chronic fatigue

(Zedlitz et al., 2011; Passier et al., 2011)

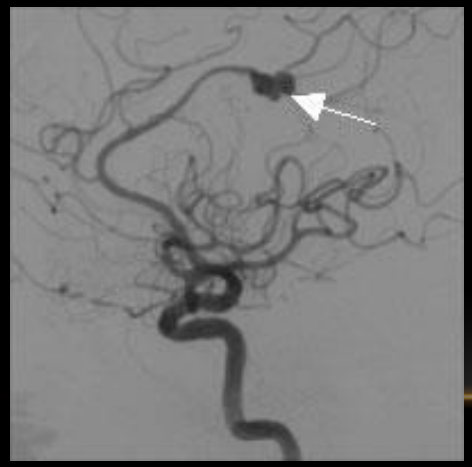
Subarachnoid hemorrhage

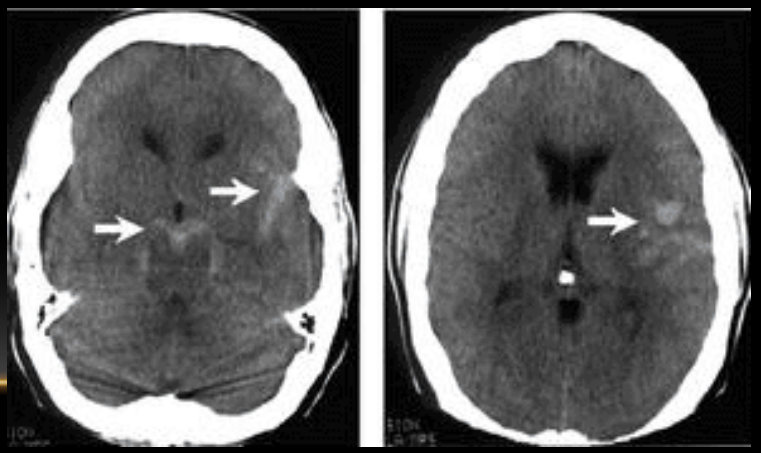
- Bleeding in the subarachnoid space
  - Aneurysm (85%)
  - No cause on CT (15%)
- Symptoms
  - Severe headache
  - Nausea
  - Loss of consciousness
  - Neurologic deficits



Diagnosis

- CT scan, lumbar puncture
- Digital subtraction angiography (DSA)
- Vasospasm, hydrocephalus





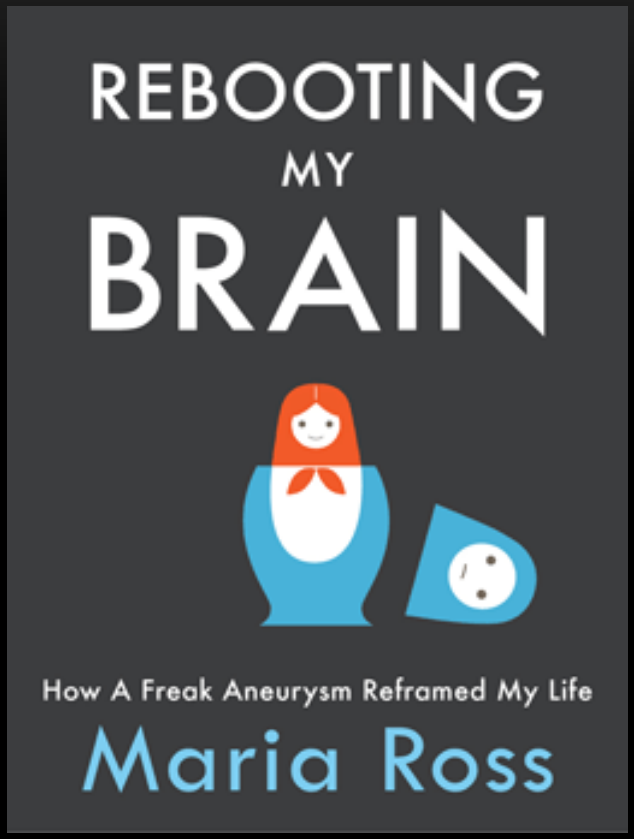
Types

- Aneurysmal SAH (aSAH)
  - Aneurysm on CT
  - Treatment: clipping or coiling
- Angiographically negative SAH (anSAH)
  - No cause on CT
  - No treatment

The problem(s)

- Relatively young (40-60 years)
- Cognitive (memory, language, attention, executive function)
- Emotional (depression, anxiety, personality)
- **Fatigue**
- Resumption of daily activities affected

Al-Khindi et al. (2010), Carter et al. (2000)

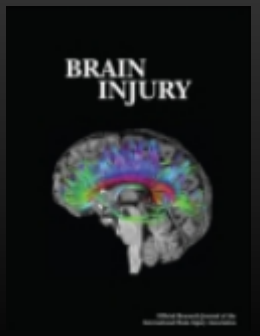

REBOOTING
MY
BRAIN
How A Freak Aneurysm Reframed My Life
Maria Ross

Cognitive and Functional Outcome After Aneurysmal Subarachnoid Hemorrhage

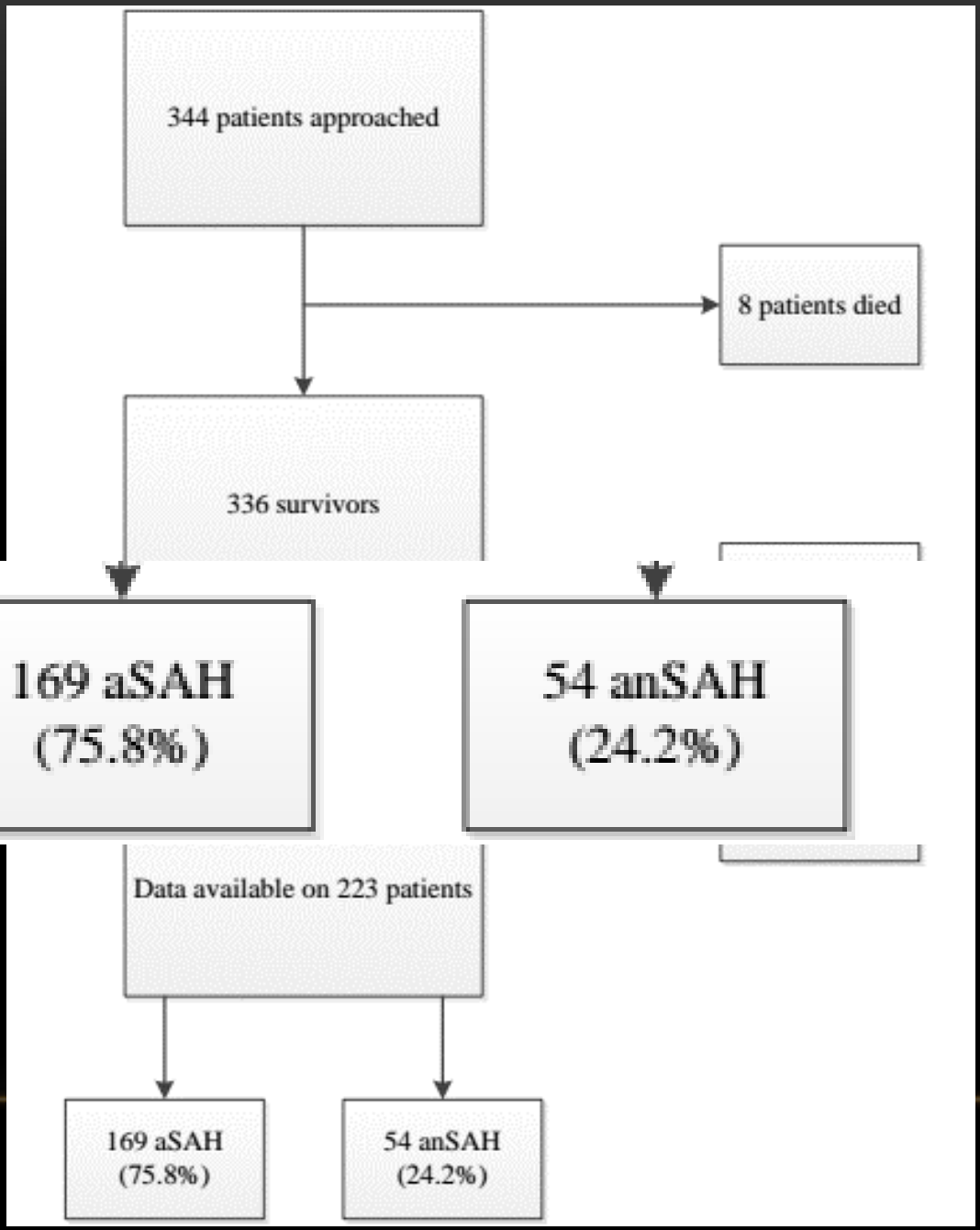
Timour Al-Khindi; R. Loch Macdonald, MD, PhD; Tom A. Schweizer, PhD

Leisure and social participation in patients 4–10 years after aneurysmal subarachnoid haemorrhage

Anne M. Buunk, Rob J. M. Groen, Wencke S. Veenstra & Jacoba M. Spikman



- Two questions
- 66% of all patients reported fatigue
- Fatigue one of the predictors of
  - Resumption of social activities
  - Leisure resumption


344 patients approached
8 patients died
336 survivors
169 aSAH
(75.8%)
54 anSAH
(24.2%)
Data available on 223 patients
169 aSAH
(75.8%)
54 anSAH
(24.2%)

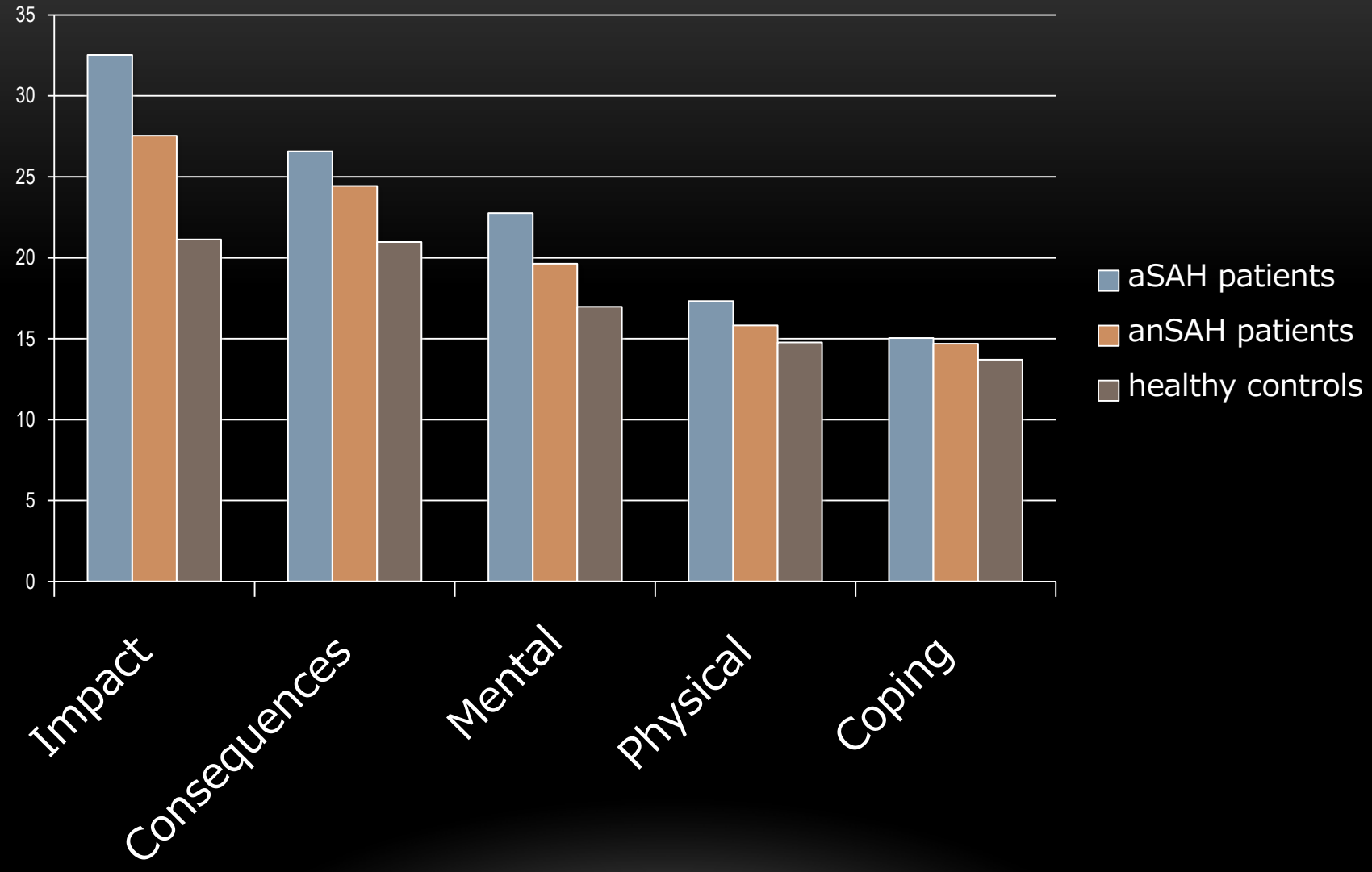
Fatigue after SAH

	aSAH patients N = 169	anSAH patients N = 54	Healthy controls N = 74
Male/female ratio (%)	31/69	57/43	50/50
Age M (SD)	60.5 (11.1)	62.0 (10.3)	58.5 (10.2)
Time since SAH	6.8 years	6.9 years	
Work status			
Employed	31.3%	40.7%	
Unemployed	66.9%	59.3%	
Unknown	1.8%		

Fatigue compared to HC

Healthy controls matched on age and gender ($p > 0.05$)

	aSAH patients	anSAH patients	HC
Impact	32.5 (11.5)	27.5 (12.4)	21.1 (6.8)
Consequences	26.6 (7.2)	24.4 (7.9)	21.0 (5.3)
Mental fatigue	22.8 (7.0)	19.6 (7.5)	17.0 (4.7)
Physical fatigue	17.3 (5.8)	15.8 (4.4)	14.8 (4.4)
Coping	15.0 (3.7)	14.7 (6.2)	13.7 (3.1)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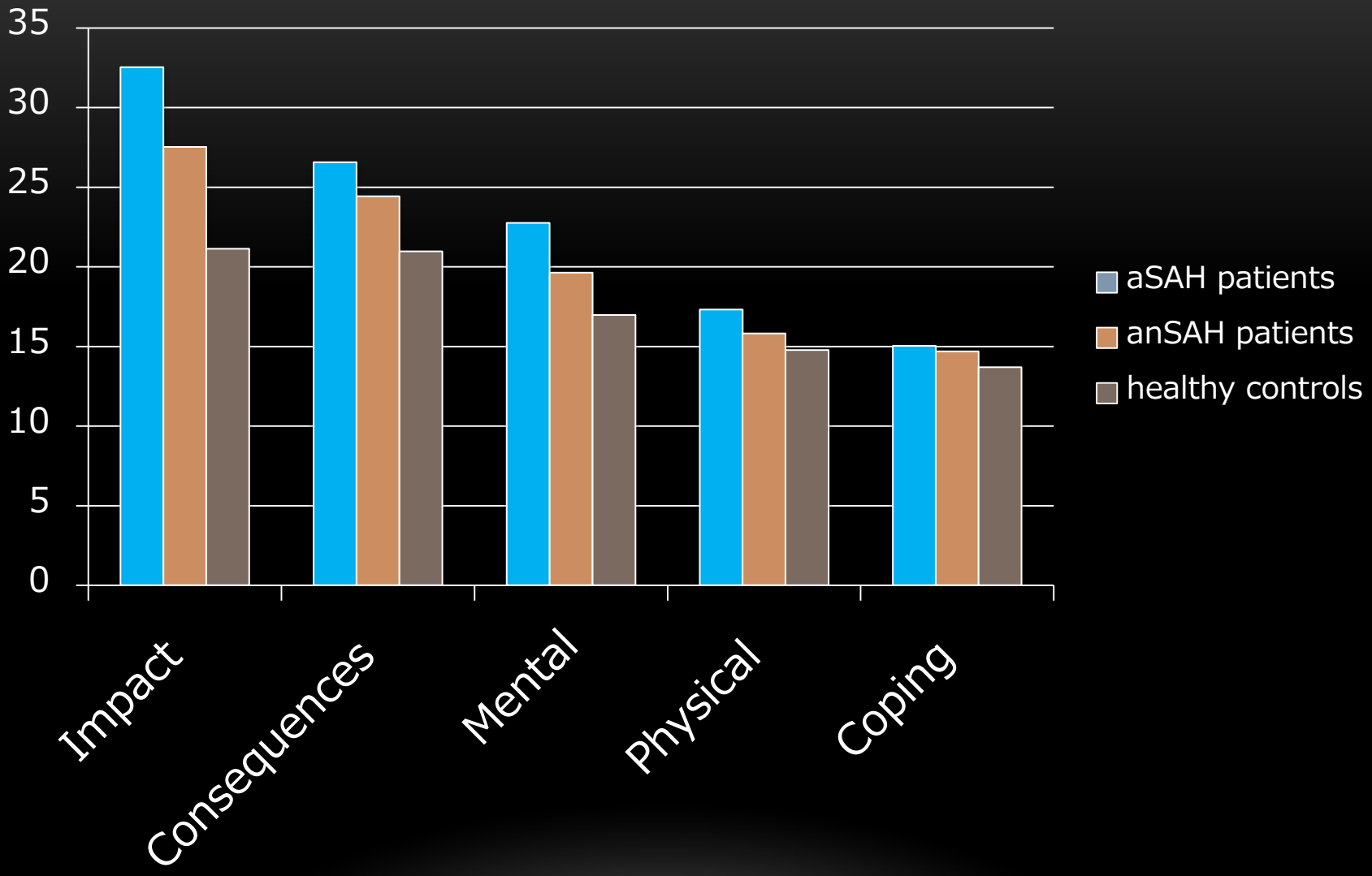
Mental
Physical
Coping
aSAH patients
anSAH patients
healthy controls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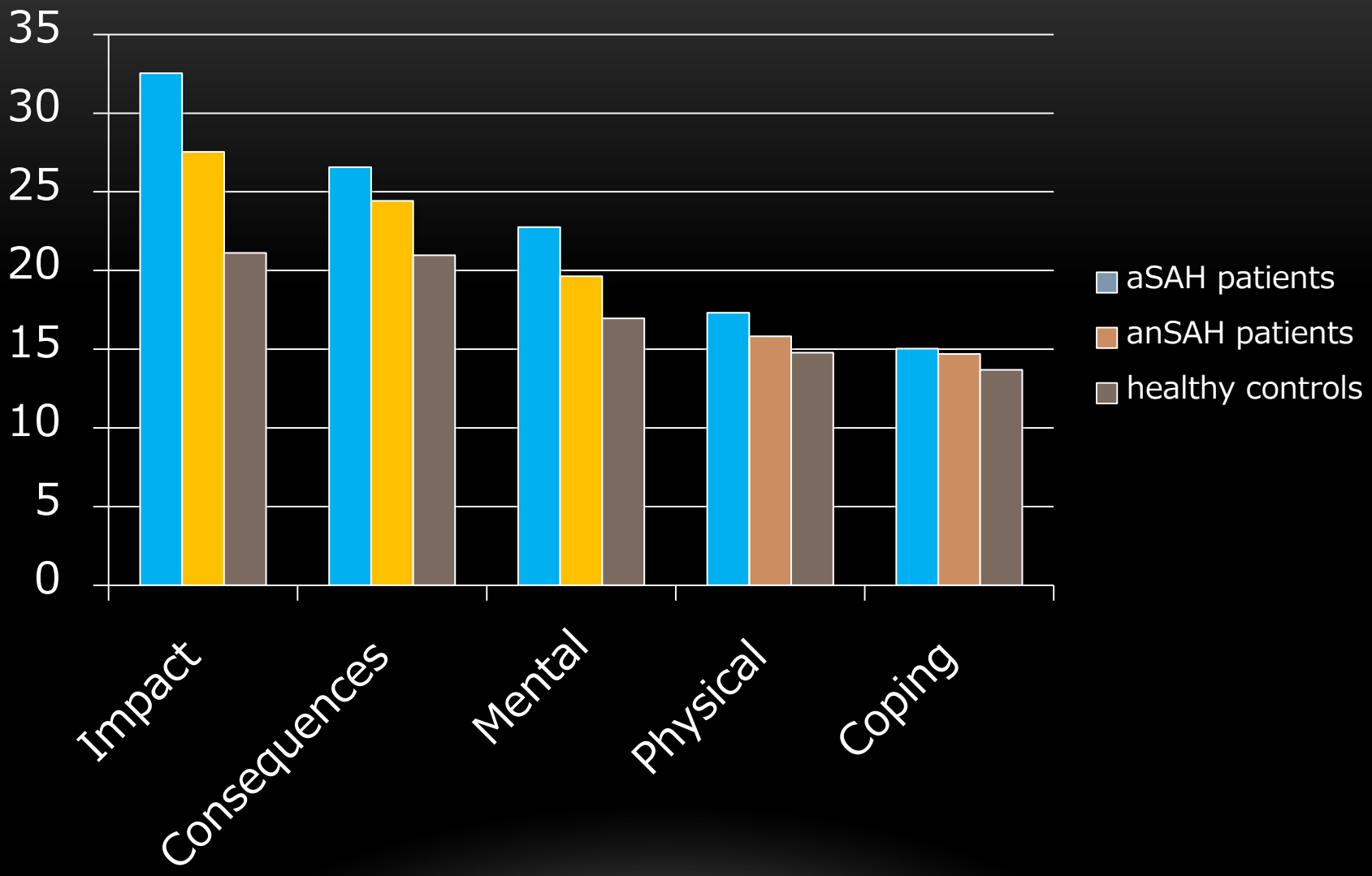
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aSAH patients
anSAH patients
healthy controls

Fatigue compared to mild TBI (N=90)

	aSAH patients	anSAH patients	mTBI
Impact	32.5 (11.5)	27.5 (12.4)	28.1 (11.9)
Consequences	26.6 (7.2)	24.4 (7.9)	23.6 (8.4)
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Fatigue compared to mild TBI (N=90)

	aSAH patients	anSAH patients	mTBI
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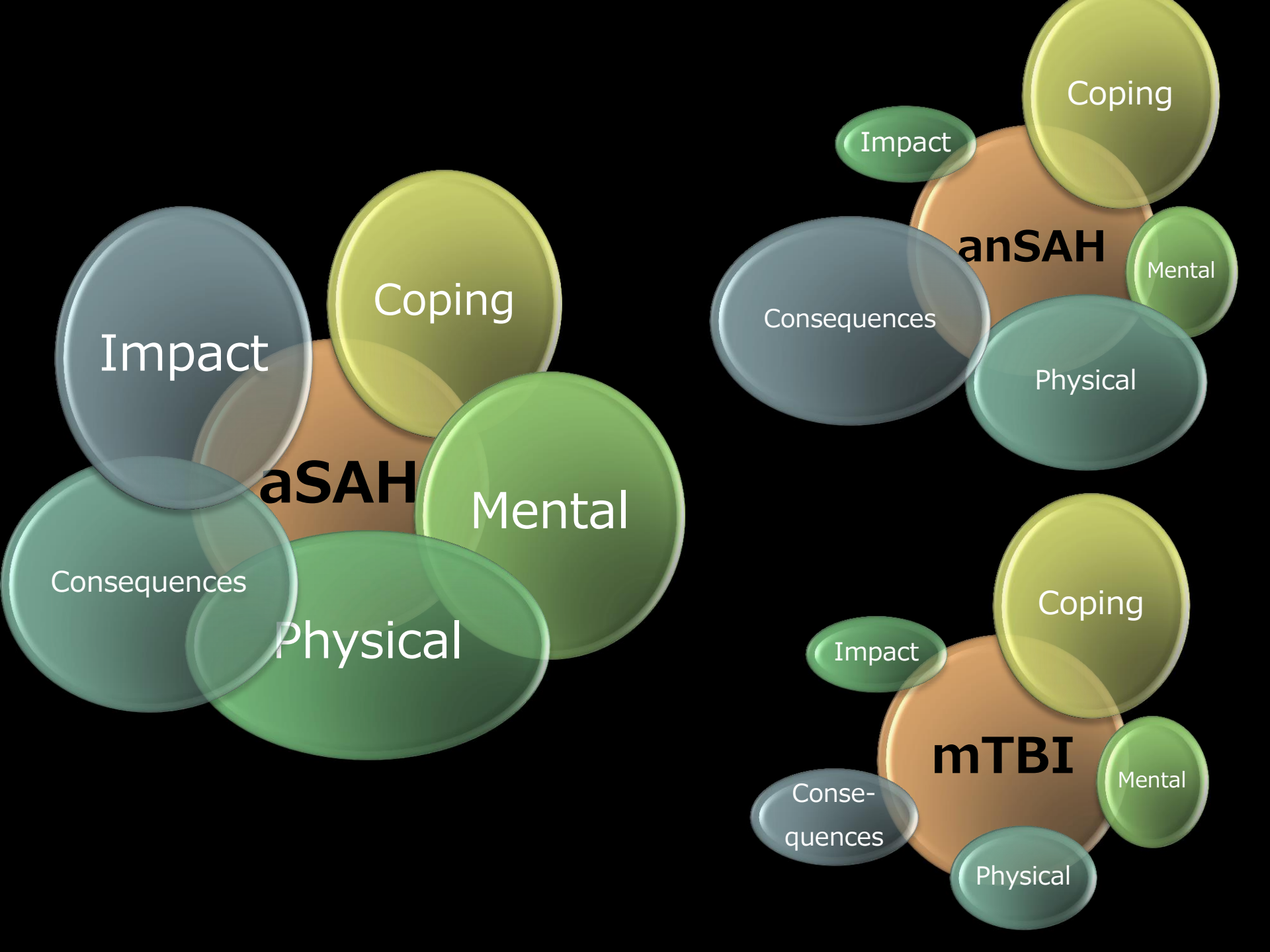
Physical fatigue	**17.3 (5.8)**	15.8 (4.4)	**15.2 (5.9)**
Coping	15.0 (3.7)	14.7 (6.2)	14.4 (3.5)

Fatigue compared between SAH groups

	aSAH patients	anSAH patients	mTBI
Impact	**32.5 (11.5)**	**27.5 (12.4)**	28.1 (11.9)
Consequences	26.6 (7.2)	24.4 (7.9)	23.6 (8.4)
Mental fatigue	**22.8 (7.0)**	**19.6 (7.5)**	20.2 (7.4)
Physical fatigue	17.3 (5.8)	15.8 (4.4)	15.2 (5.9)
Coping	15.0 (3.7)	14.7 (6.2)	14.4 (3.5)


Impact
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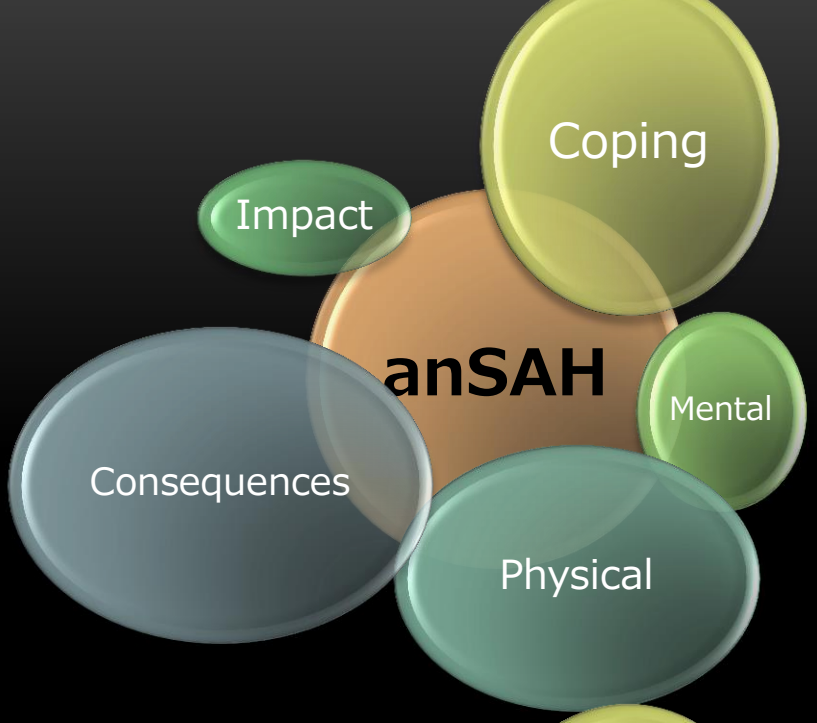
Coping
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anSAH
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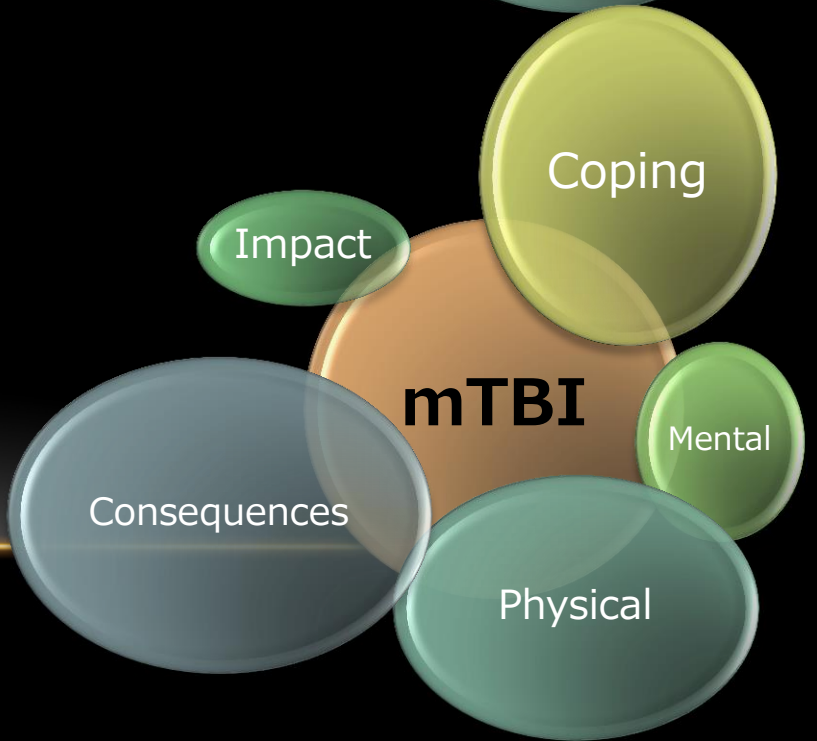
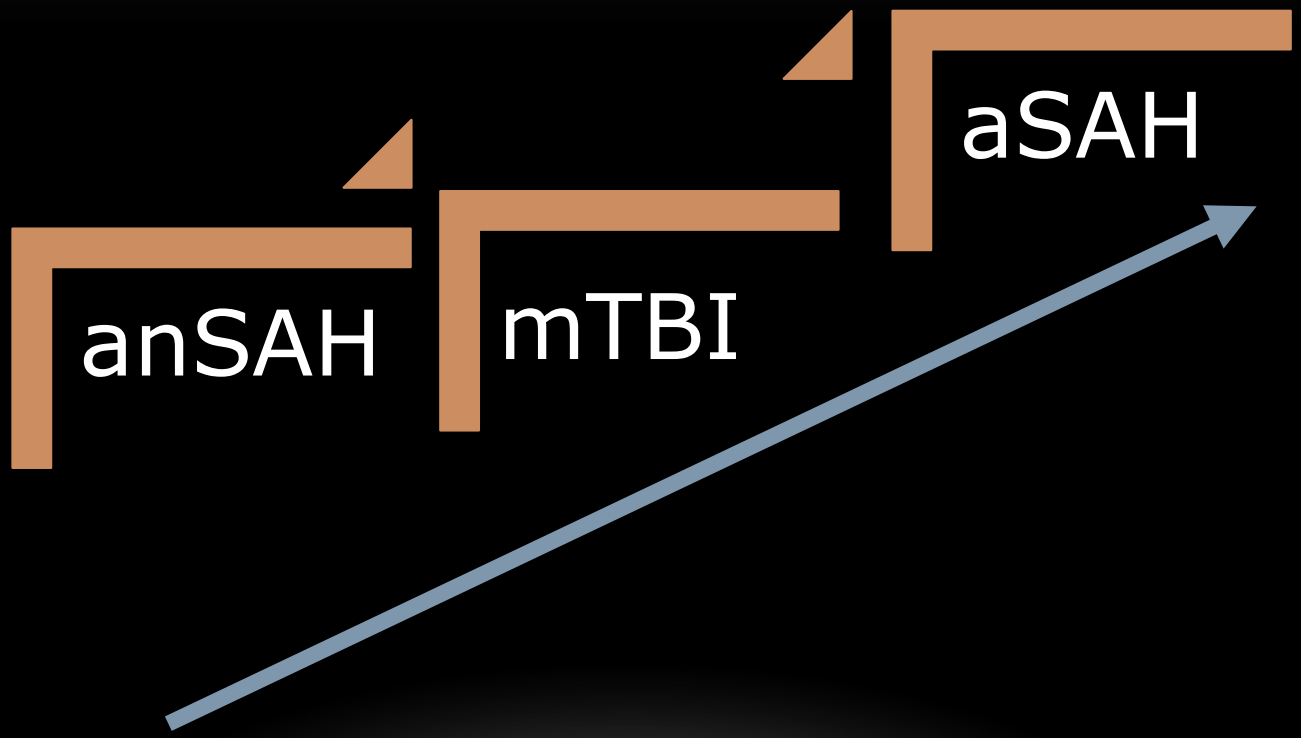
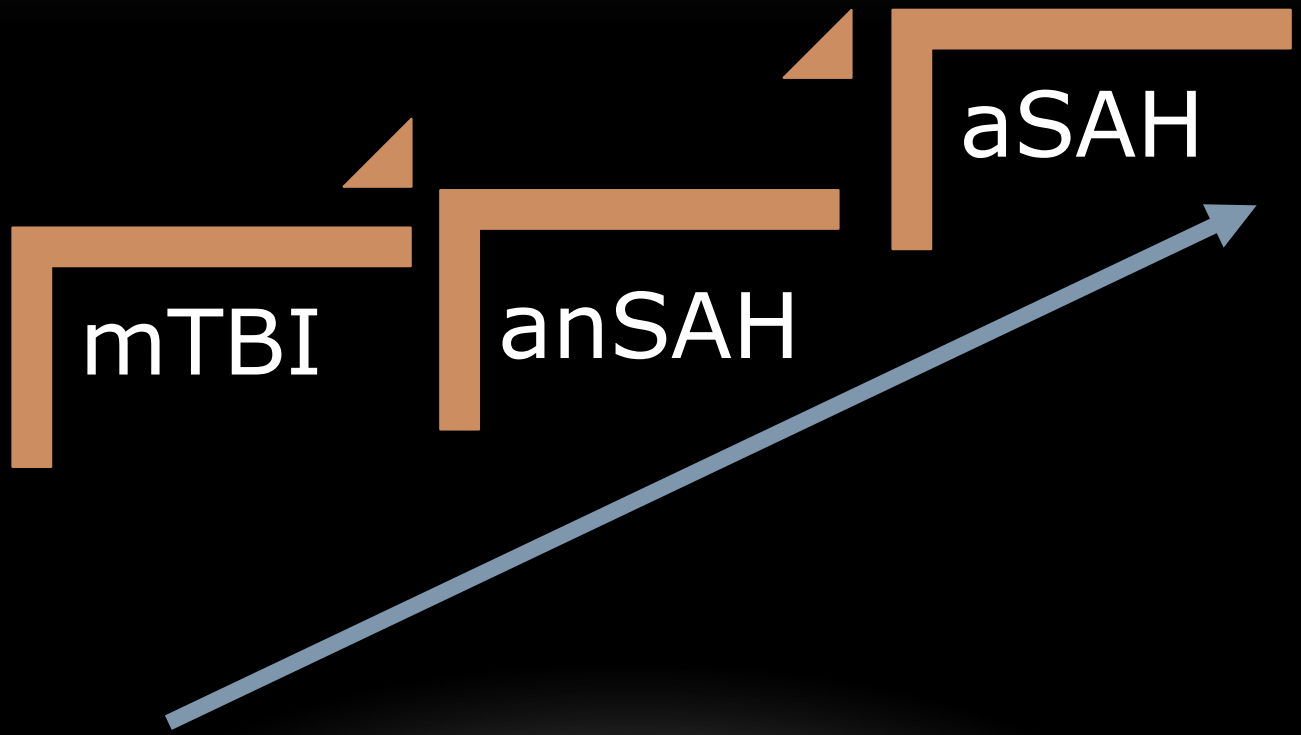
Consequences
Physical


Coping
Impact
mTBI
Mental
Consequences
Physical

Impact of fatigue
Mental fatigue



Physical fatigue
Coping with fatigue
Signs and consequences



Fatigue in patients 3-10 years after aneurysmal and angiographically negative subarachnoid hemorrhage

A.M. Buunk[1], R.J.M. Groen[2], A.C. Visser-Keizer[3], R.A. Wijbenga[1], J.M. Spikman[1]

[1]Department of Clinical and Developmental Neuropsychology, University of Groningen, The Netherlands, [2]Department of Neurosurgery, University Medical Center Groningen, The Netherlands, [3]Department of Neurology, University Medical Center Groningen, The Netherlands

Introduction

Fatigue has been reported as one of the most frequent complaints after subarachnoid hemorrhage (SAH) and is likely to interfere with daily life functioning (Passier et al., 2011; Vetkas et al., 2013). To date, research on specific features of post-SAH fatigue (e.g., the nature and impact of fatigue) and differences between aneurysmal SAH (aSAH) and angiographically negative SAH (anSAH) is limited. Therefore, we aimed to examine the most important factors of fatigue after SAH and compare profiles of fatigue between patients with aSAH and patients with anSAH. Furthermore, we investigated associations between fatigue, work status and mood in both groups.

Methods

Participants

Of a consecutive group of 336 SAH survivors, 104 did not respond and 9 were excluded because of comorbidity. Therefore, 223 patients participated: 169 aSAH patients and 54 anSAH patients. Characteristics of the patient groups and healthy controls (HC) are listed in table 1.

Questionnaires

Fatigue was assessed using the Dutch Multifactor Fatigue Scale (DMFS; Visser-Keizer et al., 2015), a questionnaire designed to measure the nature and impact of fatigue, comorbid signs and complaints, and coping with fatigue after acquired brain injury (ABI). The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) was used to examine depression and anxiety.

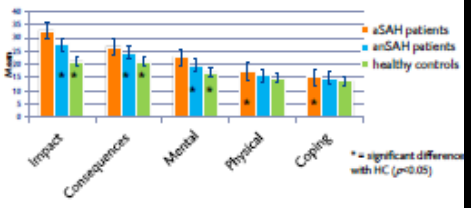
Table 1. **Characteristics and questionnaire scores of patients and healthy controls**

	aSAH n = 169	anSAH n = 54	HC n = 74
Demographic characteristics			
Ratio male/female (%)	31/69	57/43	50/50
Age in years, M(SD)	60.5 (11.1)	62.0 (10.3)	58.5 (10.2)
Time since SAH in years, M(SD)	6.8 (2.0)	6.9 (2.1)	
Work status			
Employed	53 (31.3%)	32 (40.7%)	
Unemployed	113 (66.9%)	22 (59.3%)	
Missing	3 (1.8%)		
SAH characteristics			
Treatment			
Clipping	59 (34.9%)		
Coiling	108 (63.9%)		
None/other	2 (1.2%)	54 (100%)	
WFNS, M(SD)	2 (1)	1 (0.7)	
Aneurysm circulation			
Anterior	103 (60.9%)		
Posterior	66 (39.1%)		
Questionnaires M (SD)			
DMFS			
Impact	32.5 (11.5)	27.5 (12.4)	21.1 (6.8)
Consequences	26.6 (7.2)	24.4 (7.9)	21.0 (5.3)
Mental	22.8 (7.0)	19.6 (7.5)	17.0 (4.7)
Physical	17.3 (5.8)	15.8 (4.4)	14.8 (4.4)
Coping	15.0 (3.7)	14.7 (6.2)	13.7 (3.1)
HADS			
Anxiety	5.4 (4.1)	5.0 (3.8)	-
Depression	4.7 (4.2)	4.4 (4.3)	-

Results

All SAH patients (aSAH and anSAH) scored significantly higher on the DMFS subscales (M_{impact}=31.3, $M_{consequences}$=26.0, M_{mental}=22.0, $M_{physical}$=16.9, M_{coping}=14.9) than healthy controls (M_{impact}=21.1, $M_{consequences}$=21.0, M_{mental}=17.0, $M_{physical}$=14.8, M_{coping}=13.7), all $ps <$ 0.01. Table 1 lists the means of DMFS subscales of aSAH patients, anSAH patients and healthy controls. Differences between patient groups and healthy controls are shown in figure 1; aSAH patients scored significantly higher on all subscales, anSAH patients scored significantly higher on Impact, Consequences and Mental Fatigue (all ps<0.05). Patients with aSAH experienced significantly greater mental fatigue and impact of fatigue than patients with anSAH.

Figure 1. **Mean scores on the DMFS of aSAH patients, anSAH patients and healthy controls**



Correlations between measures of mood and fatigue were moderate to high (see table 2). Patients with aSAH who were not employed reported higher scores on Physical Fatigue (M=18.1, SD=6.2) than aSAH patients who were employed (M=15.7, SD=4.7), t = 2.40, $p < 0.05$. Patients with anSAH who were not employed reported higher scores on Mental Fatigue (M=21.5, SD=7.9) than patients who were employed (M=17.1, SD=6.4), t = 2.13, $p < 0.05$.

Table 2. **Spearman correlations between DMFS and HADS scores**

	Impact	Consequences	Mental	Physical	Coping
aSAH					
HADS Anxiety	0.48*	0.63*	0.53*	0.44*	0.28*
HADS Depression	0.59*	0.50*	0.52*	0.56*	0.16
anSAH					
HADS Anxiety	0.55*	0.66*	0.49*	0.52*	0.39*
HADS Depression	0.77*	0.60*	0.67*	0.66*	0.19

* = $p < 0.05$

Conclusion

In the chronic phase after SAH, patients reported **high levels of fatigue** on a **brain injury-specific scale**. The **profiles** of aSAH patients and anSAH patients **differed**; we found higher mental fatigue in aSAH patients. Patients with aSAH also experienced higher impact of fatigue compared to anSAH patients. Additionally, **work status** was related to **physical fatigue in aSAH** patients and to **mental fatigue in anSAH** patients.

It is important to assess fatigue after SAH, preferably with a scale specifically developed for patients with ABI. Fatigue after SAH manifests itself in different ways and recognizing different profiles can be beneficial in targeting rehabilitation to individual needs.

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aSAH

Mental fatigue

Signs and consequences

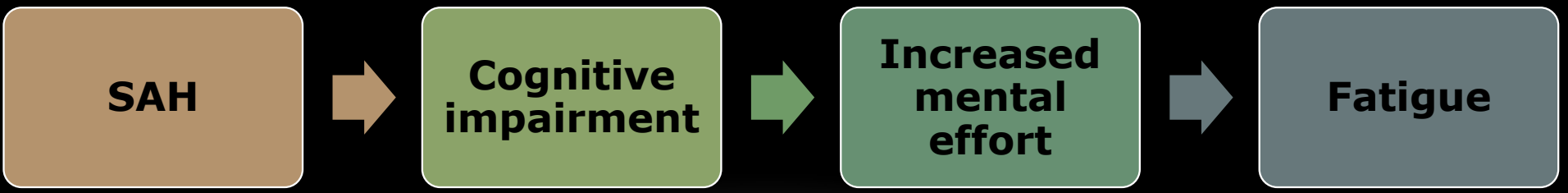
anSAH

Physical fatigue

Coping with fatigue

Coping hypothesis? (van Zomeren et al., 1984)

"Fatigue is due to the constant mental effort patients need to compensate for cognitive impairments in order to maintain task performance."



Post-stroke fatigue and return to work: a 2-year follow-up

Andersen G, Christensen D, Kirkevold M, Johnsen SP. Post-stroke fatigue and return to work: a 2-year follow-up.
Acta Neurol Scand: 2012: 125: 248–253.
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Background – Post-stroke fatigue may affect the ability to return to work but quantitative studies are lacking. *Method* – We included 83 first-ever stroke patients <60 years and employed either full-time (n = 77) or part-time (n = 6) at baseline. The patients were recruited from stroke units at Aarhus University Hospital between 2003 and 2005 and were followed for 2 years. Fatigue was assessed by the Multidimensional Fatigue Inventory. Pathological fatigue was defined as a score ≥12 on the General Fatigue dimension. Return to paid work was defined as working at least 10 h per week. Data were analyzed using multivariable logistic regression. *Results* – A total of 58% of patients had returned to paid work after 2 years. The adjusted Odds Ratio (OR) for returning to paid work was 0.39 (95% confidence interval (CI) 0.16–1.08) for patients with a General Fatigue score ≥12 at baseline. Persisting pathological fatigue after 2 years of follow-up was associated with a lower chance of returning to paid work [adjusted OR 0.29 (95% CI 0.11–0.74)]. Higher scores of General Fatigue at follow-up also correlated negatively with the chance of returning to paid work when analyzing fatigue on a continuous scale (adjusted OR 0.87, 95% CI 0.80–0.94 for each point increase in General Fatigue). *Conclusions* – Post-stroke fatigue appears to be an independent determinant of not being able to resume paid work following stroke.

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Key words: fatigue; socioeconomic outcome; stroke; work

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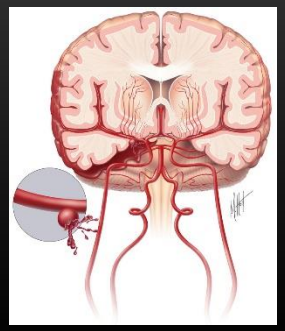
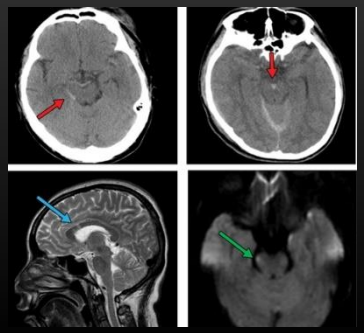


Unemployed aSAH patients higher on Physical Fatigue



Unemployed anSAH patients higher on Mental Fatigue

Fatigue after SAH

- High levels of fatigue measured by DMFS
- Profiles differ between anSAH and aSAH
- Relationship with depression and anxiety
  - Appears to differ between anSAH and aSAH
- Unemployment → more fatigue

‘The adventure’ (Bogousslavsky, 2009)

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But what seems to have been especially prominent in the first weeks is a form of inner confusion, with difficulty in organizing his thoughts: ‘I do not remember my novels characters [,] they have become strangers [;] my intentions have gone away, and what determines a style, the choice of words … I do not know anymore at which point I stand, but to leave things as they are, their disorder, this is still a witness of the problem.’ Six months later, this problem was still present: ‘… loss of memory? I am losing myself into details. I do not know anymore what is to be written and what has already been written’ (June 1944). In November 1944, over 12 months after the stroke, Ramuz was still complaining: ‘Anything which I can still do is to wander in my room until giddiness, with an empty head. I am witnessing all this in a great chaos … my ideas have no more center, they are destroying each other. They are coming from where they want, they go where they want; I do not discern even the smallest reason why they arise.’ These difficulties do not suggest memory dysfunction, but mainly an attentional disorder, which is typically associated with poststroke fatigue syndrome

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Based on patients' experiences

Valid measure

Different factors

Create profiles, tailor rehabilitation

Based on patient experiences

Outpatient rehabilitation

Valid measure

Different factors

Create profiles, tailor rehabilitation

Based on patients' experiences

Valid measure

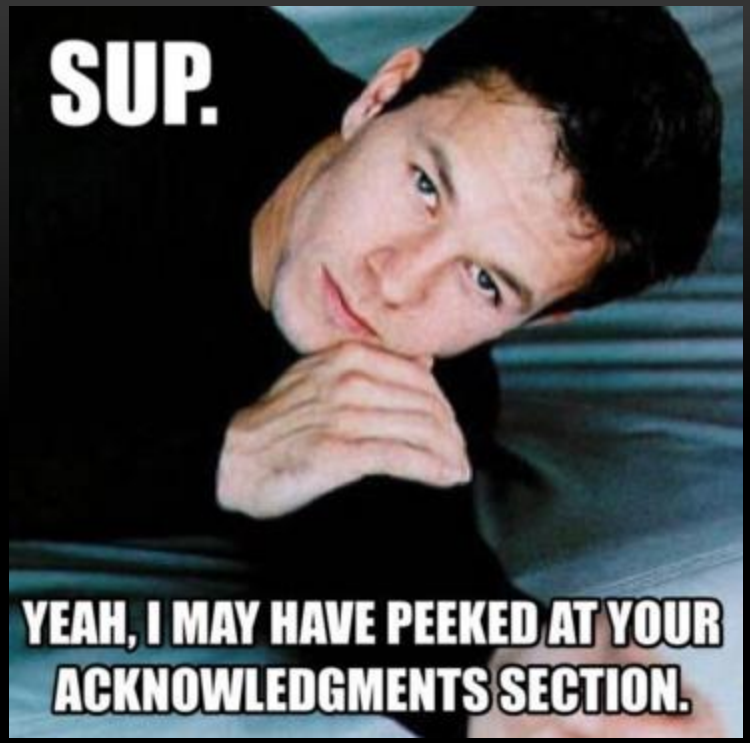
Different facto

Coping lower reliability

Create profiles, tailor rehabilitation

A valid measure of fatigue:

The Dutch Multifactor Fatigue Scale



- A.C. Visser-Keizer, Phd
- Professor J.M. Spikman
- M.E. Scheenen, MSc
- R.A. Wijbenga, MSc
- Patients and their families
- Healthy participants

TAK!

ARE YOU FINISH?
NO I'M DANISH