

# Summary QuietFrames studies

## Summary of overall results for QuietFrames studies.

- QuietFrames can increase the ability to focus/concentrate
- Around 20-30% of pupils get significant improvements in focus / productivity. (subjective observations by teachers)
- The effect has been subjectively recorded by both the individuals using QuietFrames, and observing teachers, special teachers and psychologists.
- Some individuals get a significant result in retained focus
- Some individuals get a significant result in increased productivity
- Some individuals experience a significant relief in e.g. headaches (12%), blepharospasm, photophobia
- Some individuals experience a significant effect on motion sickness (e.g. when working from the train).
- Some individuals experience a positive effect on their clarity of vision only with the shielding (i.e. not via the effect from individual correction/power, filters).
- Some individuals experience positive effects on sound / auditive noise
- A few individuals (~5%?) get headache and nausea.
- For individuals with dyslexia, special teachers and a psychologist have observed an effect on time to flow, time in flow and individuals losing track in reading a text less frequently.
- The effect on a *group level* for students aged 13-19 with intellectual disability could not be objectively measured in a recent study. However, all three teachers from three different schools could clearly see an improvement on an individual level.
- Individuals with autism may require a longer habituation to QuietFrames

## Suggestions for further studies in visually distracting environments:

- Objective observations measuring with and without QuietFrames.
  - o It makes more sense to measure improvements on individual level (rather than aggregated) since we get a significant effect for some individuals and a minor effect for others.
  - o For target groups with impression sensitivity and/or difficulties in attention deficiency or retaining focus etc. (e.g. adhd, autism).
- Working memory (e.g. serial recall study)
- Retained attention / perseverance in focus tasks
- Productivity
- Long term use and effects on productivity, quality of life, self-confidence / self-esteem

## Cases

### **CFS (Chronic Fatigue Syndrome)**

*A man, 30yo, suffers from severe chronic fatigue syndrome*

Has 2 pairs of QuietFrames with different filters, without visual correction. The shielding from above and the periphery and the comfort filters are both very appreciated. Wearing the glasses, the customer is able to leave his bedroom also during daytime.

*"My son is extremely sensitive to light. QuietFrames has been a life-changer! After two years he can finally be without blindfold while the lights are on. We can even remove some of the blackout curtains thanks to QuietFrames." // Mother*

### **HSP (Highly Sensitive Person or SPD; sensory processing disorder)**

*Woman 35yo, suffers from photophobia and impression sensitivity. QuietFrames makes her less tired after a working day in the open office, and at home. She feels less distracted and more productive.*

### **Vitreous detachment**

*Woman, 45 yo, suffers from vitreous attachment and as an effect photophobic and has eye strain. (Deeper interview pending.)*

*"Wow! They are absolutely lovely. I notice the difference immediately when i put them on. The eyes sort of calm down and relax." Linda*

### **ADHD**

*A boy with ADHD, 10yo who has difficulties concentrating at school tasks in the classroom. Desk screens are distracting to him, whereas QuietFrames gives him the ability to focus better while reading, writing and calculating.*

*"QuietFrames have changed my life in a very positive way. They help me concentrate more easily on school tasks." Max*

### **Autism**

*A boy with Autism, 6yo wanted to be able to watch TV for a longer period than 5 minutes, which was not possible due to impression sensitivity and distractability (he instead watched the iPad since it made it easier for him to focus.*

*After a few weeks habituation to QuietFrames, the boy could watch TV for ~30 consecutive minutes.*

*A boy with Autism, 14yo in a special needs class got habituated to QuietFrames and could now understand the concept of concentration time. When he was supposed to do a certain topic (Which topic?), he went to fetch his pair of QuietFrames and more independently started to focus on his tasks. The teacher said that the boy seemed happier and could easier complete the tasks, which she thought could lead to better self-esteem in the end.*

*A man with autism, 24yo suffers from a strained eye when at the screen too long at work. With QuietFrames he can work longer before his eye gets tired. He also experiences an increased focus and productivity wearing the glasses.*

## Study Special teachers, Sweden (spring semester 2024)

Can QuietFrames Glasses Help Students with Intellectual Disabilities to Retain Focus/Attention? (Andersson & Sjöström, 2024)

<https://liu.diva-portal.org/smash/record.jsf?pid=diva2%3A1866630&dswid=-9896>

Study with 12 intellectually disabled students between the (physical) age of ~13-19, conducted in three different schools. The study was conducted through a combined method with 1) pre-post test measurements with cognitive tests and 2) interviews with the three teachers of the students about the use of QuietFrames in the classroom.

The students were introduced to QuietFrames and wore them in classroom situations during two weeks. Prior to this the students did a pre-test with a cognitive evaluation (without wearing QuietFrames) and after the two weeks of habituation to QuietFrames the students did a post-test (wearing QuietFrames). After the two weeks, the teachers of the students were interviewed about the effect they had seen from QuietFrames.

All three teachers from the three different schools could notice a positive effect from the use of QuietFrames for a few of the students. In those cases, QuietFrames had a positive effect on e.g.

- Focus and concentration
- Performance
- Endurance and completion of task
- Independence on performing tasks
- (Auditive) noise tolerance
- Classroom atmosphere
- Potentially, in the long run; on self-esteem/self-confidence

The pre-post tests were analysed using the aggregated pre-test data compared with the post-test data. This showed a non-significant difference. However, as noted by the teachers, some students got significant improvements in the observations. Thus, it would be very interesting to measure how much the difference in performance was on an individual level for the the students where QuietFrames had a significant effect.

## Söraskolan, Österåker Sweden (spring semester 2024)

5 pairs of QuietFrames were introduced to a class in grade 2 in Söraskolan. Many of the pupils in this class have a difficulty reading and writing.

The glasses were first introduced where all pupils had the chance to wear them for one day (alphabetic order from the class list). After this introduction, QuietFrames were available for the pupils to borrow as they liked/needed. After one semester, the pupils filled out a survey, the teacher filled out a survey and was interviewed about the use and effectiveness of QuietFrames.

12 pupils out of 20 in the class continually wore them after the introductory period.

75% of them say that their ability to concentrate improved with QuietFrames.

83% of them say that they are less distracted by their peers with QuietFrames.

93% of them say that they get more productive with QuietFrames.

### **Teacher interview and survey**

The teacher estimated that QuietFrames

- improved concentration for ~70% of the pupils
- helped ~80% of the pupils to get less distracted by their peers
- improved productivity for ~80% of the pupils

The pupils that previously had difficulties, could succeed better in class with QuietFrames. The pupils that were sensitive to impressions got a relief by wearing QuietFrames.

## **Riverside School, Czech Republic (spring semester 2024)**

Four Year 4 students in year 4 with varying needs and behaviours were observed in math and literacy classes on the metrics 1) time to enter "focus mode" and 2) duration of sustained "focus mode" were measured.

14 children had the chance to test QuietFrames during one or few classes and after this a usage survey was filled out by all students as well as a summary from the teachers' observations from the use of QuietFrames. (7% never used them, 50% used them 1-2 times and 43% used them more than 3 times)

The first test was structurally performed with a stopwatch, however the tasks differed in subject, complexity and length and thus no significant patterns could be recorded.

### **The survey from the students:**

42% of the students would like to have had the chance to test Quietframes further. 21% of the students say that the glasses help them focus better (while 50% were neutral). Out of the usage, and the fact that 57% used them 1-2 times or never – it is very difficult to draw any conclusions.

### **The observations from the teachers:**

The glasses appeared to improve focus significantly for some students, while others showed minimal or even negative effects. For instance, Student A demonstrated improved focus duration with the glasses in certain lessons, but experienced distraction when adjusting to wearing them.

Students identified other factors, such as background music and a quiet environment, as more effective in aiding their focus compared to the glasses. This suggests that the glasses might be more beneficial when combined with other supportive measures.

Observing multiple students at the same time introduced inaccuracies. Ideally, each student's focus and engagement should be monitored individually to obtain precise data. To obtain more definitive results, future trials should be longer and involve more controlled conditions.

## Qualitative interview with teachers around Sweden (2023-2024)

**+500 pupils** tested in various ways in schools around Sweden.

Findings from the qualitative interviews with the teachers show that QuietFrames has a positive effect on e.g.

- Focus and concentration
- Performance
- Endurance and completion of task
- Independence on performing tasks
- (Auditive) noise tolerance
- Classroom atmosphere
- Potentially, in the long run; on self-esteem/self-confidence
- Dyslexia: on time to flow, reading endurance and losing track less
- Older students claim to be able to read longer texts. Younger students usually refer to that they are less distracted by their peers.

## Pupil survey (2<sup>nd</sup> grade, 2024, included in the above)

50 pupils in 2<sup>nd</sup> grade from 5 different schools answered a survey after two weeks of using QuietFrames. 87% of the pupils find it easier to concentrate on their task while using QuietFrames.

## Office (prototype study 2020/2021)

The study was meant to be conducted in open office areas. However, due to Covid, the tests became tougher, i.e. 43 individuals in an office situation tested QuietFrames during minimum 2 hours per day in home office environments.

64% said that they were able to concentrate better.

73% said that they were less distracted by the surrounding environment.

12% said that they had less headaches after the working day.

30% were highlighted that they had a need of visual shielding they did not know about.

28% said that they got a positive effect around the eye (more relaxed, less running eyes etc.)

## Needs assessment, Danderyd hospital (2019)

A needs assessment of the prototype establishes that there is a lack of aids for visual shielding and that QuietFrames would be of great benefit for the society if the idea of the shielding would work.

## External Theories & studies

- Visual noise creates a burden on the brain.
- A high level of visual noise reduction increases performance by up to 10%.
- Children perform worse in cognitive tests with higher level of visual distractions.
- Perceptual load theory, etc. We are easily distracted in the periphery.

2020

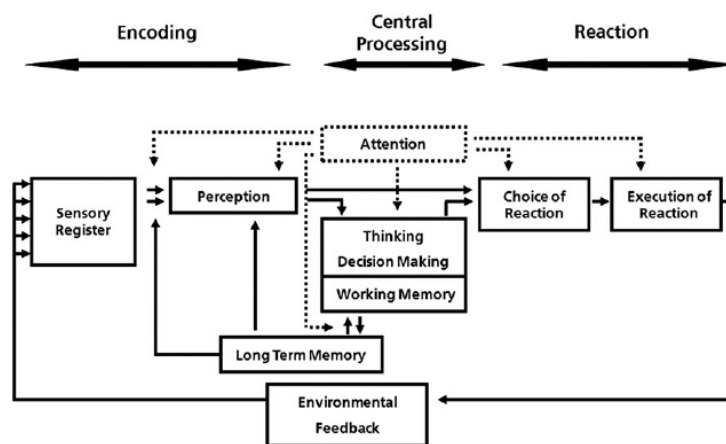
### The effects of visual distractors on cognitive load in a motor imagery brain-computer interface

<https://pubmed.ncbi.nlm.nih.gov/31614183/>

A study about how visual distractions and their effect on the cognitive load via a brain computer interface (BCI, translates the brains' signals to computer signals). The evaluation was done via NASA-TLX (Task load index). Objectively, irrelevant visual stimuli increased the burden on the brain. Subjectively, low performing participants experienced an increased burden on the brain.

2020

### information processing approach (Wickens & Hollands)



2019

### Augmented concentration: Concentration Improvement by visual noise reduction with a video see-through HMD. (Wear Space)

<https://ieeexplore.ieee.org/document/8798194>

A simulated work environment with video of passing colleagues in the periphery – with none, intermediate and high level of visual noise reduction. A high level of visual noise reduction increased the performance by 10%, intermediate level increased the performance by 7,5% vs. no visual noise reduction.

2018

### When visual stimulation of the surrounding environment affects children's cognitive performance (Rodrigues & Pandeirada)

<https://pubmed.ncbi.nlm.nih.gov/30149955/>

64 children (age 8-12) perform worse in cognitive tests with increased visual distractions around them.

2012

**Combined effects of acoustic and visual distraction on cognitive performance and well-being**

<https://www.sciencedirect.com/science/article/abs/pii/S0003687011000986>

Outer stimuli affects the individual via the senses. Fewer distractions gives a better possibility that the task at hand is performed correctly and efficiently. (Liebl et al., 2012)

**Visual noise article:**

<https://arbetsplatsenfokus.se/en/kunskapsbank/physical-working-environment/what-is-visual-noise/>

**2 Articles about Flow**

<https://arbetsplatsenfokus.se/en/kunskapsbank/workplace-health/what-is-flow-is-flow-always-a-good-thing/>

<https://arbetsplatsenfokus.se/en/kunskapsbank/workplace-health/7-tips-for-flow/>