

Cognitive Stimulation in Dementia: Time to Go into Detail. A Commentary

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ABSTRACT

While it is undeniable that cognitive stimulation (CS) is effective in patients with dementia, there is still a lack of understanding of the underlying mechanisms of the effects, and questions like “Who benefits?” or “Which factors determine the benefits?” are not yet answered. Therefore, this commentary gives an overview of different aspects (e.g., sociodemographic factors, disease characteristics, living setting) that need to be considered while doing research on CS to understand their impact on CS effects. It is also necessary to examine the effects of CS in real-life settings (e.g., geriatric hospitals) with mixed samples (e.g., patients with different severity of dementia). Additionally, important factors for future studies on CS in dementia (e.g., reporting according to the CONSORT guidelines, more health-economics studies) are outlined.

Introduction

Cognitive stimulation (CS) as a non-pharmacological intervention in patients with dementia has attracted great interest during the past decade. CS is defined as conducting a range of activities (e.g., cognitive stimulating games, sensory exercises) and discussions (e.g., talking about past experiences), usually carried out in small groups of 3 to 6 patients, with the aim of a general enhancement of cognitive and social functioning^{1,2}. Meta-analyses have shown that CS has positive effects on various cognitive and non-cognitive symptoms²⁻⁵. For example, the Cochrane review by Woods and colleagues² demonstrated a positive impact on the global cognitive state, on quality of life, and on well-being, as well as on communication and social interaction – with effects over and above those of any medication. However, although the benefits of CS are undeniable, it is true that, upon closer inspection, many open questions remain.

One major concern that challenges the generalisability of the found effects is that the target group of “patients with dementia” in itself is so heterogeneous and that the samples in the published studies differ so substantially. Thus, to boost the predictive power of CS, the next step will be to ask: “Do all patients benefit?” (which is unlikely) or, more precisely, “Who benefits under which circumstances?” and “Which factors determine whether a patient with dementia profits?” or “Which CS intervention is best for which patients?”

Possible factors with an impact on CS benefits

Sociodemographic variables

Many variables have the potential to have an impact on the effects of CS in patients with dementia (Table 1). For example, sociodemographic

variables may be relevant. Age is one of them. Notably, while some studies that examined cognitive training effects in healthy older adults showed that younger age yield better results⁶⁻⁸ (a finding that fits the notion that ageing is related to reduced cognitive and neural plasticity^{9,10}), with CS, conflicting results exist, with higher age being predictive of better results¹¹ or age having no impact¹²⁻¹⁴. Gender effects may also play a role. Besides the fact that cognitive profiles might differ in female and male patients with dementia (e.g., verbal memory is more affected in female patients with Alzheimer's dementia¹⁵ and Parkinson's disease¹⁶), gender effects on benefits of CS for patients with dementia have been reported, indicating that cognitive outcomes improve more in female participants¹¹. A stronger benefit in verbal memory/working memory was also demonstrated for female than for male patients with mild cognitive impairment (MCI) attending cognitive training¹⁷, and gender-specific cognitive plasticity has been proposed¹⁸. An alternative explanation, which has been proposed but not yet investigated in the context of CS, could be that women have a more active attitude (i.e., show more knowledge, positive emotion, and motivation to be involved in their health issues than men)¹⁹. Finally, although to the authors' knowledge, level of education has not been found (and rarely studied) to have an impact on CS benefits, it has been identified as a predictor of cognitive training effects within the ACTIVE Trial with older people without dementia (Mini Mental State Examination (MMSE) > 23 points)²⁰, indicating that more years of education yields a better training response. Thus, it might also be relevant for CS effects, even more so as education is regarded as a driver of neural and cognitive plasticity²¹.

Disease characteristics and group composition

Disease characteristics may also have an impact on benefits of CS. For example, in an observational study using a cognitive motor rehabilitation program with patients with MCI and dementia, Binetti et al.¹² reported that the responders had significantly less impairment in insight, larger functional ability and less delusions, euphoria, and aberrant motor behaviours than the non-responders.

Table 1: Factors that potentially influence effects of cognitive stimulation in patients with dementia.

- Sociodemographic variables: age, gender, education
- Disease characteristics: dementia type/etiology, disease duration, disease severity, cognitive profile, other symptoms (e.g., depression and behavioural and psychiatric symptoms, comorbidities), medication
- Living setting: at home, day-care facility, hospital, nursing home
- Characteristics of the cognitive stimulation intervention: frequency, intensity, type of tasks/activities, number of participants
- Group composition: heterogeneous vs. homogeneous (e.g., regarding type of dementia/symptomatology/severity of disease)

Therefore, it is imaginable that patients in a more advanced stage of the disease need CS programs that are cognitively less challenging. Regarding disease severity, randomised controlled trials (RCTs) demonstrated that patients with a lower cognitive baseline level were able to benefit more from CS than patients with higher baseline results^{13,14}. Besides the interpretation that there is more "room for improvement" in patients with lower cognitive baseline levels, it is also possible that the CS exercises were too easy for the fitter patients and demanded too little of them. In this context, also, the question of group selection needs to be reflected upon: Are mixed groups better (so that patients with more severe symptoms will profit from those that are fitter, and the fitter ones profit from helping the others)? Or are more homogeneous groups better (so that all patients are cognitively challenged according to their own level of functioning)? This issue is still under investigation when it comes to nursing home structures (e.g., dementia special care units vs. traditional care units²²⁻²⁴), and, to the authors' knowledge, has not yet been studied in the context of the conduct of CS interventions. Possibly, and according to the authors' own experiences in conducting CS on patients with dementia, groups in which the intervention program can be matched to the level of functioning and needs of the participants can be implemented much easier in a rather homogenous setting with patients of similar dementia severity.

While there are studies that only include patients with possible or probable Alzheimer's disease, vascular dementia, and/or mixed dementia^{2,3,25-28}, other etiologies have not been studied separately. However, cognitive and neuropsychiatric symptoms differ between types of dementia. For example, will a patient with progressive aphasia be able to participate in a CS program despite his or her problems in understanding/communication? Are patients with frontotemporal dementia willing to participate, and do they constitute a challenge in a group setting due to behavioural symptoms? Indeed, the profile of non-cognitive symptoms in patients with dementia might have a substantial influence on the benefits of CS, and the relationships between symptoms might be complex and need more research. For example, in the RCT conducted by our own group¹⁴ which examined the effects of CS versus usual care in patients with dementia in long-term care, low cognitive baseline scores predicted better outcome in cognition. However, this association was moderated by depressive symptoms, indicating that patients with lower cognitive baseline scores only benefitted more if they were not (or less) depressed. This leads to the presumption that therapy of depressive symptoms could be an important precondition for success of CS. Thus, although the ultimate aim should be to make efficient interventions such as CS available to all patients who might profit, work should be done on investigating possible differential effects

depending on the type of dementia to clarify which variations of CS are most powerful in which etiology or with which symptom complex. At the same time, it needs to be considered that the CS groups in real-life settings will mostly be mixed regarding aspects like dementia types and severity, behavioural and psychological symptoms in dementia (BPSD), and comorbidities; and in some settings such as long-term care (see below), qualified diagnoses might not even be available. Thus, CS effects should also be examined in these settings (e.g., mixed patients in nursing homes, or geriatric/psychogeriatric hospital units).

Living setting

Indeed, the impact of the living setting of the patients on CS effects is insufficiently investigated. It is well known that patients living at home differ from patients in long-term care in several characteristics: those in long-term care are typically older^{29,30} and suffer from more severe cognitive as well as functional impairment, including reduced mobility^{29,30}, as a result of being in more advanced stages of dementia. Furthermore, residents are highly affected by BPSD³¹. They often suffer from several comorbidities and take large quantities and varieties of medication³², leading to side effects, and specific dementia diagnoses are often not operationalised according to guidelines³³. Finally, community-dwelling patients typically have stronger social support, which might enhance patients' motivation and compliance for attending cognitive interventions. However, several systematic reviews and meta-analyses^{2,5,25,27} on cognitive interventions in dementia have not considered this factor. But few reviews took this aspect into account. Huang et al.³⁴ demonstrated that patients in long-term care benefited significantly more from reminiscence therapy with regard to depressive symptoms than the community sample, while Huntley et al.⁴ examined a possible association between setting (inpatient vs. outpatient) and cognitive benefits after attending cognitive intervention sessions with the help of a meta-regression, but did not find effects. To also face this barely recognised aspect, we conducted a systematic review and meta-analysis on cognitive interventions (including CS, but also cognitive training and reminiscence therapy) exclusively in individuals living in long-term care²⁶, and showed that these therapies yielded significant moderate effects on global cognition, autobiographical memory, and BPSD, as well as significant small effects on quality of life when compared with passive control groups. In studies comparing CS with active control groups, significant moderate effects were also found on global cognition and depression. Thus, the good news was that CS also seems effective for this specific group of patients. However, our systematic review also showed limitations of the current state of knowledge, as it seems unclear whether the effects on BPSD and quality of life only reflect unspecific changes due to additional attention and

care or whether they are directly related to the content of the cognitive therapy. Finally, a recent Cochrane review by Woods and colleagues³⁵ on reminiscence therapy in dementia calculated subgroup analyses for people living in the community and in nursing homes. They found that only nursing home residents improved in cognition and quality of life, whereas only the community sample showed benefits in communication. As a last but also important aspect, future studies will have to clarify which intervention type of which duration and frequency is most effective for which dementia type and severity.

Conclusion

In summary, while the main message that CS is effective in patients with dementia is undeniable and argues in favour of implementation of this type of intervention into clinical practice, more research is necessary to understand underlying mechanisms of the effects, so that CS can be tailored as efficiently as possible to the patients. Important aspects for future research are listed in Table 2. Among other research questions, future studies should define in more detail the impact of sociodemographic factors (age, education, sex), clinical parameters (severity of disease, cognitive and non-cognitive symptoms, etiology, medication), and living setting (at home or in day-care centres or in long-term care or in hospital settings) on the effects of CS – and examine whether different forms of CS in terms of intensity, frequency, and content help patients with different characteristics. With more knowledge on these topics, this powerful non-pharmacological intervention could enter the era of personalised medicine. Not to forget, health-economics studies, which have been widely neglected in CS and other non-pharmacological interventions in dementia, will also be necessary to convince policy makers of the benefit of this intervention, as few studies on this important factor for integrating this therapy option in standard care have been published so far³⁶⁻³⁸. Many of the questions raised will need large-scale multi-center RCTs, conducted and reported according to CONSORT guidelines^{39,40}. Let's face it.

Table 2: Important aspects for future study designs and study reporting.

- Study reporting according to CONSORT guidelines, considering the extended version for non-pharmacological interventions (Boutron et al., 2008) which includes, among other aspects,
 - a detailed description of the intervention
 - a detailed description of the sample and its characteristics
- Intention-to-treat analysis and per protocol analysis
- Well-defined study samples as well as examining real-life settings
- Follow-up examinations over months and years
- Prediction analysis: who benefits?
- Health-economics analysis

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Conflict of Interest statement

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