Annals of Epidemiology 24 (2014) 63–71

Contents lists available at ScienceDirect

Annals of Epidemiology

journal homepage: www.annalsofepidemiology.org

Original article

Influence of population versus convenience sampling on sample characteristics in studies of cognitive aging

Henry Brodaty MD, DSc [a,b,*], Annu Mothakunnel BPsych [a], Melissa de Vel-Palumbo MPsych [a], David Ames MD [c,d], Kathryn A. Ellis PhD [c,d,e], Simone Reppermund PhD [a], Nicole A. Kochan PhD [a,f], Greg Savage PhD [g], Julian N. Trollor MD [a,h], John Crawford PhD [a], Perminder S. Sachdev MD, PhD [a,f]

[a] Centre for Healthy Brain Ageing, University of New South Wales, Sydney, Australia
[b] Dementia Collaborative Research Centre, University of New South Wales, Sydney, Australia
[c] National Ageing Research Institute, Parkville, VIC, Australia
[d] University of Melbourne Academic Unit for the Psychiatry of Old Age, Kew, VIC, Australia
[e] Mental Health Research Institute, Parkville, VIC, Australia
[f] Neuropsychiatric Institute, Prince of Wales Hospital, Randwick, NSW, Australia
[g] Department of Psychology and ARC Centre of Excellence in Cognition and its Disorders, Macquarie University, Sydney, NSW, Australia
[h] Department of Developmental Disability Neuropsychiatry, University of New South Wales, Sydney, Australia

ARTICLE INFO

Article history:
Received 31 May 2013
Accepted 3 October 2013
Available online 12 October 2013

Keywords:
Mild cognitive impairment
Aging
Epidemiologic studies
Epidemiologic research design
Selection bias
Patient selection
Apolipoprotein E4
Neuropsychological tests

ABSTRACT

Purpose: We examined whether differences in findings of studies examining mild cognitive impairment (MCI) were associated with recruitment methods by comparing sample characteristics in two contemporaneous Australian studies, using population-based and convenience sampling.
Method: The Sydney Memory and Aging Study invited participants randomly from the electoral roll in defined geographic areas in Sydney. The Australian Imaging, Biomarkers and Lifestyle Study of Ageing recruited cognitively normal (CN) individuals via media appeals and MCI participants via referrals from clinicians in Melbourne and Perth. Demographic and cognitive variables were harmonized, and similar diagnostic criteria were applied to both samples retrospectively.
Results: CN participants recruited via convenience sampling were younger, better educated, more likely to be married and have a family history of dementia, and performed better cognitively than those recruited via population-based sampling. MCI participants recruited via population-based sampling had better memory performance and were less likely to carry the apolipoprotein E ε4 allele than clinically referred participants but did not differ on other demographic variables.
Conclusion: A convenience sample of normal controls is likely to be younger and better functioning and that of an MCI group likely to perform worse than a purportedly random sample. Sampling bias should be considered when interpreting findings.

© 2014 Elsevier Inc. All rights reserved.

Introduction

Epidemiologic studies differ regarding findings about rates of decline and prognosis of mild cognitive impairment (MCI), an intermediate state between normal aging and dementia. Differences in study findings could be associated with differences in sampling methods. Studies may use population-based sampling which aims to select a random group of participants who are representative of the population of interest or convenience sampling, which involves engaging volunteers who are selected due to ease of recruitment and willingness to participate and clinical referrals who are selected to maximize the sampling of specific types of disorders.

Convenience sampling of cognitively normal (CN) participants is vulnerable to self-selection bias as those who seek out opportunities to participate in cognitive research may be more capable and motivated than randomly recruited CN participants. Consistent with this, studies have shown that CN convenience samples tend to be younger [1–3] and better educated [1–4] than those recruited via population-based sampling and more likely to have a family history of Alzheimer disease (AD) [3], probably reflecting their personal interest and motivation.

Clinically referred samples are also susceptible to bias as they may contain people who have better access to health care due to socioeconomic factors or have more complex or severe conditions [5]. Consistent with such a bias, clinically referred MCI participants

* Corresponding author. Dementia Collaborative Research Centre, 302 AGSM, University of New South Wales, Sydney, NSW 2052, Australia. Tel.: +61 293852585; fax: +61 293852200.
E-mail address: h.brodaty@unsw.edu.au (H. Brodaty).

1047-2797/$ – see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.annepidem.2013.10.005

tend to be better educated [3,6–9] and more likely to be married and living independently than people with MCI in the wider population [6,9]. They also tend to be younger, possibly because doctors are more likely to refer younger patients to specialty clinics [3,6,7,10,11], although some studies have found them to be older [8,12]. Additionally, clinically recruited MCI and AD participants are more likely to carry the apolipoprotein E (APOE) ε4 allele [3,7] and more likely to decline faster suggesting more aggressive brain pathology [3].

Such demographic differences between population-based and convenience samples could lead to invalid research conclusions. For example, younger age of convenience samples could affect the validity of research examining neuropathology of MCI, effects of anti-AD medications, and APOE genotype [7,11]. Similarly, higher levels of education observed in convenience samples may be associated with greater levels of cognitive reserve and could lead to incorrect conclusions regarding MCI progression rates.

There are mixed findings as to whether sampling methods are associated with differences in cognitive performance of CN samples. CN convenience samples outperformed population-based participants on the Mini-Mental State Examination (MMSE) [2,3] and on a vocabulary task possibly due to higher education levels [4] but not on reasoning or word recall tasks [4].

Similarly, there is mixed evidence as to whether sampling methods are associated with differences in cognitive performance of MCI samples. There is some evidence that population-based MCI samples outperform clinic samples (solely based on MMSE) possibly because participants from clinics have a more aggressive or advanced form of MCI [6,7,12]. By contrast, others found no difference between clinic and population samples on the MMSE, memory tasks, or executive function tasks [8] or found that clinic samples performed better possibly due to higher levels of cognitive reserve although this result was not corrected for differences in sample age and education [3].

Potential cognitive differences merit further investigation. If there is consistent evidence that CN convenience samples outperform population-based samples, then studies comparing MCI participants against a convenience sampled normal reference group would exaggerate their degree of cognitive impairment. Additionally, evidence indicating that clinically referred MCI samples cognitively underperform compared to population-based MCI samples, suggests that clinic samples consist of a select group of patients with a form of MCI are more likely to progress to dementia and do not represent the heterogeneity of MCI in the general population.

Additionally, as convenience sampling is more selective than population-based sampling, one may expect less interindividual variability among convenience samples. In one study, convenience samples showed less variance than population-based samples in some quality of life and social relationship variables but not cognitive measures [4].

This study examined the relationship between recruitment method and demographic and cognitive characteristics of the purportedly random electoral roll–based sample used in the Sydney Memory and Aging Study (MAS) [13] and a convenience sample of CN participants recruited via media advertisement and clinical referrals with MCI used in the Australian Imaging and Biomarkers Lifestyle (AIBL) Study of Ageing [14]. We hypothesized that CN and MCI participants in the MAS sample would be older, less educated, less likely to be married, and less likely to be living independently than those in the AIBL study. Additionally, we hypothesized that the AIBL study would contain more CN participants with a family history of memory problems or dementia and more MCI participants who were APOE ε4 carriers than the MAS. There were no clear predictions regarding differences between the samples on cognitive performance or on interindividual variability on cognitive measures.

Methods

Protocols

Baseline data were obtained from two Australian longitudinal studies of cognitive aging: the MAS and the AIBL study. The MAS [13] was initiated in 2005 and conducted in Sydney. Participants were recruited from the community via the electoral roll (in Australia, voting is compulsory). A random sample of 8914 people living in the federal government electorates of Kingsford-Smith and Wentworth aged between 70 and 90 years were invited by letter to participate. Of these, 1772 people (20%) agreed to participate and were screened over the phone to assess their eligibility; 735 people were excluded because they were ineligible or no longer agreed to participate. The final sample had 1037 participants.

The AIBL study [14], which was initiated in 2006, aimed to recruit 200 participants with AD, 100 participants with MCI, and 700 healthy participants over the age of 60 years from Melbourne and Perth. Healthy participants were largely recruited via a media appeal and participants with MCI or AD largely via clinical referral. The total sample contained 1112 participants.

There were some differences in study exclusion criteria. The AIBL study excluded people with non-AD dementia, whereas the MAS excluded those with any form of dementia. Unlike the MAS, the AIBL study excluded people with current depression, Parkinson disease, symptomatic stroke, uncontrolled diabetes, or regular alcohol use exceeding two standard drinks per day for women or four for men. The AIBL study did not contain participants from non-English speaking backgrounds (NESBs), whereas the MAS included people from NESBs who spoke sufficient English to complete the assessment. Full details of MAS and AIBL exclusion criteria have been reported previously [13,14].

Ethics approval

Written informed consent was obtained from all participants. The MAS was approved by the Ethics Committees of the University of New South Wales and the South Eastern Sydney and Illawarra Area Health Service. The AIBL study was approved by the institutional ethics committees of Austin Health, St Vincent's Health, Hollywood Private Hospital, and Edith Cowan University.

Sample reclassification process

To allow comparison between the samples, 211 AIBL participants diagnosed with AD at baseline were excluded (by definition, no MAS participant had dementia at baseline). A further 445 AIBL participants outside the 70- to 90-year age range were excluded to match the samples' age ranges.

Participants were reclassified as CN or MCI using common MCI diagnostic criteria: cognitive impairment and subjective memory complaint (SMC) in the absence of dementia or significant functional impairment [15]. As the studies differed in how they originally defined cognitive impairment, criteria were harmonized so that cognitive impairment was defined for all participants as scores lower than or equal to 1.5 standard deviations below published normative data on at least one of the cognitive measures outlined in Table 1 (excluding estimated Intelligence Quotient [IQ] measures). SMC was harmonized by using responses to a similar question in both studies which asked about memory difficulties. As this question was not asked of clinically referred AIBL study participants, we inferred that these participants also had SMCs. Our MCI

Download English Version:

https://daneshyari.com/en/article/6148134

Download Persian Version:

https://daneshyari.com/article/6148134

Daneshyari.com