

Musical experience and dementia. Hypothesis

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ABSTRACT. **Background and aims:** Cognitively stimulating activities appear to protect against the development of dementing illness – playing a musical instrument may be one of these activities. Consistent with this notion, the aim of this study was to explore the hypothesis that dementia might be less common among orchestral musicians. **Methods:** A cross-sectional survey of 23 older orchestral musicians who were former members of a single orchestra was carried out. Prior musical background, family history, and health history were obtained. A cognitive screen was administered in person or by telephone. Musicians were also queried regarding their awareness of living former orchestral colleagues with dementia. **Results:** The mean age of participants was 76.9 ± 6.8 (SD). No participant was aware of a living former or current orchestral member with either reported or suspected dementia. **Conclusions:** The results are consistent with the hypothesis that dementing illness may be less among orchestral musicians – possibly from a lifetime engaged in a cognitively stimulating endeavor.

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INTRODUCTION

With age, dementia is often feared more than death – Alzheimer's disease (AD) being the main villain (1). Dementing illness is common (2), costly (3), and strains afflict individuals and families. Unfortunately, there are few interventions that may alter the onset of AD.

Investigators have generally found that educational attainment has a protective effect against the development of AD (4), consistent with the notion that education enhances cognitive reserves or synaptic connections protecting from or delaying the onset of AD (5). If education is protective in this manner, a similar mechanism may account for the protective role played by participation in some leisure time (6) and cognitively stimulating activities (7, 8).

Connections between several lines of evidence point to a possible link between musical training, experience, and dementia. Musical training appears to influence both brain development and elements of cognitive functioning. Investigators have found at least short-term effects of music on enhanced spatial-temporal reasoning (9, 10). Musician's brains also have anatomic differences compared with their non-musical counterparts (11-14), and musical training appears to enhance neuroplasticity (15).

Interestingly, the preventive effect of playing a musical instrument on the risk of dementia or AD has recently been suggested (8). If the association exists, then musicians may be protected from dementing illness. The purpose of this study was to explore that possibility.

METHODS

The sample was drawn from older musicians who had performed one or more years in a single orchestra but who were not current members. There were 66 former members aged 65 years of age and older – 58 had known addresses and 23 agreed to be interviewed (none of 18 older performing orchestral members were interviewed). Individuals residing geographically near the investigators were interviewed in person if possible (N=9) and others by telephone (N=14). The average age of those interviewed was 76.9 ± 6.8 (SD), compared with 79.5 ± 6.9 (SD) for non-responders and those without known addresses. Four percent of those interviewed were women, compared with 17% of the others.

Demographic characteristics, health, and family histories were ascertained (including self-reported health, falls, presence of heart disease, diabetes, stroke, hypertension, medication use, hospitalization, and family history of dementing illness). Musical background was described, including the age beginning an instrument, presence of absolute pitch, and current playing.

Those having in-person interviews completed the Mini-Mental State Examination (MMSE) (16). Participants having telephone interviews were asked the 6 MMSE

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items amenable to telephone administration. Only results from these items, because they were available for all participants, are reported. One individual declined the cognitive screen. Participants were queried regarding knowledge of any former living colleagues with dementia or AD who were ever members of the particular orchestra. They were also asked if they ever knew any individual with dementia (i.e., their likely ability to recognize dementia).

The study was approved by the institutional review board and informed consent was obtained. A geriatrician conducted interviews.

RESULTS

Participants' age and educational attainment are described in Table 1. Self-reported health was generally favorable: 12 reported excellent, 9 good, and 2 fair health; 18 reported being able to walk a mile without difficulty. In the previous year, 7 reported falling and the same number had been hospitalized. Five had a history of heart disease and 10 of hypertension. All but two reported taking prescribed medications regularly. Most were married and none smoked.

Musicians began playing instruments between 4 and 14 years of age. Twelve no longer played; the others played between 30 minutes and 2 hours per day – although many not every day of the week. Five had absolute pitch.

Comparable cognitive screens were available from 22 musicians for the MMSE items administered both by telephone and in person. The average total score of these items was 21.8 (95% CI 20.8-22.0; maximum score 22). Most (N=18) said they had known someone with dementia or AD, and five reported a parent with either dementia or notable memory loss (none of these parents had been professional musicians). No participant was aware of a living current or former orchestral member with either reported or suspected dementia. Based on the age, sex, and education of the 84 living older current and former orchestral members, 8 or 9 would have been

expected to have Alzheimer's disease (4 with moderate or severe cognitive impairment) (1, 17).

DISCUSSION

While the cognitive psychology of music and its relationship to the mind has received considerable attention (18), any protection against the development of dementing illness from playing a musical instrument has only recently been suggested (8). The results of this exploratory study suggest such a protective effect may exist, consistent with studies of cognitively stimulating activities and risk of dementia (6-8).

The practice and performance of music has elements shared by few other cognitive activities. For example, being able to play at an orchestral level requires consistent and concentrated practice beginning at a young age – many thousands of hours (19). Orchestral performance requires near-perfection, and achieving it extraordinary concentration during both practice and performance. Few cognitive activities are as demanding of the mind over such long periods. From this perspective, long-term musical practice and performance may have beneficial effects greater than those of other cognitive activities.

Although still not completely defined, the natural history of AD may span decades (20). While many exposures cannot be quantified during the decades before the onset of disease, musical practice and performance among musicians occurs intensely during its probable induction period. From the perspective of biological plausibility, musical exposure could very well provide a beneficial effect.

Dementia is a common illness among older individuals, the prevalence of probable AD reaching 10% (1). One then expects that most older individuals would be familiar with dementia. Yet surprisingly, participants were unaware of any living older musicians having played in the identified orchestra with dementia. Still, the recognizability of dementia must be considered. While mild and moderate AD appear to have limited or inconsistent recognizability by family informants, severe AD is identified accurately by family in almost 90% of cases (21). Participants also noted that they were not aware of the health of many former colleagues. Lastly, the survey formally queried knowledge of living older colleagues with possible dementia. Some participants did informally note a deceased colleague with suspected dementia.

The performance of the musicians on a basic cognitive screen, while almost without error, must be considered in light of the sample's small size and volunteer nature. Although the average age of participants was not substantially different from that of non-responders, bias against participation among compromised individuals may have occurred. However, it is also possible (as was noted by a few participants) that some musicians would be reluctant to participate because of their reputation and continued performance in other settings.

Table 1 - Age and education of participants.

	Number	Percent
Age*		
65-74	9	(39.1)
75-84	10	(43.5)
85 and older	4	(17.4)
Highest educational level		
Less than college	3	(13.0)
Some college	5	(21.7)
College/Professional degree	9	(39.1)
Master degree	6	(26.1)
Total	23	(100)

*A breakdown by sex is not included, to protect confidentiality.

Orchestral musicians may also represent a cognitively select group endowed with greater attention and memory than others. Although dementing illness may have been less common among them, it may still reflect selection bias associated with musical ability. However, studies have indicated that environment more than innate talent may be responsible for the development of musical abilities (22, 23).

In conclusion, these results are consistent with the hypothesis that dementing illness (of which the most frequent is AD) may be less common among orchestral musicians. If so, playing a musical instrument may not only be good for the soul ("Take a music bath once or twice a week for a few seasons, and you will find that it is to the soul what the water-bath is to the body" - Oliver Wendell Holmes) but also for the aging mind.

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