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Mindfulness as a potential intervention for stimulus over-selectivity in older adults

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ABSTRACT

Ageing is related to significant declines in cognitive functioning. This effect can have a serious impact on the physical and psychological health of older adults as well as their quality of life. One phenomenon linked to cognitive deficits, particularly attention, that has been demonstrated to emerge with ageing is over-selectivity. Over-selectivity occurs when behavior is controlled by a limited number of stimuli in the environment. Mindfulness is a construct that specifically targets attention and awareness of the present moment. The current study aimed to remediate over-selectivity in an elderly population by means of a focused attention/mindfulness induction. The results of this study indicated that the level of emergent over-selectivity in an elderly population was significantly reduced after a focused attention induction when compared to an unfocused attention induction. The findings are discussed in terms of the efficacy of mindfulness training in reducing over-selectivity.

Over-selectivity describes a situation when only a limited set of available stimuli come to control behavior. It has been extensively investigated in the context of populations diagnosed with developmental disabilities, especially Autism Spectrum Disorders (ASD). Investigations of this effect often present two compound stimuli, each comprising two elements, and train participants to select one compound in a simple trial-and-error-discrimination task. Following training to a criterion, the control exerted by the individual elements of the previously reinforced compound are tested in extinction, and results show that for developmentally disabled populations, control tends to be limited to one of these elements (e.g., Koegel & Wilhelm, 1973; Koegel & Scheribman, 1977; Kovattana and Kraemer, 1974; Lovaas & Schreibman, 1971; Ploog & Kim, 2007; Reed & Gibson, 2005).

While stimulus over-selectivity is a widely acknowledged problem in the population with developmental disabilities (Dube & McIlvane, 1999; Lovaas & Schreibman, 1971), and ASD in particular (Dickson, Wang, Lombard, & Dube, 2006; Reed, Broomfield, McHugh, McCausland, & Leader, 2009), it has also been observed in diverse populations, such as: those with acquired brain injury (Wayland & Taplian, 1985); older participants (McHugh & Reed, 2007); and, under some conditions, with typically developing children (Schrovcr & Newsom, 1976), and adults (Broomfield, McHugh, & Reed, 2008a; Reed & Gibson, 2005).

McHugh and Reed (2007) investigated over-selectivity in individuals from a range of different age groups with no documented disabilities. A discrimination-learning task was employed, whereby participants were presented with compound stimuli, and were reinforced for selecting one compound (S+) over another (S−). The individual elements of the compounds were then presented separately, and the responses made to the individual elements of the S+ were calculated.

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Three age groups were studied 18–22, 47–55, and 70–80 years; over-selectivity increased with age, and was highest in the 70–80-year-old group. Thus, over-selectivity may produce difficulties in older individuals, and methods for tackling this problem would be of some benefit. Any findings that emerge from this study of remediation may well have usefulness to other populations.

There is some evidence in the literature regarding techniques for the reduction of over-selectivity. One such technique requires participants to observe all components of the stimuli present, either by pointing to, or naming, them (e.g., Constantine & Sidman, 1975). However, Broomfield et al. (2008a), and Dube and McIlvane (1999), noted that the benefits of this procedure were reversed after the observing procedure was removed. An additional potential remediation technique is to extinguish the over-selected element. Broomfield, McHugh, and Reed (2008b) found that, by extinguishing the over-selected item, the previously under-selected item came to control behavior without direct training, resulting in a reduction in over-selectivity. However, McHugh and Reed (2007) found that while the extinction procedure did reduce over-selectivity for the younger age groups, the older age group did not show a significant effect on stimulus control post-intervention. Thus, to date there have been no reported successful interventions for over-selectivity in an older population.

Recent trends in behavior therapy have seen the development of a number of language-based interventions, such as Dialectical Behavioral Therapy (Linehan & Dimeff, 2001), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and techniques based on mindfulness (Grossman, Niemann, Schmidt, & Walach, 2004). These techniques have been used in a wide variety of situations; e.g., diabetes self-management (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), pain tolerance (Kingston, Chadwick, Meron, & Skinner, 2007), and reduction of prejudice (Lillis & Hayes, 2007), and several studies have shown the efficacy of such procedures relative to traditional interventions (Zettle & Hayes, 1986; Zettle & Raines, 1989).

Mindfulness training has been shown to have positive effects in older adults, and it has been suggested that mindfulness be used as a complement to Cognitive Behavior Therapy with older people (Smith, 2004). For instance, Alexander, Chandler, Langer, Newman, and Davies (1989) found mindfulness interventions improved cognitive and behavioral flexibility, perceived control, and longevity, in older adults. As mindfulness training is suitable for older individuals (Smith, 2004), and has known effects on attention to present stimuli (Bishop et al., 2004), it seems a suitable candidate to employ in order to address over-selectivitiy problems. Typically, mindfulness training is implemented over a number of sessions (Shapiro, Schwartz, & Bonner, 1998). However, even a 15-min focused attention instruction has been shown to produce mindfulness consistent behavior on a subsequent task. For example, Arch and Craske (2006) tested the immediate effects of a 15-min focused breathing induction involving 'mindfulness' of breath instructions, which provided a short experimental analogue of mindfulness. The findings indicated that participants in the focused breathing induction demonstrated more positive responses to external stimuli after the induction than an unfocused attention group.

The aim of this current study was to explore the suggestion that mindfulness (i.e., focused attention) training may reduce observed over-selectivity in an older population. To this end, participants completed an induction procedure (either focused or unfocused attention) adapted from that of Arch and Craske (2006), prior to a discrimination-learning task (based on McHugh & Reed, 2007), which is known to elicit over-selectivity in an older population. It was predicted that the focused attention (mindfulness) group would display lower levels of over-selectivity relative to the unfocused attention control group. This would be manifested in a greater ability of both cues to control behavior; in particular, participants undergoing the focused attention intervention will show greater levels of stimulus control for the less selected stimulus than the control group.

1. Method

1.1. Participants

Twenty-four old people (12 males and 12 females, aged between 71 and 90 years of age (mean 78.58) participated. All participants were native English speakers, and were naïve to the experimental procedure. The participants were recruited through advertising at retirement communities, University of the Third Age, and Probus.

The participants were required to meet several criteria for inclusion: they were required to be aged 70 or over, have a memory recall not below average for the age group, and have passed a dementia-screening test. In order to provide as much data on the sample as possible (to allow generalization to other populations) a range of psychometric assessments was conducted prior to the study, the results of which are displayed in Table 1.

It can be seen from Table 1 that, while there are some minor differences in the means across the two groups on these measures, these were not substantial. In fact, independent samples *t*-tests revealed no significant differences for any measure.

1.2. Design

Participants were randomly assigned to one of two intervention groups: a focused attention task group (mean age = 78.00, range 71–90 years of age) and an unfocused attention task group (mean age = 79.17, range 73–85 years of age).

The study employed a 2 (intervention: focused or unfocused attention task) × 2 (stimulus type: most and least chosen) mixed factorial design with the repeated measures factor on the latter variable.