

The development of 'Balance Retraining':
An online intervention for dizziness in adults aged 50 and over

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Abstract

Purpose: This article outlines the rationale and development process for an online intervention based on Vestibular Rehabilitation Therapy (VRT). The intervention aims to assist adults aged 50 and above to self-manage and reduce dizziness symptoms. **Methods:** The intervention was developed according to the Person-Based Approach to digital intervention design focused on accommodating perspectives of target-users. A prototype version of the intervention was provided to 18 adults aged 50 and above with dizziness. These adults were invited to use the intervention over a 6-week period and, during this time, took part in a think aloud session. This session sought to understand users' perceptions of how acceptable, engaging and easy to use they found the online intervention. **Results:** Users were extremely positive regarding how easy to navigate, visually appealing and informative they found the intervention. Think-aloud sessions provided valuable data for informing small amendments to further enhance acceptability of the intervention for target users. **Conclusions:** Informed by this development-phase data, a finalised version of the intervention is now being investigated in a primary-care based Randomised Controlled Trial. Results should provide an understanding of whether VRT can be effectively, and cost-effectively, delivered via an online intervention to adults aged 50 and over.

The development of 'Balance Retraining': An online intervention for dizziness in adults aged 50 and over

Dizziness is very common amongst community-dwelling older adults (Lee & Elder, 2013) with around a third experiencing dizziness symptoms (Colledge, Wilson, MacIntyre, & MacLennan, 1994; Gassmann & Rupprecht, 2009). Dizziness is associated with falls, anxiety, depression and loss of independence (Friedman, Munoz, West, Rubin, & Fried, 2002; Yardley, 2000). A common cause of dizziness reported in primary care is peripheral vestibular disorder (Bird, Beynon, Prevost, & Baguley, 1998; Hanley, 2002) and guidelines suggest that for these patients Vestibular Rehabilitation Therapy (VRT) is the treatment of choice (Wrisley & Pavlou, 2005).

VRT is a multifaceted approach to treating vestibular-related dizziness. One key component is a series of graduated exercises that patients are encouraged to conduct twice daily for up to 12 weeks. The exercises involve simple head, neck and eye movements. Through frequent repetition and the associated stimulation of the vestibular system, VRT promotes neurological adaptation to the altered signals provided by the dysfunctional labyrinth (Brandt, 2000; Cohen, 2006). The exercises also aim to help patients overcome fear and avoidance of dizziness-inducing movements (Beidel & Horak, 2001).

Trials of health care professional (HCP)-supported VRT (Yardley, Beech, Zander, Evans, & Weinman, 1998; Yardley, Donovan-Hall, et al., 2004) and self-managed VRT via guidance booklets (Yardley et al., 2012; Yardley & Kirby, 2006) have both demonstrated that VRT is safe and effective in reducing self-reported dizziness. Despite this, VRT is still not widely accessible within the UK (Yardley et al., 2012) and so there is a real need to address this. A previous study across four health authorities in England and Wales noted that only 13% of patients reporting dizziness in primary care were referred to a specialist clinic (Jayarajan & Rajenderkumar, 2003).

An internet delivered intervention may provide a promising means of increasing accessibility and availability of VRT. Internet interventions are rapidly becoming a viable alternative to paper-

based self-management materials (Andersson, 2014) and can feature elements that would not be feasible in paper-based strategies. For example, they can provide user-tailored progress-relevant feedback and can feature audio-visual content (Griffiths, Lindenmeyer, Powell, Lowe, & Thorogood, 2006).

Older adults' use of the internet for health information is increasing rapidly. Between 2006 and 2010, the largest growth in internet access was amongst people aged 65 and over (Office for National Statistics, 2010). In 2010, 72% of adults aged 55-64 and 32% of those aged 65 and over had used the internet within the last three months. 59% of those aged 65 and over had used the internet almost every day (Office for National Statistics, 2010). As such, an online intervention for dizziness is likely to be accessible to a substantial proportion of adults aged 50 and over, and that accessibility amongst this group is only likely to increase over time.

Aims

Our primary aim was to design and build an internet-based intervention for adults aged 50 and over, to support their self-management of dizziness. The intervention was based on VRT and provided psychological strategies to manage symptoms, including relaxation and controlled breathing. A secondary aim was to understand features and elements of an online intervention that are most pleasing and accessible to this age-group.

Development of the intervention

A 'person-based' approach to online intervention development was taken. This approach focuses on accommodating the perspectives of target-users to closely inform intervention content, structure and functionality (Yardley, Morrison, Bradbury & Muller, *in press*). We adapted content from the successfully trialled 'Balance Retraining' booklet (Yardley et al., 2012) for online presentation and drew on our understanding of participants from our previous self-managed VRT trials (Yardley et al., 2012; Yardley et al., 1998; Yardley, Donovan-Hall, et al., 2004; Yardley & Kirby,

2006). This gave rise to the following five guiding principles that sought to ensure that the intervention would be suited to older adults' views of VRT and to their wider psycho-social context.

Ensuring exercise safety

Given the established association between dizziness and falls, it was important to ensure that participants conducted their exercises in the safest possible environment. They were instructed from the outset (and reminded) that they should begin the exercises sitting down and should not progress until they no longer experienced dizziness at this exercise level. They were encouraged to conduct exercises near a sofa or bed in case they lost their balance.

Encouraging exercise adherence

VRT exercises are designed to induce dizziness in order to facilitate adaptation. This initial increase in symptoms can be a barrier to adherence. In attempt to address potential adherence problems, we explicitly stated that the exercises were likely to cause dizziness, and that this was a sign they were being practiced at the right intensity. We offered reassurance and made suggestions regarding how users might manage symptoms, such as initially reducing the speed or frequency with which they conduct the exercises.

The intervention provided tailored feedback on participants' exercise progress. On a weekly basis, users practiced each exercise and then recorded their subsequent level of dizziness (on a four point scale ranging from 'none at all' to 'extremely dizzy') and the level at which they conducted the exercise (sitting, standing or walking). If, for example, an individual practiced the 'shake' exercise sitting down and recorded that they experienced no dizziness afterwards, they would be advised to try the exercise standing up for the following week to gradually increase the difficulty of this exercise.

Additionally, we tried to ensure that users perceived the exercises as personally achievable. Self-efficacy theory postulates that perceived similarity to a behavioural model can increase the personal relevance of vicariously derived information and, as such, can enhance the effectiveness of

symbolic modelling (Bandura, 1977). To facilitate this effect, we tailored the demonstration videos to users' age, by using models who were over 50, and gender, so that female users saw a woman demonstrating the exercises and male users saw a man. In hindsight, however, we recognise that the gender tailoring could potentially be considered heteronormative.

Avoiding exacerbation of symptoms

A commonly reported trigger of dizziness symptoms was looking at a computer screen for long periods. As such, we ensured that sessions could generally be completed within 15 minutes. We kept pages that would require vertical scrolling to a minimum as this movement has also been reported as potentially problematic.

Meeting visual requirements of users

As the likelihood of visual problems is higher in an older adult population, we implemented techniques to ensure that pages were visually clear and accessible. The minimum font size used was 14 and large blocks of text were avoided; key words and phrases were highlighted in bold. We also ensured that text and background colours contrasted sufficiently. The inclusion of demonstration videos meant that there was also an audio option for exercise instructions.

Allowing for limited online experience

We ensured that the user interface was simple to allow for those who only had limited experience of internet use. This included ensuring that login procedures required as little input as possible and that navigation methods between pages were simple, clear and consistent. Wherever possible, we also gave options to print information documents.

Table 1 illustrates how these guiding principles informed the key features of the intervention.

(Insert Table 1 about here)

Qualitative testing of intervention

Methods

Having built this development version of 'Balance Retraining' using LifeGuide software (Hare et al., 2009), we recruited 18 adults aged 50 and over with dizziness symptoms to qualitatively pilot test the intervention. Participants were recruited by invitation via their GP, the Ménière's Society, or the University of Southampton's participant volunteer database. Over a six week period, they were interviewed at two week intervals about their experiences of using the intervention and were asked to complete one online session with a member of the research team whilst commenting on their immediate reactions to all elements of the intervention. This allowed the researcher to observe how the intervention was used and also obtained participants' views about how engaging, acceptable, and easy to use they found it. Full ethical approval from the University of Southampton (ERGO ref: 5494) and the NHS (REC Ref: 12/SC/0271) was obtained prior to recruitment. For data privacy and security, the LifeGuide server is hosted by the University of Southampton, and is behind the Electronics and Computer Science department's firewall. Users of the intervention also login via a secure connection (https).

Findings and Amendments

The interviews and think-aloud sessions were audio-recorded and transcribed verbatim. Thematic analysis was employed to identify patterns within the data (Braun & Clarke, 2006). Overall, the intervention was well received. Participants found it easy to navigate, visually appealing and informative without providing too much, or too complex, information. Preliminary analysis of usage data revealed that the mean duration of a given session was 18 minutes, indicating that our intention for sessions not to take substantially longer than 15 minutes was successful.

Participants' comments and questions about the walking-level exercises made it clear that there was some uncertainty about exactly how to do the exercise. The wording of these instructions

was changed to clarify this. A number of minor amendments were also made to the visual appearance of pages: for example, sections of text were enlarged to make them clearer and bold outlines were added to text-entry boxes as users found these hard to discern from the white background.

Next steps: Randomised Controlled Trial (RCT)

A primary-care based RCT (Geraghty et al., 2014) is now underway to determine the effectiveness of 'Balance Retraining'. A total of 296 participants from GP practices across Southern England have registered, consented and completed baseline questionnaires via the online intervention. They were randomised to either a treatment arm (immediate access to Balance Retraining + usual care) or the usual care arm. In the usual care arm participants access care from their GP for their dizziness symptoms as normal and are provided with access to Balance Retraining at the end of the six-month study period. Usual care from GPs typically consists of reassurance and medications for symptomatic relief (Brandt, 2000; Hanley, 2002).

Participants are contacted at three and six months post-registration to complete follow-up measures. The primary outcome is self-reported dizziness symptoms measured by the Vertigo Symptom Scale Short Form (VSS-SF; Yardley, Jahanshahi, & Hallam, 2004; Yardley, Masson, Verschuur, Haacke, & Luxon, 1992). For full details of all measures see Geraghty et al. (2014). Data will be collected via a GP notes review for cost-effectiveness analysis.

Conclusions

Our findings from the qualitative piloting of 'Balance Retraining' indicate that it was experienced as engaging, visually-appealing and accessible amongst a sample of target-users. A primary-care based RCT will determine whether VRT can be effectively, and cost-effectively, delivered via this online intervention to adults aged 50 and over.

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Table 1. Guiding principles and key features of the Balance Retraining intervention

Guiding Principle	Key Features addressing this
Ensuring exercise safety	<ul style="list-style-type: none"> • Safety advice and reminders to exercise at the appropriate level. • Tailored feedback and exercise instructions: on a weekly basis users record their scores on a 'Timed Exercise Scoring Test' which is used to determine the advice given regarding how to conduct exercises for the following week.
Encouraging exercise adherence	<ul style="list-style-type: none"> • Tailored feedback and exercise instructions. • Reassurance: making explicit the possibility that exercises will induce symptoms but offering information about how to manage this. • Gender-tailored exercise demonstration videos: audio-visual explanation of how to conduct exercises.
Avoiding exacerbation of symptoms	<ul style="list-style-type: none"> • Short, weekly accessible sessions: information periodically provided in manageable amounts with the facility to revisit this. • Single screen pages: no vertical scrolling required to view page content.
Meeting visual requirements of users	<ul style="list-style-type: none"> • Minimum font size 14. • Bullet point or short-sentence information presentation. • Key words/ phrases highlighted in bold.
Allowing for limited online experience	<ul style="list-style-type: none"> • Simple and consistent login and navigation procedures. • Printing options: facility to allow printing of key instruction documents for 'offline' reference.