A framework for the assessment of community exercise programmes: a tool to assist in modifying programmes to help reduce falls risk factors

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Abstract

Background: falls in older adults is a significant global public health challenge. Exercise interventions which incorporate the physiological components of balance and strength can reduce falls risk. However, the optimum qualities, such as type, duration and frequency of engagement in these exercise programmes, are yet to be established.

Objective: the overall research project aimed to develop and test a tool for the assessment of physiological criteria in community exercise programmes and to determine which community exercise programmes may be modified to help reduce falls risk factors. This initial phase of the research and the aim of this paper are to describe the development of the Community Exercise Program Assessment Matrix (the Matrix).

Methods: a review of the falls literature identified an existing classification system, which guided the development of the Matrix. An expert panel assisted in reviewing, testing and ongoing refinement of the Matrix.

Results: the Matrix contains a range of physiological and cognitive components as well as other items which capture non-physiological components. After testing some modifications were made to the Matrix to aid usage.

Conclusion: this paper has outlined the development of the Matrix, which is intended to be used for the recording of physiological components (related to falls prevention) of an exercise programme in terms of type, duration and frequency. The next step is to use the Matrix in conjunction with pre- and post-physiological testing of participants to assess a range of exercise programmes and changes in participant physiological functioning.

Keywords: evaluation, older adults, physiological components, prevention, physical activity, older people

Background

The prevalence and severity of falls in older adults represents a significant global public health challenge [1]. With the population ageing, fall-related injury has an impact on personal health and health services [2, 3].

Physical activity and exercise (containing components of strength, balance and flexibility) has been found to reduce individual’s intrinsic risk factors to falls [1, 4–11]. Physical activity refers to ‘unstructured activity incorporated in daily life’ and exercise refers to ‘structured, planned and repetitive activities’ [12]. When using these definitions, the term exercise is most appropriate when referring to community-based organised exercise programmes (referred to as programmes).

The programme ‘modified Tai Chi’ has been found to reduce fall risk factors [7, 13]; however, the type, duration and frequency for other programmes to reduce fall risk factors are unknown [7, 10, 13].
The sustainability of falls prevention efforts is a priority. Currently, reinvestments of time, effort and resources are required to develop, implement and evaluate the plethora of falls prevention interventions [2]. The development of a tool is needed to identify and evaluate existing programmes that may be modified to reduce falls risk factors. Using existing programmes should help reduce the costs of delivering fall prevention programmes, and engage the community in falls prevention [14].

The overall aim of the research project is to develop and test a tool for the assessment of physiological criteria in programmes (Community Exercise Program Assessment Matrix, referred to as the Matrix), and to determine which programmes may be modified to help reduce falls risk factors.

The initial phase of the research and the aims of this paper are to describe the development of the Matrix. The objectives are to as follows:

(1) describe the initial development;
(2) describe testing using line dancing videos.

**Methods**

**Participants**

An expert panel (n = 21) with expertise in falls prevention from exercise physiology, physiotherapy, occupational therapy, injury prevention, public health and health promotion were involved in the development and testing of the Matrix.

**Initial development: literature**

A review of the falls literature identified The Manual for Falls Prevention Classification System from the Prevention of Falls Network Europe project (ProFaNE) [15] which was used as the underlying guide to determine physiological components and subcomponents. The ProFaNE Taxonomy assists in classifying fall prevention interventions and in providing a guide so falls prevention research can be conducted and reported in a similar manner [15]. Definitions of components and subcomponents were included to ensure consistency of recording of physiological measures between observers. (Supplementary data are available in *Age and Ageing* online).

**Initial development: expert panel input**

A modified Delphi process, using the expert panel, was used to further guide the Matrix development process [16]. The expert panel added two components: ‘cognition’ (mental processes that occur while undertaking a programme) and ‘other’ (other components not captured elsewhere).

To capture the quantity of each physiological component in a programme, both descriptive words and percentage observed were included using a six-point scale.

General observations about the programme were included to allow other factors to be captured such as duration; adaptability (i.e. allows for progression depending on the person's ability); variability (i.e. the activity changes from week to week or component/subcomponents vary); class level (i.e. beginners, advanced); safety aspects (i.e. hydration, footwear); instructor expertise and facility infrastructure appropriateness.

**Testing of the matrix using line dancing videos**

The expert panel used the Matrix to rate six short-line-dancing videos which depicted a group performing structured dance routines and ran for a combined length of 13.5 min. Line dancing was selected to test the Matrix as research indicates choreographed movements (particularly those requiring balance) to music can be useful for reducing falls risks [17].

The expert panel provided written feedback and participated in a videoconference 4 weeks following testing of the Matrix to assist in further refinement (Figure 1).

The study was approved by the James Cook University Research Ethics Committee in September 2011 (approval number H4306). Written and verbal consent was obtained from the line dancing facilitator and individuals in the programme prior to obtaining video footage.

**Results**

**Testing of the matrix using line dancing videos**

Nine individuals from the expert panel tested the Matrix. There were some differences in the observations recorded in relation to percentage observed of the physiological components, programme adaptability, variance and class level. There was a 10-month gap between development and testing.

![Figure 1. The Matrix development flowchart.](image-url)
Feedback from the expert panel

Written feedback and a videoconference with the expert panel focused on the experiences with testing the Matrix. Discussion points included the layout, aim, instructions, usability and definitions. The video conference identified seven key areas for improvement which were used to refine the Matrix. First, the definitions and the Matrix should be able to be viewed at the same time.

Second, new users should undergo a short-training session in using the Matrix as familiarity with the physiological components/subcomponents is essential. One expert indicated: ‘I needed to read over [the definitions] a few times but in real life situations you need to know what to look for’.

Third, it should be explicit that the whole group should be observed, rather than individuals when assessing a programme as ‘some people work harder than others’.

![Community Exercise Program Assessment Matrix](image)

**Figure 2. The Matrix.**
Focusing on the whole group provides a better indication of the physiological components in the programme.

Fourth, the complexity of the programme needs to determine whether or not rating one session of a programme would generate accurate data. As one expert questioned ‘is this session similar to what usually occurs?’

Fifth, the six-point ‘% observed’ scale should be reduced to a four-point scale to increase consistency, reduce deliberation and increase user accuracy. As one expert said: ‘it was difficult to assess how often each component was observed without keeping a running tally’.

Sixth, the definition of balance should clearly indicate that it includes both dynamic and static balance as ‘most movements are dynamic – that is they are done whilst moving and not done whilst standing completely still’. Finally, heel and toe raises should be included in the balance section only (i.e. removed from gait) as they are captured elsewhere in the gait section, e.g. walking forwards (Figure 2).

Limitations

A limitation was using the expert panel to both develop and test the Matrix. The familiarity with the Matrix from the development stage could bias the testing stage. However, the 10-month gap between the Matrix development and testing should reduce any bias. This assumption was evident with the expert panel reporting they needed to re-familiarise themselves with the Matrix.

Using video footage was a limitation as this made it difficult to assess some of the general observations (e.g. programme adaptability, variance and class level). However, this method was used as it was not feasible, to have the expert panel view the programme in real time.

Discussion

This paper presents the initial development of a tool (Community Exercise Program Assessment Matrix) for the assessment of physiological components within an exercise programme. The Matrix developed allows for this assessment, however, future work is required to validate the Matrix on a range of programmes.

Recently, in Australia there have been major changes to the health promotion landscape [18, 19], with the removal of health promotion from health services. This highlights the need to find innovative, sustainable prevention solutions. The research team’s vision is to have a range of programmes being delivered by a variety of community and sporting groups that work towards reducing the risk of falls. We believe doing this would not only ensure a diversity of programmes but increase their sustainability. The Matrix is the first step in allowing this vision to be realised as it allows for the measurement of the physiological components of a programme.

While the research team believes that all relevant physiological components are contained in the Matrix, a challenge is how to accurately record the information through observation. Understanding the underlying physiological components of programmes is complex, particularly where there is a wide range of constantly changing activities being undertaken. The expert panel found it challenging to accurately record all elements in the line dancing videos; however, they acknowledge that with an increased use of the Matrix familiarity and accuracy in recording would follow.

A recommendation from the expert panel was a short on-line training session to enable familiarisation with the physiological components, which are then reinforced with the definitions. The Matrix was designed so it could be used by anyone with minimal training without the need for special manuals or qualifications. Development of a short training video and further testing such as pre- and post-physiological testing of participants is required.

Conclusion

The Matrix is the first step in developing a sustainable model for delivery of community exercise interventions that reduce fall risk factors for older people. This paper has outlined the initial development of the Matrix, which can be used to record the physiological components of an exercise programme.

Key points

• Risk of falls can be reduced by undertaking exercise containing components of strength balance and flexibility.
• A framework (the Matrix) has been developed to identify physiological criteria within an exercise programme.
• Further testing of the Matrix is required to ensure it identifies modifiable exercise programmes to reduce risk of falls.

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**Conflicts of interest**

None declared.

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**Supplementary data**

Supplementary data mentioned in the text is available to subscribers in *Age and Ageing* online.

**References**


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