TITLE

Single-Subject Design: Experimental Designs for Research and for Clinical Practice.

AUTHORS

Stefania Costi

Physical Medicine and Rehabilitation Unit - Arcispedale Santa Maria Nuova-IRCCS, Viale Risorgimento 80, 42123, Reggio Emilia, Italy.

Department of Surgery, Medicine, Dentistry and Morphological Sciences, University of Modena and Reggio Emilia, Via del Pozzo 71, 41124, Modena, Italy.

Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics and Maternal Child Health, University of Genoa, L.go P. Daneo n°3, 16132, Genoa, Italy.

Davide Corbetta

Department of Rehabilitation and Functional Recovery, San Raffaele Scientific Institute, Via Olgettina 60, 20132 Milan, Italy.

Physiotherapy Degree Course, Vita-Salute San Raffaele University, Via Olgettina 58, 20132 Milan, Italy.

Corresponding Author:

Davide Corbetta,

Department of Rehabilitation and Functional Recovery, San Raffaele Scientific Institute, Via Olgettina 60, 20132 Milan, Italy.

Physiotherapy Degree Course, Vita-Salute San Raffaele University, Via Olgettina 58, 20132 Milan, Italy.

email: corbetta.davide@hsr.it

phone: +39 0226434685

ABSTRACT

Background: The individual variability among people presenting motor impairments often leads to the difficulty to obtain an adequate sample size in the conduction of trials in physiotherapy. Furthermore, in clinical practice, it is often difficult to recognize the relationship between the administration of a treatment and its expected results. Psychological and educational sciences often use single-subject design (SSD) studies to explore behaviours under experimental conditions. This study design allows to test the relationship between an independent variable, the treatment, and a dependent variable, the main outcome of interest. The purpose of this work is to present researchers and clinicians the methodology of the SSD studies and their application in physiotherapy both in research context and everyday practice.

Results: In SSD studies, repeated measurements of the outcome of interest occur across time starting from a condition without treatment, the so called “A-phase”, and continuing during the administration of the treatment, the so called “B-phase”. A-phase measurements serve as a standard of performance that can be compared to B-phase measurements in terms of change in the mean level, change in trend or change in variability of measure, depending on the nature of the assessed outcome. Different types of SSD studies exist, those alternating introduction and removal of the treatment called “treatment removal”, following the AB, ABA or ABAB schemes, those with the introduction of one or more alternative treatments, named C, D and so on, called “alternating treatments”, following the ABACAD scheme, those with a progression of different treatments according to achieved levels of the outcome of interest called “changing criterion”, following the ABCD scheme, and those where more subjects follow the scheme of alternating phases starting at different time points, called “multiple baseline”.

Conclusions: SSD studies offer an option for the identification of an individual response to a specific intervention when traditional between-group designs would not be appropriate both in clinical and research contexts. SSD studies result in acceptable internal validity but in very low external validity.

KEY WORDS

Research Design - Rehabilitation - Translational Medical Research.