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1 **TITLE**

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

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## ABSTRACT

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

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

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

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**KEY WORDS**

55 Research Design - Rehabilitation - Translational Medical Research.