Single case designs in psychology practice

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Abstract

A brief overview highlighting key elements of single case design is presented. Four types of single case design are identified. Central elements and the value of the use of single case designs are underscored.

Introduction

A wide variety of valid, useful designs exist for the measurement of a single case. These designs are either classified as qualitative or quasi experimental designs as they do not contain the provisions of random, representative samples or randomization to treatment/intervention. This classification convention also occurs because traditional statistical analyses based classical theorems are not used. Regardless of these circumstances, the single case designs provide the practitioner and field researcher with a powerful means of *behavioral measurement*.[1-3]

This paper will present elements in an overview of commonly used single case designs: Baseline-Treatment-Return to Baseline (ABA or OXO); Baseline-Treatment (A-B or OX); Baseline-Treatment-Intensified Treatment (AB_1B_2 or changing criterion); time series ($O_1O_2O_3O_4$ X $O_5O_6O_7O_8$).[4] Each of these commonly used designs highlights some of the central features of single case design such as *ease of use, immediate feedback to client, natural use in clinic or field setting.* Perhaps the strongest value of the single case approaches are their inherent ability to *comfort and address threats to internal validity and confounds*.[5] The history a participant brings to the study along with the changes as a function of being in the single case study are welcomed reactions (*i.e.*, confounds to other types of studies). Further, the *enhanced sensitivity* of being in a study, recording behavior with an instrument in some settings, sets the participants' behaviors to question. By contrast, in a single case study, these behaviors are implicitly manufactured with the design selection.

Discussion

With focus currently on evidenced-based practice/medicine in health care, more exacting measurements of treatment are needed.[6] The purposeful, visible emphasis on *process and outcome date provides the participant/client with an ongoing view of the validity of the intervention approach.* The evidence-based practice movement can be addressed easily with the low cost (*i.e.*, low expense and time expenditure).

The Scientist Practitioner Model guides clinicians to *use data collected in laboratory* to *guide decisions of treatment implementation*. In turn, treatment implementation, according to the *Scientist Practitioner Model*,[7] influences the direction of research. Research evidence of treatment effectiveness is valued. In single case designs, the *systematic monitoring* and evaluation positions the participant/client to adopt a problem-solving experiment, conjointly with the practitioner/field researcher on herself/himself. In so doing, the *findings are immediate* and *directly applicable to their situation.*[1,4] In some cases, these approaches promote the *generation of alternative interpretations of collected data* and quite possibly, causal explanations of behaviors. The clinical practices of establishing support, setting up a conceptual/ethical concept of clients' situation, identification of areas of change/strength/weakness, selection and implementation of treatment, evaluation of change/plan for relapse and follow-up are conducted within the simple case design context.[2,5,6] All single case designs involve training the participant/client in observation practices. This *training* of the individual to understand what behavior to record, how to record the behavior and when to record the behavior is central to single case design. It is common for the practitioner/field researcher to work with the participant/client in their selection of a behavior to change and thereby, *record*.[1,4] This becomes important as this descriptive data will ultimately become the pivotal source of information about the *functional relationship* between the target behavior for change and those behaviors that precede and follow (*i.e.,* antecedent consequences) as they are typically interdependent. In fact, this circumstance is what is termed the functional assessment. Some representative target behaviors often used in an ABA single case design are: nutrition; hydration – amount of water; weight gain or loss; medication compliance; adherence to treatment; smoking cessation; substance use cessation. Client's values are incorporated in the choice of targets and goal setting procedures. The *baseline measurement* is followed by the implementation of a change in a target behavior such as the examples listed above. After the implementation period, the participant/client returns to an *adlib* or no intervention schedule. The ABA design, like other single case designs, allows the *client values to be incorporated* into the choice of targets and *goal setting procedures*.[4,5] In the AB design, the intervention is followed by a baseline period. The disadvantage to this approach of no comparison is offset by the ease of use, *immediate implementation in clinical practice*, and *value of reactivity to measurement to the participant/client* (*i.e.*, their heightened awareness of their behavior as reflected in the measurement).[1,6]

The clinician in practice is apt to select the AB_1B_2, changing criterion design. The single case approach *provides a means of measuring the increased amount of an intervention*. For example, in Kazdin,[2] increased expected levels of quiz performance are used across math objectives 1, 2, 3 and 4 as measured during daily school sessions.[3,5]

The purpose of a time series design is the periodic measurement of a participant/client. The design is represented as:

$$O_1\ O_2\ O_3\ O_4\ X\ O_5\ O_6\ O_7\ O_8$$

where X represents the exposure of a participant/client to an experimental intervention. The O refers to a process of measurement in a *temporal order*.[4,6] An example of the design's use is in the area of sleep medicine where a daily sleep log measures minutes of sleep and minutes in bed rendering a sleep efficiency ratio that is examined each day. The intervention is often the implementation of a stimulus control procedure to reduce wake time after sleep onset and a designated sleep schedule of no napping and a regular wake-up time.

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Conclusions

We find that single case designs are powerful measurement tools of behavior. The challenges and need for quantification that occurs in field settings can be uniquely and precisely addressed with single case designs.

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