



In.tra project. Data analysis methods

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Abstract: Given the nature of the data provided by the trials, specific types of data analysis were adopted and aimed at better identifying the causal factors of the changes obtained in the performance of therapeutic activities. The specific activities developed along the following lines: a) general evaluation of the data and their nature; evaluation of the most appropriate strategies; quantitative evaluation of the initial, intermediate and final phase of the project; statistical analysis of data in parametric mode; quantitative analysis of transcripts relating to psychological evaluation and psychotherapy courses.

Introduction

The objective of the data analysis is to provide confirmatory quantitative support to the observations that clinicians make and record during the course of therapy. A useful practice is to agree between clinicians and methodologists the methods of observation, operationalization, recording and verification of what has been observed and transcribed. These constitute the fundamental architecture to be given to the data analysis process.

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The 4 steps can be represented as follows:

1. Observation

In the observation it must be taken into account that we may be present in different contexts. Behavioral observation, in which we code what we can see with the basic tools. Psychometric assessment, in which we use more complex tools, such as tests, question you, structured interviews. Psychophysiological evaluation, in which with adequate instrumentation we are able to “read” aspects that otherwise we could not register, such as the activities of the autonomic nervous system.

2. Operationalization

The process that allows the transformation of an observed component into a measurable, quantifiable variable.

3. Recording

It consists of the phases of identifying the nature of the data collected and the implementation of information structures suitable for their storage.

4. Check

Necessary for the identification of data not foreseen in the ranges associated with the variables identified in the operationalization phase.

Naturally, all this must be constantly shared between clinical operators and methodologists, so as to be able to guarantee the fundamental path for a correct general interpretation that starts from the qualitative, passes through the quantitative (tests, questionnaires, statistical analysis), back to a quantitative evaluation, this time enriched by the observations “certified” by statistics.

Phases of data analysis

General evaluation of the data and their nature

Therapeutic processes have provided information that is complementary, but different in their nature. Behavioral observations, on the characteristics of communication and reporting of experiences, quantitative results of the psychometric tests used, quantitative transformations on the reports of the patients transcribed by the psychotherapists were recorded.

Evaluation of the most appropriate strategies

The general model therefore considered consolidated tools for the scoring of psychometric tests tools for quantitative transformations of patients’ reports and narratives, coding actions of the observations carried out allowing to arrive at a “robust” qualitative vision, enriched by these two points of view, methodologically integrated. The clinical aspects observed and considered were in fact intercepted by appropriate operationalizations carried out by the components of the psychometric tests put in place. The integration of various information and the relative redundancy of some of them made it possible to validate the consistency and reliability of the observations and recordings made. This integrated observation methodology is validated by numerous studies on the quantification of



behavioral data, allowing the elimination of errors due to the underestimation of false positives and negatives, typical errors that occur in “one-way” evaluations used in the encoding of information on clinical processes. In the processes of verifying therapeutic actions this constitutes an “antidote” to incorrect operationalizations.

Quantitative evaluation of the initial, intermediate and final phase of the project

The collected data were stored in Excel sheets, appropriately coding the information; suitable models have been created for the various statistical analyzes envisaged. A temporal division was made, relative to the initial phase (t0), consisting of the parameters of the patients before the therapeutic process, to an intermediate phase (t1) and to the time relative to the conclusion of the therapeutic process (t2). For each of these phases, when they exist, specific areas have been implemented for recording and subsequent statistical analysis.

The information structures used were designed for immediate use of statistical analysis software (SPSS © and STATISTICA ©).

Statistical analysis of data in parametric mode

Appropriate coding was carried out both of the parameters making up the body of the tests used, and of the time phases of observation. Sometimes the difference between the beginning and the end of therapy was measured, sometimes a reference point was added, consisting of the medium-term measurement (t1).

Given the nature of the data, and the number of measurements, it was decided to use the following analysis processes:

- a) for the psychometric assessments relating to relational aspects and the interception of possible psychopathological aspects, the student's t test was used when evaluations on two points in time (beginning-end of therapy) were available;
- b) ANOVA analysis of variance for three distinct times (beginning t0, medium term t1, end of therapy t2).

For both, a process of verification of the significance of the differences in the three phases was set up and activated, both from a qualitative and a quantitative point of view.

Quantitative analysis of transcripts relating to psychological assessment and psychotherapy actions

As regards the evaluation of the narratives, computational procedures have been put in place for the identification of the most frequent words, and relative measurements, through the use of software (WordCloud) for the generation of statistics and graphic representations of the content of the narratives and of the observations generated in the various phases of the therapeutic process.

The methodology adopted was that, now shared by the scientific community, which allows the extraction of relevant information from the analysis of the transcripts of clinical reports, of the patients' narratives of their comments and observations. Once the texts were collected, they were divided by category and period, allowing a precise analysis of the components used.

Through specific software, the text is processed and the frequencies of the words used are extracted. Subsequently, we proceed to the evaluation of significant words that can convey the experience of the patients, in the observation periods considered.



Overview

In general, the numerous measurements carried out made it possible to apply consistent and appropriate statistical evaluations, despite the relatively low number of cases analyzed.

An effect of the practices adopted can be clearly seen, which can be read through results that are very close to full statistical significance in many cases and that in some cases reach the high significance of the differences between the averages of the parameters used.

Considering both the strictly psychometric evaluations and those deriving from the quantification of the narratives coming from the sessions carried out, a marked improvement in the conditions of the patients is noted. The general trend is positive, with highly significant improvement events, and others in the process of reaching significance, with values very close to the cut-off of $p = 0.05$.

The articulation of the psychometric tools adopted, therefore, and their integration both in the theoretical model and in the quantitative evidences allow to highlight the general positive aspects of the therapeutic actions implemented.



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