

Methodological rigour in the study of addictions

Rigor metodológico en el estudio de las adicciones

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The methodological advances of recent years in the study of addictive behaviour have been astounding. A whole set of methods and techniques have been developed which would have been unimaginable a few decades ago and which allow a better understanding of the phenomena we study in our field, in turn leading to the development of new forms of evaluation, diagnosis and intervention. Latent class models, network analysis, or multilevel models are just a few examples. In addition, the growing specialisation of some related areas such as neuroscience or behavioural genetics (Costas, 2015), means that sophisticated methodological advances are incorporated which are very often difficult to understand by non-specialists in the field. Nevertheless, despite these advances, researchers should not lose sight of the three key aspects of the methodological approach to any research: design, measurement of variables and analysis of data. Progress has been made in each of these central aspects. We on the editorial committee of *Adicciones* wish to emphasise the need to take these three parameters into account to serve as a guide for updating the methodological review criteria of the papers sent in to the journal, leading to an improvement in the scientific quality of the research published. This process of methodological updating and standardization to which *Adicciones* is committed is similar to that already carried out by other scientific journals (Ato, López & Benavente, 2013). The technical requirements to be met by all research are already well documented in

the specialised literature (Abad, Olea, Ponsoda & García, 2011; Ato & Vallejo-Seco, 2015; Muñiz, 2000; Ruiz-Ruano & Puga, 2017; Wells & Faulkner-Bond, 2016). We will limit ourselves here to highlighting those issues that seem to us most relevant.

The first step of the research process from a methodological point of view is the design, that is, the strategy we propose to follow in order to test our objectives and hypotheses. Crucial aspects covered by the research design include the selection and allocation of participants and the control of extraneous and confounding variables. A design should basically consider two types of validity: internal and external. These will determine the quality of the study. While internal validity refers to the degree to which the design guarantees the attribution of causality by controlling the influence of possible extraneous variables, external validity has to do with the degree to which the results can be generalised to other participants, contexts and/or times. A detailed description of the participants (number, age, gender, nationality, origin, diagnosis, etc.), of the type of sampling performed, the possible experimental conditions, the context and circumstances in which the study is performed, and the procedures used to control the extraneous variables is therefore an essential requirement in any research. All this needs to be clearly reflected so that readers and other researchers have the necessary information to assess the relevance of the study.

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The second pillar is the process of measuring the variables, involving their identification and definition as well as measurement. It is necessary to select the variable of interest, to provide it with an operative definition and to assign numbers to its attributes according to certain rules. The scale of measurement used, which, according to Stevens' classical approach, may be nominal, ordinal, interval or ratio must be explicitly stated. The issue is not a trivial one, as this in turn bears a direct relationship to the statistical analysis procedures to be performed subsequently. Measuring also requires the use of an instrument to collect data, samples of behaviour. It should not be forgotten that in the study of addictive behaviour we frequently work with latent variables or constructs, leading to an unobservable variable being postulated from a set of indicators. In almost all measurement contexts, the scores contain a certain degree of error. The size of such measurement error must be clearly stated when drafting all scientific papers. To put it bluntly, if the measurement process is flawed, both the inferences drawn and the decisions made on the basis of the data obtained could be incorrect and groundless.

As for the measuring instruments, detailed information on the metric quality of the instruments, and especially on the reliability of the scores, as well as evidence of validity, must be provided. Reliability refers to the accuracy of the scores, that is, to the quality of the data, while validity involves the quality of the inferences (Prieto & Delgado, 2010). A test itself is not reliable; what is reliable are its scores. A test is not valid; what is valid are the inferences made on the basis of its scores. Note that what may be valid for a given group of people or population may not be valid for another, and what may be valid in one assessment context need not be so in a different context. The new classification proposed by the *Standards for educational and psychological testing* (American Educational Research Association, American Psychological Association & National Council on Measurement in Education, 2014) refers to five types of validity evidence, namely test content, response processes, the internal structure of the test, relations with other variables and the consequences arising from the use for which they are proposed. According to this conceptualization of validity, terms such as construct validity begin to fall into disuse, and it is becoming preferable, for example, to speak of evidence of internal structure instead of factorial validity. For more detailed information the reader may consult previous studies (Sireci & Padilla, 2014; Leong, Bartram, Cheung, Geisinger & Iliescu, 2016).

When a measuring instrument is newly created, it is necessary to justify the need for its development and to provide detailed information about the construction and validation process (Lane, Raymond & Haladyna, 2016; Muñiz & Fonseca-Pedrero, 2017). When the instrument is adapted to Spanish, standards for the translation and adaptation of tests from

one culture to another must be followed (Muñiz, Elosua, & Hambleton, 2013). If it is not a new construction or an adaptation, the researcher must select those measuring instruments that have been duly validated and for which information on their psychometric properties in the population under study is available (Zumbo, 2007). Similarly, measuring instruments should be used appropriately, and impartiality should be ensured throughout the measurement and evaluation process, for example by analyzing the measurement invariance or the differential item functioning (e.g., Mezquita, Stewart, Kuntsche & Grant, 2016). In order to analyze measurement tool quality, a model for test evaluation has been developed (Hernández, Ponsoda, Muñiz, Prieto, & Elosua, 2016) which in essence allows us to separate the wheat from the chaff. A rigorous assessment with a suitable measurement tool is a key requirement for accurate diagnoses from which effective interventions based on empirical evidence can be derived (Muñiz & Fonseca-Pedrero, 2017).

The third methodological pillar is data analysis. Here we have to use the most appropriate statistical procedures based on both the objectives and hypotheses postulated initially and the nature of the data. This is not a simple task. Assuming that the statistical analyses applied are appropriate, it is necessary to report on the statistical instrument used, the level of significance, the degrees of freedom, the confidence intervals and, of course, the effect size. Articles subject to *Adicciones* should incorporate information about the magnitude of effect, i.e. the practical significance of the results, and go beyond the mere statistical significance, or *p*-value. All this will have a bearing on the validity of the statistical conclusions. Likewise, if the statistical technique used is novel or difficult to understand due to its complexity or for any other reason, information that allows it to be fully understood by non-specialists in the subject has to be provided. Data analysis is an essential aspect of scientific advancement because sooner or later anyone wishing to investigate the empirical study of a variable has to resort to the statistical analysis of the data.

In sum, this editorial emphasises the need to incorporate quality standards of scientific research, in this case, of a methodological nature, in the manuscripts submitted to the journal *Adicciones*. We call for a statistical re-education as well as the use of checklists and guidelines that allow the methodological quality of the scientific studies to be assessed. Students and professionals should be trained continuously in the different methodological changes and innovations, particularly considering the increase in levels of specialisation of professionals and the rapid assimilation of statistical advances. We must never lose sight of the fact that proper application of research design, measurement procedures and statistical analysis influences the accumulation of scientific knowledge and has an impact, whether we like it or not, on our professional work and, therefore, on people.

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References

- Abad, F. J., Olea, J., Ponsoda, V. & García, C. (2011). *Medición en ciencias sociales y de la salud*. Madrid: Síntesis.
- American Educational Research Association, American Psychological Association & National Council on Measurement in Education. (2014). *Standards for Educational and Psychological Testing*. Washington, DC: Author.
- Ato, M., López, J. J. & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología*, 29, 1038–1059.
- Ato, M. & Vallejo-Seco, G. (2015). *Diseños de investigación en psicología*. Madrid: Pirámide.
- Costas, J. (2015). Un abordaje genómico del alcoholismo. *Adicciones*, 27, 87–89. doi:10.20882/adicciones.693.
- Hernández, A., Ponsoda, V., Muñiz, J., Prieto, G. & Elosua, P. (2016). Revisión del modelo para evaluar la calidad de los tests utilizados en España. *Papeles del Psicólogo*, 37, 161–168.
- Lane, S., Raymond, M. R., & Haladyna, T. M. (2016). *Handbook of test development (2nd edition)*. New York, NY: Routledge.
- Leong, F.T.L., Bartram, D., Cheung, F.M., Geisinger, K.F. y Iliescu, C. (Eds.) (2016). *The ITC International Handbook of Testing and Assessment*. New York: Oxford University Press.
- Mezquita, L., Stewart, S. H., Kuntsche, E. & Grant, V. V. (2016). Estudio transcultural del modelo de cinco factores de motivos de consumo de alcohol en universitarios Españoles y Canadienses. *Adicciones*, 28, 215–220. doi:10.20882/adicciones.822.
- Muñiz, J. (2000). *Teoría Clásica de los Tests*. Madrid: Pirámide.
- Muñiz, J. & Fonseca-Pedrero, E. (2017). *Construcción de instrumentos de medida en psicología (2ª edición)*. FOCAD. Madrid: Consejo General de Colegios Oficiales de Psicólogos.
- Muñiz, J., Elosua, P. & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: segunda edición. *Psicothema*, 25, 151–157.
- Prieto, G., & Delgado, A. R. (2010). Fiabilidad y validez. *Papeles del Psicólogo*, 31, 67–74.
- Ruiz-Ruano, A. M. & Puga, J. L. (2017). *Fundamentos de estadística*. Murcia: Iuris Universal.
- Sireci, S. & Padilla, J.-L. (2014). Validating assessments: Introduction to the Special Section. *Psicothema*, 26, 97–99. doi:10.7334/psicothema2013.24.
- Wells, C. S. & Faulkner-Bond, M. (2016). *Educational Measurement. From Foundations to Future*. New York, NY: The Guilford Press.
- Zumbo, B. D. (2007). Validity: Foundational issues and statistical methodology. En C. R. Rao & S. Sinharay (Eds.), *Handbook of statistics: Vol. 26. Psychometrics* (pp. 45–79). Amsterdam, Netherlands: Elsevier Science.