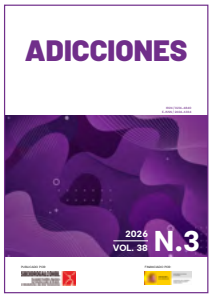
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EDITORIAL

Undermining cross-sectional studies undermines public health research

Desacreditar los estudios transversales debilita la investigación en salud pública

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A cross-sectional study is an observational study in which data are collected from a population at a single point in time, including people who may or may not be affected by the outcome or event of interest. Although data are collected only once, the variables may refer to past events, current circumstances, or future intentions. For example, in addiction research participants may report the age at which they started smoking, their current smoking status, their intention to smoke in the future, or retrospective information about parental smoking or alcohol consumption during childhood (Aonso-Diego et al., 2024). Data are typically collected using standardized questionnaires or surveys, although cross-sectional studies may also rely on secondary data sources, including electronic health records, administrative databases, disease registries, or other routinely collected datasets (Puspa Zuleika & Legiran, 2022). Despite their important role in identifying population-level problems and exploring associations between behavioural and health-related factors, which are particularly relevant in the field of addictions, cross-sectional studies are increasingly dismissed in epidemiological publishing, often due to concerns regarding their limited ability to establish causal relationships. This can be explained by the tendency of such critiques to conflate the inherent limitations of the design with shortcomings in its implementation, while ignoring that the scientific value of cross-sectional research depends primarily on the clarity of the research question and the rigor of its execution (Bono & McNamara, 2011; Dávila-Mendoza & López-Ortiz, 2025). Scientific publishing has become a central pillar of the modern academic system, engaging not only researchers and academic staff but

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Marina Bosque-Prous. Department of Psychobiology and Methodology in Health Sciences, Universitat Autònoma de Barcelona (UAB), Carrer de la Fortuna, Campus de la UAB, 08193 Bellaterra, Spain. Email: marina.bosque@uab.cat

also students and a broader audience beyond traditional academic circles. The steady rise in scientific publishing has led to a surge in submissions, causing journals to adopt either more restrictive editorial policies or, in some cases, more permissive approaches driven by economic incentives.

In this context, initial editorial decisions, particularly whether a manuscript is sent for peer review, have become critically important. One main reason for rejection at this early stage is the cross-sectional nature of the study (Bono & McNamara, 2011; Dávila-Mendoza & López-Ortiz, 2025). In fact, several journals have implemented explicit policies that exclude cross-sectional studies from consideration for publication. A study published in a medical journal reported that 98.7% of rejected manuscripts were observational reports, of which 138 (92.6%) were cross-sectional studies (Dávila-Mendoza & López-Ortiz, 2025). This tendency is also reflected in peer-review practices. For example, in a study examining the association between hospital tobacco control policies and smoking among healthcare workers across 60 hospitals and more than 10,000 participants, a reviewer acknowledged that "the large dataset is a key selling point," while simultaneously stating that "the cross-sectional nature of the study is a key limitation." In another case, a population-based study including over 8,000 adolescents, representing more than 65% of the adolescent population in each territory, was criticized as being "non-scientific" due to its cross-sectional design and the inclusion of multiple variables in the questionnaire, despite the analyses being guided by a clear conceptual framework. These examples reflect a deeply rooted epistemological hierarchy in the teaching of epidemiology and research methodology, where study designs are primarily assessed on the basis of their capacity for causal inference, control of the independent variable, and sample selection. Within this hierarchy, experimental designs are considered the highest, followed by longitudinal studies, with cross-sectional designs ranked lower (Bosque-Prous & Espelt, 2022; Portell & Vives, 2024).

Focusing exclusively on causal inference, that is, on the methods used to establish cause–effect relationships, can obscure the concept of causality itself, understood as how processes actually operate in the real world (Muntaner, 2013). Approaches that reduce causation to statistical associations risk overlooking key elements such as underlying mechanisms, system dynamics, context, and stability. As a result, findings may function as "black-box" relationships that identify casual-associations but offer limited explanatory power or guidance for effective interventions (Muntaner & Dunn, 2019). For example, the well-documented social gradient in health in longitudinal studies shows that relying only on statistical methods is not enough to fully understand why health inequalities occur. These patterns are shaped by broader social and structural factors that are not always captured by standard analytical approaches. In addition, one of the most widely used frameworks for assessing causality relies on comparing what happened with what would have happened under different circumstances. However, these alternative scenarios cannot be directly observed or empirically tested within a single study design. For this reason, and as discussed below, traditional approaches that prioritize certain methods for causal inference should not be considered the only, or the highest, standard for evaluating causal relationships (Muntaner & Dunn, 2019).

It is widely stated and commonly accepted that causal relationships cannot be inferred from cross-sectional studies, as they do not allow for the establishment of temporal order between variables, which is considered one of their main limitations. For this reason, most cross-sectional studies aim to describe individual or contextual health determinants and to evaluate associations between outcome (dependent) and exposure (independent) variables, rather than to establish causal relationships (Kesmodel, 2018; Puspa Zuleika & Legiran, 2022). However, this limitation should be interpreted with caution. In many cases, well-formulated research questions and appropriately designed measures can support a plausible temporal order, even within a cross-sectional design. For instance, analyses of age at first use of a substance in relation to subsequent dependence allow for a logical (and cautious) temporal interpretation. Similarly, it is conceptually well established that the link between parental educational level and children's dietary patterns or children's substance use has a temporal direction based on cross-sectional data. Therefore, it is not automatically true that longitudinal and experimental studies are inherently better suited for establishing causal relationships. Moreover, the external validity of experimental and longitudinal studies may be influenced by factors such as loss to follow-up, restrictive inclusion criteria, incomplete data, and non-representative samples (Szklo & Nieto, 2012). Finally, it should be noted that study designs considered to have greater capacity for causal inference are often defined, in part, by their ability to manipulate the independent variable, an option that is not available in observational studies (Deaton & Cartwright, 2018). However, this criterion should not be interpreted as an inherent indicator of higher methodological quality. In many cases, the inability to manipulate the independent variable reflects ethical or practical constraints rather than limitations of the study design itself. Moreover, experimental studies are frequently conducted under highly controlled conditions, which may limit the external validity of their findings in real-world settings. For these reasons, the core issue is not the study design itself but whether the chosen design is appropriate for the research question and carried out with methodological rigour.

Importantly, negative perceptions of cross-sectional research are often reinforced by the dissemination of

methodologically weak studies. This may be partly explained by the fact that the relative simplicity and lower cost of cross-sectional designs, while important strengths, can also represent potential weaknesses. If not carefully designed, this ease of implementation may lead to misuse and, ultimately, to the devaluation of the design. Common issues include analyses based on insufficient sample sizes, inadequate population coverage when representativeness is required, and limited statistical precision and power. More critically, a significant proportion of cross-sectional studies provide little additional knowledge by replicating well-established associations without addressing unresolved questions, improving measurement, expanding populations, or offering new conceptual insights. Such redundancy adds limited scientific value and may be misattributed to flaws in the design itself rather than to deficiencies in study justification, originality, or analytical strategy (Spector, 2019).

As with other study designs, though arguably with greater emphasis due to its frequently undervalued status, high-quality cross-sectional research requires not only robust, well-implemented sampling strategies and validated data collection methods aligned with the study objectives, but also their clear and thorough documentation, along with a well-articulated analytical framework, including causal diagrams (Shahar & Shahar, 2013). When these conditions are met, cross-sectional studies are highly valuable for describing the distribution of health-related phenomena, plausible causal and non-causal association, including potential confounders. In this sense, due to their simplicity and parsimony, and because they are easier to communicate to the public and monitor over time, they represent a fundamental tool for public health research, planning, and decision-making (Gibson, 2010). Dismissing cross-sectional studies also entails neglecting the assessment of the magnitude and distribution of health conditions and behaviours, particularly across axes of social inequality (Espelt et al., 2016; Muntaner, 2019). This, in turn, distances research from external validity and from a more comprehensive understanding of population health. Given that all study designs have inherent limitations, critical appraisal should focus on study design and implementation, rather than on design labels.

When appropriately designed and implemented, cross-sectional studies do not undermine the scientific method; rather, they strengthen its capacity to generate meaningful and policy-relevant evidence.

Conflict of interest

The authors declare no competing interests. Albert Espelt is an Editor of Adicciones. He was not involved in the editorial process or in the decision-making regarding the review and acceptance of this manuscript.

Artificial intelligence (AI)

We used an AI tool to assist with improving the English language and clarity of the manuscript. We carefully reviewed all AI-generated suggestions and incorporated changes where appropriate. We remain fully responsible for the final content of the manuscript.

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