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## EDITORIAL

## Turning the Spotlight on Experimental Design in Discrete Choice Experiments—A Focus on Pragmatic Approaches in Health

Stated preference techniques including the discrete choice experiment (DCE) provide a fundamental and increasingly popular method to evaluate the trade-offs people are willing to make between different characteristics of health and health care [1]. The development of discrete choice studies is an iterative process involving a number of dependent stages [2]. As a consequence, the implementation of these studies demands a range of diverse skills, spanning both qualitative and quantitative methodologies. Perhaps the most elusive of these skills for many researchers and practitioners has been experimental design, that is, “the process of generating specific combinations of attributes and levels that respondents evaluate in choice questions” [3].

The frequent application of fractional factorial designs in health (100% of DCE studies published in health between 2001 and 2008 used fractional factorial designs [1]) reinforces the integral role experimental design plays in every DCE study. The research frontier in experimental design, as with many other areas of choice modeling, is evolving quickly. The development of experimental design methods has taken place not only in health but also to a large extent in fields outside a health context. Consequently, researchers and practitioners using stated preference methods are challenged to keep abreast of rapidly changing goalposts and an ever-developing array of possible experimental design approaches.

This issue of *Value in Health* sees the publication of a much anticipated report from the ISPOR Conjoint Analysis Experimental Design Good Research Practices Task Force on Constructing Experimental Designs for Discrete-Choice Experiments [3]. As highlighted by the authors of the report [3], the “significant advances” in experimental design have been accompanied by “significant confusion” and inadequate reporting of experimental design in stated preference studies. While many studies undertake and report experimental design approaches appropriately, one recent review found that 37% of the DCE studies published in health between 2001 and 2008 did not provide sufficient detail to discern the source of an experimental design and 28% did not clearly report the method used to create choice sets [1]. There appears to be a clear need then for further guidance and understanding of what constitutes “best practice” for experimental design, and this seems to have been a motivator for the establishment of the Task Force and the subsequent report [3].

While the authors of the report perhaps wisely do not attempt to establish standards or recommendations for experimental design, they have engaged widely with the research and practitioner community who use stated preference methods. The result is a succinct summary covering a comprehensive range of design approaches with a practical focus, which aims to “assist researchers specifically in evaluating alternative approaches to

experimental design.” The guidance provided is specific to the traditional DCE stated preference format, which has been the most commonly used approach in health to date [4]; however, the authors highlight that much of the report is also relevant to some other stated preference formats.

After an introduction, the report summarizes the underlying theory and concepts of experimental design. Here, the authors focus strongly on the importance of identification, and the inextricable links and trade-offs between statistical and response efficiency. The need for flexibility in design approaches is at least as (or perhaps more) paramount in health as in other fields in which DCE studies are used. All design approaches can cater to the situation in which a basic generic choice with no constraints is all that is required. However, to provide a realistic and meaningful choice for respondents, it is sometimes necessary to consider a more complex design approach. Examples of cases in which this arises are detailed by the report and include when an opt-out or status quo alternative may be required, when attribute levels need to be specific to the alternative on offer, or when a particular combination of attribute levels may need to be avoided. The authors take a pragmatic approach throughout the report, identifying and discussing challenges to statistical and response efficiency that are often seen in health applications. In doing so, they achieve their aim to “provide a guide for choosing an approach that is appropriate for a particular study” (emphasis added).

The report also highlights the challenges arising from the relatively small sample sizes that are frequently used in health and health care [3]. Sampling frames particularly for studies involving patients or decision makers can often be limited [3,4], making large samples or sample extension beyond reach. Arguably, sample sizes are limited to a greater extent in health than in many of the other fields, in which preference populations may focus, for example, on the general public or transport users (e.g., [5,6])—a less constrained sampling frame. As highlighted by the report authors [3], in health perhaps more so than in many other fields, a consideration of design efficiency in addition to identification is particularly pertinent. Awareness of efficient design approaches has increased in recent years [1], emphasizing the need for a broader understanding of these design principles.

The authors go on to compare a range of different approaches to design, in terms of their accessibility to researchers, underlying assumptions, and flexibility to specific requirements such as the inclusion of interaction effects or design constraints [3]. This perhaps represents the most important contribution of the report, particularly for the more novice researcher using DCE methods. The array of design approaches now available and in particular the availability of design software supports the

development of more advanced, complex, and flexible designs than was previously possible, and puts these designs within the reach of researchers without substantial experimental design experience. In contrasting the comparative merits of these approaches, the authors support the researcher to choose an approach appropriate to both their study and their abilities.

The European Medicines Agency and, to a lesser extent, the Food and Drug Administration recently have advocated a more prominent role for patients' assessments of the risks and benefits of drug and device interventions in the regulatory process [7,8]. DCEs are an excellent vehicle for quantifying patient views, and the increasing number of DCE studies in health has been commensurate with the increased attention to patient preferences by regulatory bodies and others. However, the acceptance of DCEs within the regulatory process requires the consistent use of high-quality research methods. High quality does not necessarily mean "the most sophisticated" approach, and it certainly does not imply a single, one-size-fits-all approach. Rather, the production of high-quality research requires an appreciation and an understanding of the strengths and weaknesses of alternative approaches and the thoughtful application of an appropriate approach to a specific problem. As noted above, the authors have provided a framework that allows researchers to do exactly that.

Few would disagree that an understanding of experimental design is crucial for those using stated preference methods. So, as the saying goes, "garbage in, garbage out." Choice data elicited from a DCE study are only as good as the underlying experimental design. If the design is poor, so is the capacity to make inferences from the choice data. How timely then to have guidance produced in consultation with the community of researchers and practitioners using stated preference methods, which provides a summary and comparison of contemporary approaches to experimental design. The authors state, "We create designs that we know are not perfect, but these designs are good enough to identify the parameters of interest under particular simplifying assumptions" [3]. While "perfect" designs may be unachievable in many health DCE applications, this report takes researchers and practitioners a step closer to at least achieving the best design that is pragmatically feasible and reporting their approach with clarity and precision.

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