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Discrete choice experiments in health economics

Distinguishing between the method and its application

In their recent guest editorial in this journal Bryan and Dolan [1] (BD hereafter) offer a critique of the use of discrete choice experiments (DCEs) in health economics grouped under the following four categories: normative issues about how data from DCE studies might be used to inform policy, psychological issues concerning the meaningfulness of the data generated, technical issues relating to the data generation process, and issues relating to the generalisability of the data from such studies. Based on this critique they conclude that more caution and greater circumspection towards DCEs is appropriate.

BD suggest that their editorial offers an alternative view to the "rosy" one presented in health economics. It is important to note that not all work investigating DCEs in health economics has been as "rosy" as suggested by BD. For example, Viney et al. [2] provide a detailed critique of the application of DCEs in the health arena as well as suggesting a way forward. Similarly, Lancsar and Savage [3, 4] provide a critique of the manner in which welfare measures have been derived from choice experiments in health economics, and suggest that such measures should be calculated via the Hicksian compensating variation approach.

The call by BD for a more open debate on "the relative strengths and limitations of the DCE method, particularly when applied in health settings" is warranted. However, their editorial has only added to part of this debate in that it focuses on the application of choice experiments in the health sector but says little on the strengths and limitations of the DCE method in general. The criticism posed by BD does not challenge the theoretical/methodological basis of DCEs per se. Instead, it (rightly) challenges the manner in which many DCEs have been applied in health economics.

In the present contribution we comment on the four themes outlined in BD, in each case drawing a distinction between the method of choice experiments and its application in health economics. As such, this paper may be considered as a companion to the BD paper.

Normative issues

The discussion of normative issues regarding "whose preferences about what are relevant to which policies" provides a critique of how researchers have applied choice experiments in health, rather than of DCEs per se. BD argue that DCEs conducted to date are more relevant to private health insurance schemes than to predominantly tax-based systems such as those in the United Kingdom and many other European countries. They build this argument by first highlighting that many of the DCEs conducted in health have been undertaken with specific patient groups and have included non-health benefits. Next, they suggest that in order to inform policy decisions the appropriate context is a tax-based health care system, and that therefore tax-payers are implicitly the appropriate study group. Finally, they couple this with an assertion that tax-payers ex ante "might" value health rather than non-health benefits.

This raises four issues. First, BD provide no evidence for this assertion. Tax-payers "might" equally be concerned with broader matters, such as access, the characteristics of those benefiting from the product or programme, and option value [5]. Exactly what tax-payers value is an empirical question.

Second, DCEs can and have been used to investigate utility derived from purely health effects [6, 7] as well as simultaneous contribution of both health and non-health or process characteristics [8, 9]. The ability to include both forms of benefit is surely an advantage of the method rather than a limitation; DCEs offer a more general approach which is to be preferred as a starting point. As an aside, it is important to note that DCEs are not concerned merely with benefits but also provide information on *negative* influences on utility.

Third, the fact that many applications of choice experiments in health have focused on specific patient groups or users of a service does not mean that DCEs cannot or have not been used with members of the general public [10, 11, 12]. Again, this relates to the application rather than to the method.

Fourth, the distinction between ex ante and ex post warrants unpacking. It is not the case that merely because a DCE is undertaken with a patient group that the study therefore takes an ex post perspective. It may be ex post in the sense that the patients are already unwell or service users. However, the choice task is usually between different hypothetical permutations of a treatment or service that respondents have not yet used in real life

(although there are exceptions [13]) so they are not ex post in the sense of use. As such, respondents' ex ante attitudes to risk and uncertainty associated with choice between the hypothetical alternatives described in the experiment can be captured.

Psychological issues

BD discuss the cognitive burden associated with completing a choice experiment. This is an important issue, but, again, rather than negate the method, it has implications for the manner in which choice experiments should be undertaken. There are clearly trade-offs in terms of the number of scenarios, number of attributes, complexity in the levels of the attributes, number of choice options in each choice set, and respondent's familiarity with the subject area on the one hand and the cognitive burden placed on respondents on the other. These trade-offs need to be considered in the design of any choice experiment, including the medium of data collection.

Technical issues

BD raised the central issue of the use of small fractional factorial main effects designs which has been a key drawback of much of the work undertaken in health economics to date, although there are exceptions [8, 9, 14]. The use of such designs and the associated estimation of linearly additive models involve, at least implicitly, making the unrealistic assumption that all higher order interactions are equal to zero and limits the investigation to a very small fraction of the response surface. However, again, this is a criticism of the application rather than the method since larger designs that include interactions (and therefore facilitate non-linear models) are available.

BD also suggest a number of areas requiring further research; however, all of these have been or are being addressed in work in the broader DCE literature, and some are being undertaken in the area of health. For example, BD call for more research investigating the analysis of data at the individual rather than aggregate level. Louviere and colleagues [15] have made considerable advances in developing the proofs underpinning models for single individuals which are required before such analysis will be possible. Similarly, extensive progress has been made in the area of optimally efficient experimental design theory and, in particular, methods for creating the optimal grouping of scenarios in choice sets [16]. We agree wholeheartedly with BD's view that deleting non-traders (or equivalently those with lexicographic preferences) from choice experiments is not appropriate, particularly if the study results are to inform public policy decisions. Indeed, possible explanations for so-called "dominant" preferences and the implications of removing such preferences has been highlighted [2], and work on accounting for non-compensatory decision making within the analysis of choice experiments is being progressed in the broader DCE literature [17].

Generalisability

The editorial seems to entangle two distinct issues: generalisability and the use of a generic off the self instrument. It is important to note that using the latter does not guarantee the former. Generalisability relates to how representative the sample of respondents who undertook the experiment are of the population to which one wishes to generalise. Using a generic instrument means that it avoids the need to develop a new instrument for each study. It does not make the results (for example, the incremental cost per quality-adjusted life-year, QALY) of a given study more generalisable across populations, context, locations etc.

Taking the results of choice experiments and applying them outside the population from which they were estimated is problematic. As discussed in Viney et al. [2], generalisability of the results of choice experiments is a key area for future research and relates to factors such as time, context and geographic location which suggests the need for replication over each of these factors. Work has commenced on this issue in health and in the broader DCE literature [13, 18].

BD claim that "where the focus on 'health' is seen as sufficient and/or appropriate" a generic method such as an EQ-5D and QALYs could be used. This raises four issues. First, there is still debate around whether "health" is the appropriate maxim, and/or whether a broader view of utility is more appropriate [19, 20]. Second, avoiding having to develop a preference elicitation instrument for each study has considerable appeal; however, such measures may be inadequate to pick up the subtlety of the question at hand since it is not clear whether the utility values of health states elicited from a sample of the general population are always applicable to outcomes for specific groups. Third, QALYs have there own set of limitations, not least of which is the absence of a clear welfare (or any) theoretic foundation. Fourth, an advantage of generic outcome measures such as QALYs is they facilitate comparisons across different health products or programmes. However, so too do monetary measures such as willingness-to-pay derived from DCEs, and in fact willingness-to-pay facilitates comparison across a broader range of attributes, products, programmes or even sectors of the economy than does the use of QALYs.

BD state that the onus is on advocates of DCEs to show how the results generated have sufficient generalisability to be of use in a broad policy context. This assumes that, as with QALYs, the only research outcome of a DCE is a measure(s) of health benefit. This ignores the vast amount of information, other than preferences over health states, that are potentially provided by DCEs.

As already noted, DCEs facilitate the elicitation of preferences for all forms of benefit and as such, allows the valuation of non-use-demand or option value which may be relevant in some health settings. It is important to note that DCEs are not merely concerned with benefits; they are used to estimate an indirect utility function and therefore provide information on positive *and negative* influences on utility. DCEs potentially offer considerable flexibility in that a model of preferences is estimated based on many quality differentiated versions of a given product or programme, rather than a single fixed version.

Once the model of preferences, summarised by an indirect utility function, has been estimated, this can potentially be used in various ways. For example, the relative importance of the attributes of a product or programme can be investigated via their impact on the probability of

choice. The estimated model can also be used to derive the rate at which persons are prepared to trade off such attributes via the MRS, which is highly relevant in a resource constrained policy environment. Similarly, the estimated model can be used to predict uptake or demand; again such information is paramount in some policy settings such as immunisation [8]. Since welfare measures such as the Hicksian compensating variation can be calculated from the estimated model [3], the results of evaluations can be compared across contexts and can potentially be used in cost benefit analysis.

A key subject overlooked in the editorial is the strong theoretical basis that choice experiments enjoy. DCEs are estimated in random utility theory [21] and are based on Lancaster's [22] characteristics theory of demand.

As is the case with all methods, DCEs are not without limitations. While BD have discussed some important limitations regarding many of the past applications of choice experiments in health economics, the criticism contained in the paper does not invalidate the method of DCEs per se. It does, however, offer a useful warning regarding applying choice experiments without a thorough understanding of the theory, methods, or how to appropriately interpret the results. It also highlights the need for researchers to look beyond health economics to the broader DCE literature.

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Abstract

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Abstract

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Keywords

Discrete choice experiments · Health economics