VALUE IN HEALTH ▮ (2015) ▮▮▮–▮▮▮

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Survival or Mortality: Does Risk Attribute Framing Influence Decision-Making Behavior in a Discrete Choice Experiment?

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ABSTRACT

Objective: To test how attribute framing in a discrete choice experiment (DCE) affects respondents' decision-making behavior and their preferences. **Methods:** Two versions of a DCE questionnaire containing nine choice tasks were distributed among a representative sample of the Dutch population aged 55 to 65 years. The DCE consisted of four attributes related to the decision regarding participation in genetic screening for colorectal cancer (CRC). The risk attribute included was framed positively as the probability of surviving CRC and negatively as the probability of dying from CRC. Panel mixed-logit models were used to estimate the relative importance of the attributes. The data of the positively and negatively framed DCE were compared on the basis of direct attribute ranking, dominant decision-making behavior, preferences, and importance scores. **Results:** The majority (56%) of the respondents ranked survival as the most important attribute in the positively framed DCE, whereas only a minority (8%) of the respondents ranked mortality as the most important attribute in the negatively framed DCE. Respondents made dominant choices based on survival significantly more often than based on mortality. The framing of the risk attribute significantly influenced all attribute-level estimates and resulted in different preference structures among respondents in the positively and negatively framed data set. **Conclusions:** Risk framing affects how respondents value the presented risk. Positive risk framing led to increased dominant decision-making behavior, whereas negative risk framing led to risk-seeking behavior. Attribute framing should have a prominent part in the expert and focus group interviews, and different types of framing should be used in the pilot version of DCEs as well as in actual DCEs to estimate the magnitude of the effect of choosing different types of framing.

Keywords: discrete choice experiment, framing, risk, stated preferences.

Background

When making health-related decisions, individuals have to weigh several benefits and risks. The trade-offs that people make between those benefits and risks can be measured by means of a discrete choice experiment (DCE). The use of risk information in DCEs is almost inevitable and assumed customary [1,2]. Nevertheless, accurately communicating risk information can be a challenge. Risks are often perceived as difficult to interpret, especially among certain subgroups of the population (e.g., individuals with a lower educational level or lower health literacy skills [3–5]). If not presented clearly, risk information might be misinterpreted, which would limit the validity of the study outcomes. The framing that is used to present risk information is one of the many aspects of communicating risk information which influences how respondents interpret, perceive, and value risks [1,6,7]. From the early experiments of Tversky and Kahneman [6,7] and others [8–12], it is known that presenting otherwise identical risk information either positively or negatively will influence people's decision-making behavior. When risks are framed positively, they are more often interpreted as a "gain," resulting in risk-averse behavior (i.e., choosing the safest option), whereas risk-seeking behavior is more common when risk information is framed negatively and is interpreted as a "loss." Therefore, it is expected that respondents would value certain risk attributes in a DCE differently on the basis of whether they are framed positively or negatively. Specifically within a DCE, framing effects are of importance, because framing a risk does not affect only the decision-making behavior with respect to the risk attribute at hand. Due to of the multiattribute approach of DCE studies [13,14], framing a risk attribute might also influence the valuation of all included attributes. Limited research outside health economics indicate that attribute framing within DCEs might affect decision-making behavior [15,16].

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1098-3015$36.00 – see front matter

http://dx.doi.org/10.1016/j.jval.2015.11.004

Table 1 – Attributes and levels that were included in the DCE*.

Attributes	Level 1	Level 2	Level 3
Probability of being genetically predisposed (genetic predisposition): The likelihood that you are genetically predisposed to develop CRC:			
	1% (1 out of every 100)	3% (3 out of every 100)	15% (15 out of every 100)
Probability of developing CRC (CRC risk): 5 out of every 100 (5%) Dutch individuals develop CRC. If you have a genetic predisposition to develop CRC and you do not participate in preventive colonoscopies, the probability that you will develop CRC is higher and varies between:			
	15% (15 out of every 100)	70% (70 out of every 100)	99% (99 out of every 100)
Frequency of preventive colonoscopies (colonoscopy frequency): If the genetic test shows that you are genetically predisposed to develop CRC, you will be invited to participate in preventive colonoscopies. These colonoscopies are performed to prevent cancer from developing or to diagnose cancer in an early stage. These colonoscopies will be scheduled on a regular basis varying between:			
	Every 1 y	Every 2 y	Every 5 y
Probability of surviving CRC (survival): 60 out of every 100 (60%) Dutch individuals survive CRC over the next 5 y. If you know you are genetically predisposed to develop CRC and if you participate in the preventive colonoscopies, the probability that you will survive CRC over the next 5 y will increase and varies between:			
	80% (80 out of every 100)	92% (92 out of every 100)	98% (98 out of every 100)
Probability of dying from CRC (mortality): 40 out of every 100 (40%) Dutch individuals die from CRC within the next 5 y. If you know you are genetically predisposed to develop CRC and if you participate in the preventive colonoscopies, the probability that you will die from CRC within the next 5 y will decrease and varies between:			
	20% (20 out of every 100)	8% (8 out of every 100)	2% (2 out of every 100)

* All choice tasks included the first three attributes; for half of the population, survival was added as a fourth attribute, whereas for the other half of the population, mortality was added as a fourth attribute. CRC, colorectal cancer; DCE, discrete choice experiment.

Research on possible framing effects is even scarcer within health-related DCEs [17]. At the same time, the use of DCEs in the public health and health care research setting has increased [18,19], and results are increasingly being used as input for policymaking [13,14,20]. Therefore, the accuracy and validity of the measured (i.e., stated) preferences are essential. Currently, both positive and negative framing are used to communicate risk attributes without exact knowledge of the effect of attribute framing on an individual's decision-making behavior or evidence of best practice. This study empirically tests whether framing a risk attribute either positively or negatively influences respondents' decision-making behavior and their preferences.

Methods

DCE Case Study and Participant Recruitment

A DCE on preferences for genetic screening for colorectal cancer (CRC) was used as a case for this study. The decision to participate in cancer screening typically involves mastering concepts of risk. CRC is one of the most commonly diagnosed and one of the leading causes of death among all types of cancer in developed countries [21,22]. Several countries (among which is The Netherlands) have implemented a population-based CRC screening program. Within this population screening program, however, there is no specific attention paid to genetically predisposed individuals, whereas about 5% of all diagnosed with CRC have a genetic origin [23,24]. It has been argued that genetic screening will provide options to optimize surveillance of individuals at high risk, and consequently will reduce CRC-related morbidity and mortality [25–28]. Therefore, individual preferences of the target population are important to consider within this context.

Respondents were recruited via an existing online panel of the general Dutch population. Respondents were selected on the basis of their age (55–65 years) and were representatives for the entire target population with respect to sex and educational level. In total, 11,000 individuals were invited to participate in this study, and recruitment continued until at least 1,000 questionnaires were fully completed. Of those initially invited, 1595 (14.5%) started the questionnaire within 4 weeks. Complete data were gathered for 1262 respondents (79.1%), after which data collection was stopped. Respondents were excluded from the data set if they had completed the questionnaire at an unlikely fast pace (within 10 min) (14%), or when they had already participated in the National CRC Screening Program (3.2%), which resulted in a total sample size of 1045 respondents. The Dutch Central Committee on Research Involving Human Subjects concluded that formal approval by an institutional review board was not needed, because respondents were only required to complete an anonymous questionnaire once, which is in accordance with the guidelines laid down in the Declaration of Helsinki.

Attributes, Levels, and Framing

To construct the current DCE, potential attributes and levels were identified from previously published studies [29–33], six expert interviews, and five group interviews with members from the target population (n = 38). These group interviews were conducted using the nominal group technique [34]. During these interviews, participants were asked to rank a number of potential attributes from the "most" to the "least important." The mean group ranking of the attributes was then discussed in the group, after which participants could change their primary individual ranking [34]. Following a consensus meeting with the authors, four attributes with three levels each were rated as most important and were selected for the DCE (Table 1). For the purpose of the present study, the survival attribute that described