



Preferences for lives, injuries, and age: A stated preference survey

Fredrik Carlsson^a, Dinky Daruvala^b, Henrik Jaldell^{b,*}

^a Department of Economics, Göteborg University, Box 640, SE-40530 Göteborg, Sweden

^b Department of Economics, Karlstad University, SE-651 88 Karlstad, Sweden

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ABSTRACT

One of the more difficult ethical questions from a public decision-making perspective is whether the estimation of benefits from risk reducing projects should be influenced by factors such as age groups and risk domains. For example, should a project that saves the lives of elderly people be assigned a more different benefit value in cost-benefit analyses than one that saves the same number of children's lives? This paper examines the preferences of the general public in Sweden on these issues. We design a choice experiment in which subjects are required to make six pair-wise choices where the characteristics of each choice are accident type (fire and traffic), number of fatalities and serious injuries avoided, and age of those saved (5–15-, 35–45- and 65–75-year-olds). We find that avoiding the fatality of one 5–15-year-old is equivalent to avoiding 1.4 fatalities of 35–45-year-olds. Likewise, avoiding the fatality of one 5–15-year-old is equivalent to avoiding 3.3 fatalities of 65–75-year-olds. We find no significant differences between the causes of accident. One avoided fatality is found to be equivalent to around 3.5 avoided severe injuries, which is lower than the official value of 6 used by the Swedish Road Administration.

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1. Introduction

Governments are regularly required to implement policies in various sectors in order to prevent or reduce inhabitants' risk of injury and death. One of the more difficult ethical questions from a public policy perspective is whether the estimation of benefits from risk reducing projects should vary across factors such as age groups and risk domains. For example, should a project that saves the lives of elderly people be assigned the same benefit value in cost-benefit analyses as one that saves the same number of children's lives, or should the values be differentiated? While there is no clear cut answer, empirical evidence suggests that there are considerable differences in the size of society's investments in life-saving interventions in different areas (Ramsberg and Sjöberg, 1997; Tengs et al., 1995). These findings may indicate that investments are made in an arbitrary fashion, and thus public cost efficiency can potentially be increased. On the other hand, the different values given to risk reductions may in fact be a reflection of society's preferences. For example, there is evidence that the safety of children is prioritized. Legislation such as bicycle helmet laws for children and restrictions on additives such as glutamates and coloring in children's food suggests that there are differences between soci-

ety's values of risk reductions for adults and children.¹ Although these differences are rarely explicit, one exception is the [European Commission's \(2001\)](#) recommendation of an age-adjustment factor of 0.7 for valuing elderly people in environmental cost-benefit analyses.

The issue of preferences regarding the lives saved of different age groups is one of the concerns of this paper. Further, we also investigate differences in preferences for the number of injuries avoided and the context of risk. More specifically, we use a stated preference survey where respondents assume the role of a social planner and choose between projects that vary between four attributes: context (fire or traffic accident), saving lives, reducing severe injuries and affected age groups. The respondents are asked to make choices that do not affect themselves directly. We use the approach of [Cropper et al. \(1994\)](#), [Johannesson and Johansson \(1997\)](#) and [Johansson-Stenman and Martinsson \(2008\)](#), and quantify preferences regarding saving the lives of other people. Our purpose is to investigate the public's views on the characteristics of risk reducing projects, such as age or context, which in turn, may be an important input for decision makers when constructing public policy.

The method used makes it possible to estimate the stated social marginal rate of substitution (SMRS) between for example saving the life of a person belonging to group *i* compared to a per-

* Corresponding author. Tel.: +46 54 7001369; fax: +46 54 700 1799.

E-mail addresses: Fredrik.Carlsson@economics.gu.se (F. Carlsson), dinky.daruvala@kau.se (D. Daruvala), henrik.jaldell@kau.se (H. Jaldell).

¹ These legislations are also driven by the legal principle that children are unable to make informed risk choices.

son belonging to group j . The SMRS measures the relative value between the two groups so we are unable to find absolute values (such as a value of statistical life). Instead, the purpose is to investigate a number of issues: first, how the SMRS varies with the age of those who are saved from death or severe injury; second, if the SMRS varies with the risk domain; fire or traffic accidents, and third, the trade-offs made by the respondents between the number of saved lives and number saved from severe injury.

In this study, respondents are required to assume the role of a social planner, thus we estimate what Johansson-Stenman and Martinsson (2008) call ethical preferences, i.e. preferences regarding the outcomes for other people. There are several reasons for using a method where the respondents make choices for others, rather than for themselves. First of all, we believe that our approach is complementary to the value of statistical life (VSL) approach, where the willingness to pay for a risk reduction for oneself is elicited through a survey or through revealed preference data (Chilton et al., 2002; Magat et al., 1996; Persson et al., 2001; Viscusi and Aldy, 2003). The approach used in this study has some advantages over the former. One of the main problems with willingness to pay estimates from surveys is the insensitivity of the willingness to pay measure to the size of the risk reduction. This is particularly so when small risk changes are involved (Hammit and Graham, 1999). The method used in this study can potentially reduce some of the cognitive difficulties associated with small changes in risk.² Another advantage of our approach is that we may readily make comparisons between children and adults. Finding the willingness to pay for children's welfare is clearly difficult. While one could rely on asking parents to value the life of their children, asking subjects questions regarding the life of their children is complicated due to the sensitive nature of the question. There is a risk that the subject would get upset and thus reject the whole survey, or state extremely high willingness to pay (WTP) values for saving their own child's life. Although the latter values may well be true, it is not clear that they should be the basis for society's priorities for saving lives of different ages; for a discussion of using value of statistical life for public decision-making see Hammit (2002).

The remainder of the paper is as follows; Section 2 reviews previous empirical evidence. The design of the survey is presented in Section 3 and the results of the survey are presented in Section 4. Section 5 concludes the paper.

2. Previous empirical evidence

The literature on the relationship between age and willingness to pay for safety, e.g., in value of statistical life studies, is extensive, both in terms of theoretical models (e.g., Jones-Lee, 1989; Johansson, 2002) and empirical investigations (e.g., Alberini et al., 2004; Aldy and Viscusi, 2007; Evans and Smith, 2006; Krupnick et al., 2002). It is important to make a distinction between estimates of willingness to pay that are based on the age of those at risk, and those based on the age of the subject in stated choice experiments or in a revealed preference study. Although empirical studies could be concerned with both, most studies have focused on the second question where the implicit assumption then is that the age of the subject can be used as a value for the age of those at risk. One problem with this approach is that the values are derived from adult-based studies and thus a value for children cannot be

obtained. Another approach is to use parents' preferences for their children's safety as a proxy for children's preferences. The few studies that have estimated the marginal rate of substitution for the lives for children relative to adults have shown mixed results. Revealed preference studies on the use of seat belts and bicycle helmets found lower values for the lives of children (Carlin and Sandy, 1991; Jenkins et al., 2001) while the reverse was found by Blomquist et al. (1996). Yet another study by Mount et al. (2004) established no difference except within the same family. Within the stated preference literature, most studies estimate higher values for children than adults. Johansson-Stenman and Martinsson (2008) found that the relative value of a saved life decreases with age and that children were worth 1.7 times that of 40-year-old adults. Tsuchiya et al. (2003) found a monotonically decreasing ranking with age from children to the elderly for providing life saving treatment. The results from Lewis and Charney (1989) showed that respondents prefer that a 5-year-old receives life-saving treatment over a 70-year-old, but to a lesser degree preferred treatment be given to an 8-year-old rather than a 5-year-old. Agee and Crocker (2008) estimated parents' marginal rate of substitution between their own and their child's health and found that parents value their children's health over their own by almost two-fold. Similarly, Liu et al. (2000) found that mothers' willingness to pay to avoid a cold was 1.5 times higher for her children than herself. On the other hand, a contingent valuation study in New Zealand by Leung and Guria (2006) found no significant difference in value between adults and children.

A few studies have also compared the relative value of the elderly to other adults. While results indicate that people are generally in favor of giving priority to the young, there are considerable differences in the magnitude of divergence between the values given to different ages. Johannesson and Johansson (1997) found that the lives of forty 70-year-olds to be equivalent to one 30-year-old, while the corresponding figure was around 2.5 in the Johansson-Stenman and Martinsson (2008) study. Although one can only speculate about the large difference between the two studies, we believe one important explanation is that in Johansson-Stenman the risk context is very specific, road accidents, while in Johannesson and Johansson, the risk context is more vague, "different accidents and diseases". We believe the context in the latter study to have particular impact to the values given for saving older people, since subjects are then more likely to think of diseases as a more likely cause of death for this age group. While both Johannesson and Johansson (1997) and Johansson-Stenman and Martinsson (2008) show that the relative value of a saved life decreases with age, Cropper et al. (1994) found that the utility attached to saving an anonymous life is a hump-shaped function of the age of the person saved. They found that saving the lives of eight, eleven and seven 60-year-olds was considered equivalent to saving the life of one 20-year-old, 30-year-old and 40-year-old, respectively. Considering the value of statistical life literature two recent surveys came to two conclusions about the value of the elderly compared to other adults depending on the method used. Krupnick's (2007) review of stated preference studies concludes that: "The fact that the studies that focus on this issue are split in their findings is further evidence that the senior discount effect, if it exists, is not robust." (p. 275). Aldy and Viscusi's (2007) review of revealed preference labor market studies concludes that: "The labor market VSL increases with age, peaks in mid-life, and subsequently declines. The decline, later in life, appears to be flatter than the early-adult life increase for models that recognize either cohort effects or life-cycle consumption patterns" (p. 257).

Results from studies that have compared the relationship between the context of risk and the willingness to pay (WTP) to reduce or avoid the risk have yielded mixed results. In the transport sector, Jones-Lee and Loomes (1995) found that the WTP for

² An alternative to using frequencies is the use of visual aids; see, for example, Corso et al. (2001) for a discussion on different visual aids to improve the understanding of small risks. Furthermore, there is some evidence that the use of frequencies does not result in more consistent behavior than probabilities. For example Beattie et al. (1998) find that expressing risk in frequencies results in larger problems with embedding than if the risk is expressed in small probabilities.

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