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Existence and Magnitude of Health-related Externalities: Evidence from a Choice Experiment

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Abstract

Health-related external benefits are of potentially large importance for public policy. This paper investigates health-related external benefits using a stated-preference discrete-choice experiment framed in a health care context and including choice scenarios defined by six attributes related to the a recipient and the recipient's condition: communicability, severity, medical necessity, relationship to respondent, location, and amount of contribution requested. Subjects also completed a set of own-treatment scenarios and a values-orientation instrument. We find evidence of substantial health-related external benefits that vary as expected with the scenario attributes and subjects' value orientations. The results are consistent with a number of hypotheses offered by the general theoretical analysis of health-related externalities and the analysis of externalities specific to health care.

1 Introduction

Sound policy development in sectors such as transportation, the environment and health care requires an understanding of the nature and magnitude of health-related external benefits. Health-related external benefits — sometimes referred to safety-focused externalities — derive from altruistic concerns people have for the health and safety of others, which creates utility interdependencies among members of society. The appropriate treatment of health-related externalities in the evaluation of public policies depends on the nature of people's altruistic preferences.

Bergstrom (1982; 2006) showed that if people are pure altruists, in the sense that person i cares about person j's overall level of utility while respecting j's preferences, then under a utilitarian social welfare function health-related external benefits should be excluded from cost-benefit analyses of public programs. Jones-Lee (1992) extended this conclusion to the case of pure paternalistic altruism in which person i values person j's consumption trade-offs strictly in terms of i's own preferences. If, however, people are pure health-focused altruists such that person i's concern for person j is limited only to person j's health status, then heath-related external benefits should be included in cost-benefit analyses of health-affecting public programs (Jones-Lee, 1991). More generally, if people exhibit a mixture of pure and health-focused altruism, external benefits should be included to the extent that they derive from health-focused altruism.

Empirical evidence indicates that health-related external benefits are large in relation both to own-benefits and to external benefits derived from pure altruism. Studies consistently find that people's willingness to pay for an intervention that improves the health and safety of others is a substantial fraction of the amount they are willing to pay to obtain the same benefit for themselves. Jacobsson *et al.* (2005), for instance, estimated that

external benefits equaled 15-20% of own-benefits for severe health conditions; Smith (2007) similarly found average willingness to contribute for the treatment of another person equal to about one-half the willingness to pay for one's own treatment; Andersson (2009) found that willingness to pay for a traffic safety device that would protect the general public was about one-third the willingness to pay for a device that protected only oneself; and parents' willingness-to-pay for policies to reduce health risks or provide treatment to their children actually exceeds their willingness-to-pay for such gains to themselves (Viscusi et al., 1988; Liu et al., 2000; Dickie and Messman, 2004; Dickie and Gerking, 2007). The small number of studies directly compare health-related altruism and pure altruism find that health-related altruism dominates pure altruism. Jacobsson et al. (2007) compared willingness to contribute cash vs. nicotine patches to diabetic smokers who expressed a willingness to quit smoking but also stated that they were unwilling to pay the cost of nicotine patches themselves. Contributions for the nicotine patches substantially exceeded contributions of cash, a finding that was robust to a number of alternative experimental designs. Similarly, Andersson et al. (2009) found that people were willing to contribute more on behalf of a relative for the rental of a transportation safety device than they were willing to contribute in cash to the relative. Health, it appears, is a special focus for altruistic preferences, but the literature leaves many question unanswered regarding the specific nature and magnitude of health-related preferences.

This paper contributes to this empirical literature on the nature of health-related externalities by using a community-based stated-preference, discrete-choice experiment to examine health-related externalities associated with the consumption of health care. We use a health care frame for two reasons. First, the primary purpose of most health care is the improvement of health and in many countries health care constitutes one of the largest sectors of the economy (between 10 and 15 percent of GDP in developed nations), and one

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of the largest single areas of government expenditure (OECD, 2009). Second, health care raises distinct issues for health-related externalities. Even purely self-interested individuals obtain external benefits from health policies targeted at communicable diseases (Weisbrod, 1961). Person i derives benefit from person j's consumption of health care that prevents or cures a communicable disease because j's treatment reduces the chances that i will contract the disease. For health care services used to treat non-communicable diseases, which constitute by far the largest proportion of health care spending in developed countries, economists have debated two types of paternalistic, "caring" externalities (Hurley, 2000). Early analyses posited that a paternalistic altruism concerns others' consumption of health care *per se* (Pauly, 1970; Lindsay, 1969). That is, the external benefit derives from the other person's absolute or relative consumption of health care itself. Later analyses argued, consistent with the theoretical literature cited above, that the altruism pertains to others' health, in which case health-care-related external benefits arise only for the consumption of health care that improves another's health (Evans and Wolfson, 1980; Culyer and Simpson, 1980).

By studying contribution behaviour with respect to both communicable and non-communicable conditions, and with respect to health care services expected to improve a person's health versus health care expected to improve well-being for non-health reasons, we shed light on these unique aspects of external benefits associated with health care consumption. As part of a robustness check, we compare contribution behaviour regarding the provision of health care to another individual with an independent measure of a person's value-orientation derived from a validated instrument from social psychology (Messick and McClintock, 1968; Greisinger and Livingston, 1973) that classifies individuals on a 5-category scale from "aggressive" to "altruistic."

We find that, like previous studies, health-related external benefits are substantial in re-

lation to own-benefit and that, although subjects exhibit a baseline of general altruistic preferences, paternalistic health-focused externalities dominate. Similarly, while both selfish and caring externalities exist, caring externalities appear substantially larger. Subjects' contribution behaviour with respect to the treatment of other individuals corresponds as expected with the subjects' value orientations. Our findings imply that a full accounting of the benefits of programs that generate health benefits should include external benefits.

2   Methods

We use a discrete-choice, stated-preference methodology. The discrete-choice survey included three main components: one part pertaining to a subject's willingness to contribute for the treatment of another individual; a second part pertaining to a subject's willingness to pay for their own treatment; and a third part concerning a subject's value-orientation. At the end of the survey subject's completed a short demographic questionnaire.

2.1   Treatment of others

To measure the external benefits that subjects obtain from the health care treatment of another person, we assess subjects' willingness to contribute to the treatment of another person. The choice scenario had to be designed so that it was plausible that a potential recipient could not afford the desired health care service and the subject's contribution would enable the person to obtain the service (without requiring that the subject contribute the full cost). The scenario therefore emphasized that although Canada's publicly funded health care system covers medically necessary physician and hospital services free of charge, it provides either no coverage or limited coverage for many other types of health

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care such as prescription drugs, physiotherapy, counseling by a clinical psychologist, and dental care. Such uninsured services can be medically necessary, in the sense that they would be expected to improve a person's health, or non-medically necessary, such as a cosmetic procedure. Obtaining uninsured services can impose a sizable financial burden on individuals and families.

Subjects were told that a registered charitable organization had been created to provide financial assistance to individuals seeking treatment for an uninsured health care service. The charitable organization verified that the desired service was effective in addressing the condition of concern and that there was no reasonable, lower-cost way to treat the condition. The charity organized its requests for contributions on a case-by-case basis according to the individuals who had applied for financial assistance, thereby making it plausible that subjects would be asked about their willingness to contribute for the treatment of specific individuals. The charitable organization therefore served a number of purposes in the choice scenario: it legitimized the contribution request by verifying the condition and the treatment sought, it made it plausible that a contribution toward only a portion of the cost could ensure treatment, and it provided a mechanism by which a subject would be asked their willingness to contribute to specific potential recipients (charities commonly describe specific initiatives or needs and request donations channeled to them).

Subjects were then presented with a series of choices regarding their willingness to contribute to the charity to ensure that a described individual would obtain treatment. Each choice problem described three such potential recipients in terms of a set of attributes (described below), including a requested contribution amount. Subjects were asked to indicate which of the three individuals to which they would contribute or, if they preferred, to make no contribution. Including the no-contribution option avoided possible upward bias that arises when people are forced to choose a positive contribution level (Hensher et al.,

2005). To reduce the chances that subjects would make inappropriate assumptions about the individuals and conditions described, subjects were told that the patients had been approved to receive donations through this charity and that the potential recipients were identical in all respects other than those described. Appendix 1 presents the survey.

2.1.1 Attributes and levels

The choice alternatives were described using six attributes (Table 1).

Relationship to Subject. Other things equal, we expect a subject's willingness-to contribute to be greater when the recipient is emotionally close to them. As noted above, previous work has investigated this with respect to familial ties such as a parent-child relationship. Because it was a community-based survey and some respondents may not have living spouses or relatives, we chose a more general framing with two values: the recipient is a friend of the subject or the recipient is a stranger unknown to the subject.

Communicability of the condition. The communicability of the recipient's condition was included to test for selfish externalities. Communicability took on one of two values: "Communicable," meaning that the condition was highly communicable, meaning that it spread easily from person-to-person by direct physical contact (e.g., handshake) or indirect contact (e.g., germs left on a door handle, counter-top, etc.); or "Non-communicable," meaning that it could not be spread by from person to person.

Location of the recipient. The location of the recipient took on one of two values: "Neighbour," meaning that the recipient lives in the subject's neighbourhood; or "Distant," meaning tha the recipient lives in a distant city. Location was included for two reasons. First, selfish externalities should be greater when the recipient has

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a communicable condition and lives in the subject's neighbourhood than when the recipient lives in a distant city. Second, subjects may identify more closely with someone who lives geographically near and, other things equal, be more willing to contribute for such a recipient compared to someone living in a distant city.

Severity of the condition. Studies of priority setting and resource allocation in health care consistently find that individuals give priority to those who suffer from conditions with greater severity (Dolan and Olsen, 2002). The severity of the recipient's condition takes on one of two values: "Mild," meaning that the condition does not impair the recipient's ability to function; or "Severe," meaning that the condition impairs the recipient's ability to function and carry out some activities of daily living. Other things equal, we expect subjects to be more willing to contribute for the treatment of an individual with a severe rather than a mild condition.

Medical necessity of the condition. As noted, there is debate in the health literature as to whether paternalistic externalities arise with respect to another's health care consumption *per se* or only with respect to another's level of health. We therefore include an attribute for medical necessity that takes on one of two values: "Medically Necessary," meaning at the treatment of the recipient's condition is expected to improve the recipient's health; or "Not Medically Necessary," meaning that the treatment of the recipient's condition is not expected to improve the recipient's health though it can be expected to improve their overall sense of well-being. A cosmetic procedure, for example, may affect a person's sense of well-being while not improving their health. This attribute targets the crucial distinction between health care services expected to improve health versus those valued for non-health reasons.

Amount of contribution requested The contribution requested took on one of six val-

ues: $15, $25, $100, $200, $1000, or $2000

2.2 Own treatment

In the second part of the experiment subjects were again reminded of the range of uninsured health care services and were told that they suffered from a condition that required treatment not covered by the public system; further, if they had private insurance, the treatment was not covered by private insurance. Hence, to obtain treatment they would have to pay for the care out-of-pocket. Subjects were then presented with a series of choice problems with two options: obtain treatment paying the amount specified or do not obtain treatment. The scenarios for this component of the survey used the subset of four of the attributes described previously relevant for an own-treatment scenario: communicability, severity, need, and payment required. The attribute descriptions were identical to those used for the other-treatment scenarios.

2.3 Social Values Orientation

In addition to the choice experiments, participants completed a social value orientation (VO) exercise. The VO instrument originated in social psychology (Messick and McClintock, 1968) as a method for defining an individual's value orientation along individualistic and collective or altruistic perspectives. In the VO exercise, individuals make a series of money-sharing decisions between themselves and another individual with whom they are randomly matched. Based on how individuals choose to share the specified amounts between themselves and the other individual, people are characterized as Altruistic (maximize the pay-off to the other person), Cooperative (maximize joint pay-offs), Individualistic (maximize own pay-off with no concern of other's pay-off), Competitive (maximize own

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pay-off relative to other's pay-off) and Aggressive (minimize the other's pay-off). The VO instrument has been validated and has been used by experimental economists investigating voluntary contributions in public goods games (Buckley et al., 2001; Offerman et al., 1996). The VO exercise was based on hypothetical money-sharing (i.e., no money was at stake).[1] We use the subjects' VO classification in the analysis of contribution behaviour.

2.4 Experimental design

For the component regarding willingness-to-contribute to the treatment of others, a full-factorial generic design with five two-level attributes and one six-level attribute generates 192 possible combinations ($L^A = 2^5 * 6 = 192$). Allowing for all two-way and some higher-order interactions, a fractional-factorial design was produced with 24 choices scenarios of three alternatives plus the no-contribution alternative (Kuhfeld, 2005; Zwerina et al., 1996). To reduce the burden on subjects, the 24 choice scenarios were divided into two blocks of 12 scenarios so that each subject saw only 12 other-treatment scenarios. For the component regarding own-treatment, the full-factorial generic design generates 48 possible combinations ($L^A = 2^3 * 6 = 48$) and a fractional-factorial design allowing for interactions was obtained with 16 choices over two alternative (purchase, do not purchase). Because it is unlikely that a communicable or severe condition would not be medically necessary, we restricted the choice set to exclude communicable, non-medically necessary conditions and severe, non-medically necessary conditions. All aspects of the experimental design were performed using SAS 9.1.3 built-in capabilities (Kuhfeld, 1997).

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[1]In a recent comparison of responses to the VO instrument based on hypothetical money-sharing hypothetical and responses based on real money-sharing, Mentzakis and Mestelman (2010) found no evidence of hypothetical bias.

2.5   Survey Administration

The survey was administered to a province-wide sample drawn from the community-dwelling population of Ontario, Canada. It was administered using a mixed-mode methodology in which community participants were recruited using a letter of invitation sent via regular mail, which allowed us to use postal contact information (obtained from a marketing research firm) for a representative, random sample of the provincial population, but participants completed the survey via the Internet. Participants were compensated for their participation. The study was approved by the McMaster University Research Ethics Board.

2.6   Econometric Methods

Choice experiments assume that subjects are utility maximizers who derive utility from the attributes of an alternative (Lancaster, 1966, 1971) rather than the alternative *per se* (Louviere et al., 2000). Observed choices may vary systematically with subject characteristics, which act as conditioning variables: other things equal, people with certain characteristics are more likely to donate than are others.

The utility associated with a choice alternative is assumed to comprise two components, a deterministic component and a random component. Letting q denote an individual and i denote a choice alternative,

$$U_{qi} = V_{qi} + \epsilon_{qi}$$

where V_{qi} is the deterministic component and ϵ_{qi} is the stochastic component. The deterministic component includes all those observable factors that influence choice, and is

normally assumed to be additive:

$$V_{qi} = \sum_{j=1}^{J} \gamma_{ji} Z_{qj} + \sum_{k=1}^{K} \beta_k X_{qik}.$$

Z_{qj} are personal characteristics of individual q, X_{qi} are the attributes for alternative i, and γ_{ji} and β_k are the utility parameters to be estimated. The stochastic component to utility, ϵ_{qi} includes all unmeasured factors that influence the utility of alternative i to individual q.

The econometric specification used to estimate γ and β depends on the assumptions placed on ϵ_{qi}. The most common assumption is that ϵ_{qi} are independent and identically distributed (iid) extreme value type I, which gives rise to the conditional logit model (McFadden, 1974; Hensher et al., 2005). For the conditional logit model, the probability that individual q would choose alternative i is as follows:

$$P_{qi} = \frac{e^{V_{qi}}}{\sum_{j=1}^{J} e^{V_{qj}}}$$

where $j = 1 \ . \ . \ . \ J$ denotes the set of choice alternatives. The conditional logit model assumes independence of irrelevant alternatives (IIA), which implies that the ratio of the choice probabilities for two alternatives is unaffected by the presence or absence of a third choice alternative. This assumption is often violated for choice data (Hensher et al., 2005). We test the validity of the IIA assumption.

When the IIA assumption is violated we opt instead for a nested-logit specification that partially relaxes the IIA assumption. The nested-logit model does this by dividing the overall choice set into subsets, or nests, and relaxing IIA across nests (though IIA is still assumed to hold within each nest) (Louviere et al., 2000; Hensher et al., 2005). Figure

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1 illustrates one way to nest the choices for the other-treatment scenarios. In this two-level structure, choice at level 1 is whether or not to contribute; conditional on deciding to contribute, the choice at level 2 concerns which of the three individuals to which to contribute. Letting d denote the choice alternatives at the top-level (contribute, do not contribute), the probability that individual q chooses alternative i within the contribution nest is the product of the probability of the individual chooses to contribute and of the probability of choosing alternative i conditional on contributing:

$$P_{qi|d} = P(d) \cdot P(i|d)$$

Each of the two probabilities on the right-hand-side of this expression is a standard logit, so the probability can be expressed in terms of deterministic utility as:

$$P_{qi|d} = \frac{e^{(\lambda_d V_{qd} + \lambda_d IV_d)}}{\sum_{d=1}^{D} e^{(\lambda_d V_d + \lambda_d IV_d)}} \cdot \frac{e^{V_{i|d}}}{\sum_{m=1}^{M} e^{V_{m|d}}}$$

In this probability expression, IV_d is called the inclusive value. The inclusive value represents the desirability of the set of choice alternatives available if a particular nest is chosen, and is defined as: $IV_d = ln \sum_{m=1}^{M} e^{V_{m|d}}$. It links the levels of the nested model, transmitting information about the level 2 alternatives up to the level 1 choice. The λ_d are scale parameters to be estimated. There are two scale parameters in our setting; one is normalized to 1.0 and the other is estimated from the data. For the specification to be consistent with the underlying random utility choice model, the estimate of λ must fall in the interval [0,1]. The conditional logit model is a special case of the nested logit model in which $\lambda = 1$. Two things should be emphasized about the nested logit model. First, although the model structure is often described as a series of sequential choices, the model does not assume

that decisions are made sequentially. The decision tree is simply a convenient way to depict the model. Second, although the structure of the decision tree often reflects intuitive relationships among the choice alternatives, the optimal model structure depends entirely on the statistical properties of the data, and in particular on the correlations present among the stochastic terms associated with the choice alternatives. The specification is defined by statistical relationships, not behavioural relationships. All estimation and calculations were performed in Stata©

2.7 Testing Hypotheses Regarding the Nature, Scope and Magnitude of Health Care Externalities

We test our hypotheses and present our results using three estimates: the estimated coefficients; the estimated probability that a person makes a contribution (or purchases own-treatment); and, using the cost attribute as a numeraire, the estimated marginal rates of substitution among attributes, which is an estimate of the average willingness-to-pay (WTP) for each choice attribute (Bennett and Adamowicz, 2001). Both the probability of contributing and WTP avoid the scaling problem faced when comparing coefficients across models (Swait and Louviere, 1993).

If subjects are wholly self-interested, they should contribute to the treatment of another person only when that individual has a communicable disease and the subject is at some risk of contracting the disease. In such a case, only the coefficients on communicability and interaction terms involving it (especially "neighbourhood") would be statistically significant. If subjects exhibit altruistic preference that are purely health-focused, they should be willing to contribute only when another person's condition is medically necessary. In this case, only the coefficients on communicability and medical necessity and interaction

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terms involving them would be statistically significant. If, however, altruism extends beyond a purely health focus, subjects should be willing to contribute to the treatment of another individual even when the individual's condition is not medically necessary. Jones-Lee (1991) hypothesizes that for people with whom we are emotionally close pure altruism weighs more heavily than health-focused altruism; but for people who are more distantly removed, health-focused altruism weighs more heavily than pure altruism. We can test this two ways: if true, the willingness to contribute to the treatment of a non-medically necessary condition for a friend should exceed that for a stranger; in addition, the incremental impact of medical necessity on the willingness to contribute should be smaller for a friend than for a stranger. Finally, if contribution behaviour is related to underlying value-orientations, as one would expect, those classified as altruistic or cooperative should be more willing to contribute to the treatment of another than should those classified as individualistic, competitive or aggressive.

3 Results

3.1 Sample descriptive statistics

The sample includes 268 respondents, which is adequate for robust estimation (Hensher et al., 2005). Descriptive statistics for the sample are given in Table 2. The sample has a mean age of 52, 59% are males, 60% report excellent or very good health, 75% are married; 76% are post-secondary graduates (university, college, professional/trade-school), 56% have full-time jobs and 82% own their house. Less than 10% of the respondent households earn less than $20,000 per year, 15% earn between $20,000 and $50,000, 33% earn between $50,000 and $100,000, 25% earn over $100,000, and 20% did not report their

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income. The values-orientation scores classify 1% as aggressive, 1% as competitive, 26% as individualistic, 66% as cooperative and 7% as altruistic, which is consistent with the common finding that most people are cooperative or individualistic. Comparison of our sample with data from the Ontario component of the Canadian Census and the Canadian Community Health Survey confirms that our sample broadly corresponds to the population with respect to age, employment status, home ownership, health sector employment, and self-assessed health status, but that relative to the Ontario population it includes a higher proportion of males (58% vs. 48.2%), a higher proportion of married individuals (75% vs. 52%) and is better educated (e.g., 44% vs. 25% university graduates).

3.2   Regression Results

3.2.1   Other-treatment Choices

a. Analysis for Full Sample

A test of the IIA assumption for the conditional logit model rejects IIA ($\chi^2 = 24.64$, p = 0.00). We therefore present the results from the nested logit model with the structure depicted in Figure 1. Column 1 of Table 3 presents the coefficient estimates for the analysis of responses for the full sample. The top panel presents the estimates regarding the decision of whether or not to contribute; the bottom panel presents the estimates regarding the impact of the attributes on subjects' decisions. The inclusive value (λ) is 0.661, which is statistically different from both 0 and 1, confirming that the specification is consistent with utility-maximizing behaviour.

The positive coefficient on the alternative-specific constant (0.683), which represents the average likelihood of contributing across all scenarios assessed, indicates a strong propensity

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to contribute for the treatment of another. [2] Its magnitude implies that, other things equal, the odds that a subject will contribute are twice the odds that they will not contribute. The likelihood of contributing, however, varies with personal characteristics. As expected, those with altruistic or cooperative value-orientations are more likely to contribute to the treatment of another person than are those with individualistic, competitive or aggressive value-orientations (odds-ratio (OR) = 1.57). Males are less likely to contribute than are females (OR = 0.80). Age is associated with increased rates of contributing. Those in very good or excellent health are less likely to contribute than are those in poor, fair or good health (OR = 0.72).[3] Those who are married are less likely to contribute (OR = 0.78), as are those who own their own home (OR = 0.50). The income relationship is not monotonic: subjects with household income of $20,000 - $50,000 are less likely to contribute than are those with household income of less than $20,000 (OR = 0.31), but those with household income over $50,000 are more likely to contribute.

The estimates relating to the scenario attributes reveal that each of communicability, severity, medical necessity, friendship and contribution level exert a statistically significant effect on the probability of donating. In all cases the effect is in the expected direction and is large in magnitude. To provide an indication of the size of the effects associated with the attributes, Table 4 presents the probability that a respondent would make a donation to an individual with the characteristics listed. The first scenario listed serves as a baseline, and refers to the probability of making a contribution of $25 to a stranger living in a distant city who suffers from a mild, non-communicable, not medically necessary condition.[4] The

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[2]Because qualitative variables are effects-coded, the intercept represents a true average effect and is not confounded by the reference categories of qualitative variables.

[3]This may be due to empathy. Jacobsson et al.(2007) found that empathy was the primary motive for contributing to the treatment of another and those in poorer health may have greater empathy for another person seeking treatment.

[4]All scenarios assign a value of "0" to each of the personal characteristics. The choice of characteristics affects the probability of contributing, but because this is constant across all scenarios compared, differences in probabilities across scenarios can be ascribed solely to the differences in attributes. The specific choice

probability that a respondent would contribute \$25 in such a scenario is 0.49. Changing the condition from mild to severe while keeping all other attributes at their baseline levels increases the probability of a contribution to 0.67, a change of 0.18 or 37% over the baseline. The impact of severity, medical necessity and friendship are roughly equal and slightly larger than that associated with communicability. The impact of contribution requested is, as expected, negative and significant. The three panels of Table 4 correspond to different levels of financial contribution. The differences in the probability between \$25 and \$1000 are unexpectedly small; the probability of donating in the baseline scenario is 0.35 even for a \$1000 contribution. This suggests that subjects gave less-than-expected weight to the contribution attribute, a point we will return to below.

Subjects were willing to contribute more for the treatment of another person with a communicable disease than an otherwise identical person with a non-communicable disease. However, the coefficient on the interaction term between communicability and neighbourhood, though positive and consistent with selfish external benefits, is not statistically significant. This suggests that the increased willingness-to-contribute for the treatment of a communicable disease derives less from selfish external benefits than from a form of health-focused altruism: compared to a non-communicable disease, treating a communicable disease is more important because it reduces the chances that it will be spread to other individuals.

The significant coefficients on severity, medical necessity and friendship confirm that selfish motives are not the only source of external benefits since subjects were willing to contribute to the treatment of a person with a non-communicable condition. Further, the fact that subjects are willing to contribute even for non-medically necessary conditions indicates al-

scenario simulated is that between "Do not contribute" and three identical contribution alternatives with the attributes listed. The probability listed is that from level 1 of the decision tree: contribute to any one of the three contribution alternatives or do not contribute.

truistic preferences are not restricted to health effects. The pattern of coefficients indicates that external benefits are larger for the treatment of medically necessary conditions that improve the recipient's health than for non-medically necessary treatments. Health-related altruism dominates general altruism. The interaction terms reveal more subtle patterns of effects consistent with much of the theoretical literature. The negative and statistically significant coefficient on the interaction term for friend and medical necessity supports the conjecture of Jones-Lee (1992) that health-focused externalities are smaller relative to pure altruistic preferences for those with whom one is emotionally close than they are for strangers. The combination of a large positive "main" effect for friendship and the negative coefficient on the interaction term with medical necessity implies that the incremental effect of medical necessity on the probability of making a contribution is larger when the recipient is a stranger than when they are a friend. That is, health-focused externalities figure more importantly in decisions regarding a contribution to a stranger. The interaction of medical necessity with neighborhood indicates that although respondents are no more likely to contribute for the treatment of someone in the neighbourhood (vs. someone in a distant city) for non-medically necessary conditions, they are more likely to do so when the condition is medically necessary.

b. Sub-group Analysis by Value-orientation

Columns 2 and 3 for Table 3 present separate estimates for those whose value-orientation is altruistic or cooperative (hereafter referred to as "altruists") and those whose value-orientation is individualistic, competitive or aggressive (hereafter referred to as "individualists"). Two aspects of the estimates are noteworthy. First, the estimated constant terms indicate that altruists are much more likely to contribute than the average subject (constant = 1.491, OR = 4.44), while individualists are less likely to contribute (constant = -1.673, OR = 0.19). The baseline scenario in Table 4 indicates that altruists are five times

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more likely to contribute than are individualists. Second, contribution behaviour among altruists is more homogeneous than it is among individualists: for altruists contributions vary systematically only with housing tenure and income; for individualists, contributions vary with respect to all measured personal characteristics.

The estimated coefficients on the attribute variables exhibit the expected patterns. The estimates are statistically significant for many of the same attribute variables, with the same sign for both altruistic subjects and individualistic subjects. But notably, medical necessity is not statistically significant for altruistic subjects while it is for individualistic subjects: those with altruistic value orientations are as likely to contribute for non-medically necessary conditions as for medically necessary conditions. The point estimates for the interaction terms involving communicability are substantially larger for those with individualistic orientations than for those with altruistic orientations, though only the communicability*severity interaction reaches statistical significance.[5] These results imply that selfish externalities are relatively stronger (even if still less than caring externalities) among those with individualistic orientations.

3.2.2 Own-treatment Choices

Column 4 of Table 3 presents the results for the own-treatment choices. Because the own-treatment choice scenario involved a simple pair-wise choice of whether to obtain treatment at the stated cost or opt to not obtain treatment, choices were analyzed using a conditonal logit model. We present the results for only the full-sample model as own-treatment decisions did not differ by value-orientation.

Across all responses, individuals are more likely to treat themselves than to forgo treatment

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[5]This may in part be a power issue as individualists constitute a smaller proportion of the sample.

(constant = 0.599; OR = 1.82). Income is the most important subject characteristic affecting choice. Although the income gradient is flat at low- and middle-income levels, subjects with household income greater than $100,000 are much more likely to purchase care for themselves (OR = 2.21). Those in very good or excellent health are more likely to purchase treatment than are those in poor, fair or good health (OR = 1.30), while those who are married are less likely than are those who are not married (OR = 0.64). Cost has the expected negative effect on the likelihood that a subject purchases care.

The probability of purchasing treatment for the baseline scenario of a non-communicable, mild, non-medically necessary condition is 0.239, which is less than the probability of donating $25 to another individual with the same condition (Table 4). This somewhat surprising result may be explained by two phenomena. First, subjects' contributing behaviour may be subject to "warm-glow" effects (Andreoni, 1990), increasing their propensity to contribute for the treatment of another compared to purchasing treatment for themselves. Second, subjects may be disinclined from treating themselves for a mild condition that is of little worry to them, but contribute to another who, for whatever reason, has expressed a desire for the service and therefore is presumed to derive benefit from it. To the extent the latter is true, it suggests that subjects are not pure paternalists even with respect to health: they are willing to contribute based on other people's own preferences even when those preferences differ from the subject's preferences.

All four scenario attributes affect choices in the expected direction: respondents are more likely to choose treatment for a condition that is communicable (OR = 1.64), severe (OR = 3.82) or medically necessary (OR = 14.50), and, other things equal, are less likely to choose treatment as the cost rises. The only interaction term that retained significance in the model was that between communicability and severity, which has a negative sign: the incremental impact of communicability is less for a severe condition than it is for a

mild condition (and vice-versa). This is plausible as a person is likely to obtain treatment for a severe condition regardless of whether it is communicable or non-communicable; but for a mild condition — for which a person might forgo treatment if non-communicable — communicability exerts a larger impact. This may reflect a type of other-regarding preferences: out of consideration for the possible impact on others, at the margin subjects are more willing to obtain treatment for a communicable condition they would not otherwise treat if it were non-communicable. The patterns of probability estimates presented in Table 4 indicate that the incremental impact severity and medical necessity, is larger for the decision to treat oneself than it is for the decision to contribute to the treatment of another. Furthermore, comparing the estimates across the $25, $100 and $1000 panels reveals amount of contribution exerts a stronger negative impact on the likelihood of purchasing own-treatment than the likelihood of contributing to the treatment of another. Other things equal, the ratio of probabilities paying $1000 for own treatment and paying $25 is smaller than is the same ratio for other-treatment decisions.

3.3 Willingness-to-Pay for Treatment of Others and for Own Treatment

Table 5 presents the marginal rates of substitution between money and the indicated attributes, which can be interpreted as monetary average WTP for each attribute. For attributes involved in interaction terms, the WTP depends on the value of variables with which the attribute is interacted. When calculating WTP, we set the other variables equal to the sample mean. We omit the attribute neigbourhood because its impact on choices was not statistically significant. To test for statistical differences in WTP estimates across own- and other-treatment choices we use a combinatorial approach that provides a simple, unbiased non-parametric test of the difference in two distributions (Lusk and Schroeder,

2004). The test is based on drawing 1000 observations from a multivariate normal distribution using the coefficient estimates and the variance-covariance matrices from each of the estimated models and then calculating all possible differences between the WTP values that need to be tested. See Poe *et al.* (2001) and Lusk and Schroeder (2004) for further details regarding this approach.

For the other-treatment scenarios, subjects were willing to contribute the most at the margin for the treatment of a severe rather than a mild condition ($1509) and a medically necessary rather than a non-medically necessary condition ($1410). This pattern is consistent with the broader literature on public views regarding health care priority setting, and the large effect of medical necessity is consistent with the theoretical literature on externalities in health care that emphasizes a concern for others health rather than health care *per se*. Next largest is communicability: at the margin they were willing to contribute $1095 for the treatment of another individual with a communicable rather than a non-communicable disease. Finally, they were willing on average, to contribute $960 for a friend rather than a stranger.

For the own-treatment scenarios, at the margin WTP is greatest for the treatment of a medically necessary condition over a non-medically necessary condition ($2091); next is WTP for a severe over a mild condition ($1193); and smallest is WTP for a communicable over a non-communicable condition ($447).

Unlike the coefficient estimates, WTP values across the other- and own-treatment are directly comparable. As expected, the willingness to pay at the margin for a medical necessity condition is substantially larger for own-treatment decisions than for the treatment of others ($ 2091 vs. $1410). At the margin, subjects are willing to pay less to treat a communicable (rather than non-communicable) condition of their own than they are for

another person ($447 vs. $1095).[6] This makes sense if they view themselves as responsible and unlikely to spread the condition to others but believe that others may not take precautions against spreading the disease. Harder to understand is the expressed willingness to pay more at the margin for the treatment of a severe rather than a mild condition for another person than for oneself ($1509 vs. $1193).[7]

4   Discussion

Jone-Lee (1992) showed that external benefits are relevant in policy analysis only to the extent that people's preferences are paternalistic — specifically health-focused — but people are not pure paternalists — they do not impose their own preferred rates of trade-off between health and money when evaluating the effects of programs on other people's health gains. By these criteria, the results of this study indicate that external benefits associated with the provision of health care are large and policy relevant. Although the responses reveal external benefits that extend beyond purely health-focused paternalism, health-focused paternalistic benefits strongly dominate. People's willingness to contribute to the treatment of others with a medically necessary condition for which the treatment can be expected to improve health is substantially higher than their willingness to contribute for the treatment of a non-medically necessary condition. These findings are consistent with the conclusions of Jacobsson *et al.* (2007) and Andersson *et al.* (2009) that people exhibit

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[6]This does not mean that they are necessarily willing to pay more overall for the treatment of another individual, only that the incremental amount they are willing to pay for a communicable vs. non-communicable condition is larger.

[7]These estimates are based on the models in columns 1 and 4 of Table 3, which have different attributes in the other- and own-treatment models. The conclusions do not differ when the analysis is based on models with identical sets of attributes for the other- and own-treatment models (i.e., when other choices are analyzed using a constrained model that drops "friend" and "neighbourhood." Such a constrained model approximates a situation in which individuals explicitly ignore the omitted attributes (Hensher, 2006; Hensher et al., 2005)

strong, health- and safety-focused paternalistic preferences. Although we are not able to test formally the necessary condition regarding a person's preferred rate at which another individual trades-off health against money, our findings suggest that people are not pure paternalists. Specifically, respondents indicated a willingness to contribute an amount for the treatment of a (generally mild) condition suffered by another person that they would not obtain if they suffered from it themselves. Finally, like others who have investigated the issue (Jacobsson et al., 2005; Smith, 2007), our results suggest that external benefit are large relative to own-benefits.

The observed pattern of external benefits is also consistent with theoretical conjectures from the literature. As posited by Jones-Lee (1992), the ratio of health-focused to pure altruistic benefits is smaller for those with whom one is emotionally close (in our case, a friend) compared to strangers. We find that people are both more willing to contribute for the treatment of a friend than a stranger, and that the incremental impact the condition being medically necessary is smaller for a friend than for a stranger. The more general finding that medical necessity notably increases the willingness to contribute (for both friends and strangers) confirms that the focus of concern is health itself, and that externalities are not associated with health care *per se* as has been posited by some (Hurley, 2000; Culyer and Simpson, 1980). The findings with respect to communicability are consistent with the conjecture that the control and treatment of communicable conditions create external benefit even in a world of selfish individuals, but they also highlight a little discussed aspect of the treatment of communicable diseases: caring externalities are also present and exceed those associated with an otherwise identical non-communicable disease. The strongest test of selfish externalities in our context — incremental willingness to pay for treatment of a communicable condition for a person living in the respondent's neighbourhood — is not significant. The non-significance of this three-way interaction is not surprising given that

such higher-order interactions commonly account for only a small proportion of variation in such models (Dawes and Corrigan, 1974; Hensher et al., 2005) But we do find evidence of selfish externalities among those respondents with individualistic value orientations, precisely the subset of people for which such external benefits are likely to be greatest. We also find a incremental willingness to contribute for the treatment of a communicable condition even when the respondent has little or no risk of acquiring the condition from the person in question. Because treating such a condition reduces the chances that it spreads among the population, caring externalities for such conditions exceed those for non-communicable conditions, a point that has received little attention in the analysis of public health and related interventions, which has emphasized only selfish externalities.

The fact that our results are in most respects consistent with *a priori* expectations, both with respect to the impact of the attributes and to differences in contribution behaviour across sub-groups classified by value-orientation, reassures us that subjects understood the scenarios and responded to the variation in the alternatives presented to them. One puzzling aspect, however, is the relatively small impact of contribution level on contribution behaviour in the other-treatment scenarios, and specifically, subject's unrealistically high willingness-to-contribute for the treatment of another. If we observed these effects for both the other-treatment and the own-treatment scenarios, it could easily be ascribed to straightforward hypothetical bias. But these effects are particularly present in the other-treatment scenarios. As noted above, they may arise from a type of "warm-glow," whereby subjects derive utility from the act of giving, which has been widely documented in stated-preference surveys (e.g., Nunes and Shokkaert, 2003). Subjects always saw the other-treatment scenarios first, so it is also possible that some type of order effect is present, though interestingly, recent work that found evidence of sequence effects for private goods did not find evidence of sequence effects in the context of charitable donations (Clark and

Friesen, 2008). Regardless, as long as any such effect, whether from warm glow, order, or another factor, is constant in the other-treatment scenarios, all estimates of the attribute effects remain valid. The effect does, however, temper conclusions that can be drawn about the precise magnitude of external benefits relative to own-benefits, and suggests that future research on health-related external benefits would be strengthened by the use of revealed-choice designs involving real contributions.

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Figure 1: Example of Nested Logit Structure for the Decision of Whether to Contribute
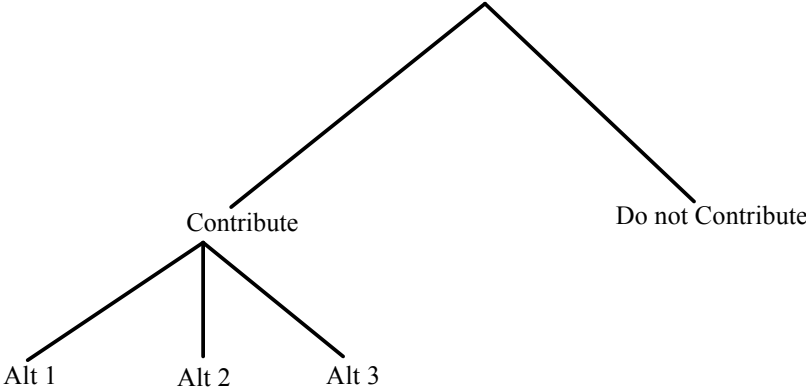for the Treatment of Another Individual

Table 1: Attributes for Choice Scenarios Regarding the Treatment of Others

Attribute	Values
Relationship	*Friend*: The individual is a friend of yours.
	Stranger: The individual is a stranger.
Communicability of Conditon	*Communicable*: The individual's condition is highly communicable and is easily spread from person to person by direct physical contact (e.g. handshake) or indirect contact (e.g., germs left on door handle, countertop, etc.
	Not Communicable: The individual's condition is non-communicable and cannot be spread from person to person.
Location	*Neighbourhood*: The indiviudal lives in your neighbourhood.
	Distant City: The individual lives in a distant city.
Severity of Condition	*Severe*: the individual's ability to function is seriously impaired and the individual is not able to carry out some usual daily activities.
	Mild: the individual's ability to function is not impaired
Medical Necessity of Condition	*Medically Necessary*: the condition is judged by health professionals to be medically necessary. That is, the treatment is expected to improve the health of the individual.
	Not Medically Necessary: the condition is judged by health professionals to not be medically necessary. That is, the treatment is not expected to improve the health of the individual, but it will improve the individual's overall sense of well-being.
Contribution Requested	$15, $25, $100, $200, $1000, $2000

Table 2: Descriptive Statistics

Variable	Mean	Std Dev
Age (Min = 16; Max = 92)	52.00	14.10
Male (1 = male; 0 = female)	0.59	0.49
Married (1 = married; 0 = non-married)	0.75	0.44
SAHS (1 = E,VG; 0 = G,F,P)	0.60	0.49
Education (1 = post-secondary grad; 0 = other)	0.76	0.43
Employed (1 = employed FT; 0 = other)	0.56	0.50
Own House (1 = own home; 0 = rent)	0.82	0.38
Household Income		
< $20,000	0.07	0.25
$20,000 to $50,000	0.15	0.36
$50,000 to $100,000	0.33	0.47
>$100,000	0.25	0.43
Did not report	0.20	0.40
Values Orientation		
Aggressive	0.01	0.09
Competitive	0.01	0.86
Individualistic	0.26	0.44
Cooperative	0.66	0.47
Altruistic	0.07	0.25

Table 3: Analysis of Other-treatment and Own-treatment Choices

	Other Treatment[a]			Own Treatment[b]
	Full Sample	Altruistic	Individualistic	Full Sample
(a) Probability of Contribution	(1)	(2)	(3)	(4)
Altruistic/Cooperative	0.227***			0.034
	(0.059)			(0.061)
Male	−0.112*	−0.021	−0.416***	0.063
	(0.061)	(0.074)	(0.134)	(0.051)
Age	0.007*	0.000	0.051***	0.004
	(0.005)	(0.006)	(0.011)	(0.005)
Excellent/VG Health	−0.166***	−0.097	−0.376***	0.131**
	(0.570)	(0.070)	(0.109)	(0.053)
Employed	0.021	−0.072	0.382***	−0.014
	(0.059)	(0.072)	(0.123)	(0.056)
Married	−0.125*	−0.139	−0.349***	−0.221***
	(0.070)	(0.093)	(0.131)	(0.064)
Own Home	−0.356***	−0.287**	−0.807***	0.100
	(0.091)	(0.111)	(0.204)	(0.077)
Post-secondary Graduate	0.021	−0.145*	0.401***	0.024
	(0.063)	(0.086)	(0.118)	(0.061)
Income 20-50k	−0.586***	−0.596***	−2.042***	−0.133
	(0.124)	(0.166)	(0.308)	(0.117)
Income 50-100k	0.391***	0.041	1.045***	0.035
	(0.107)	(0.153)	(0.194)	(0.096)
Income > 100k	0.225*	0.173	0.414*	0.397***
	(0.128)	(0.174)	(0.239)	(0.015)
Income: Did not report	0.140	−0.204	0.946***	0.273***
	(0.115)	(0.160)	(0.202)	(0.100)
Constant (Contribute)	0.683***	1.491***	−1.673***	0.599**
	(0.242)	(0.322)	(0.535)	(0.255)
(b) Attribute Estimates				
Communicable	0.331***	0.367***	0.276***	0.235***
	(0.033)	(0.041)	(0.060)	(0.056)
Severe	0.455***	0.498***	0.401***	0.670***
	(0.042)	(0.051)	(0.079)	(0.107)
Medically Necessary	0.422***	0.465***	0.380***	1.337***
	(0.060)	(0.077)	(0.105)	(0.083)
Friend	0.355***	0.418***	0.257***	
	(0.051)	(0.067)	(0.085)	
Neighbourhood	0.030	−0.002	0.093	
	(0.041)	(0.051)	(0.075)	
Contribution	−0.0006***	−0.0007***	−0.0005***	−0.0012***
	(0.0001)	(0.0001)	(0.001)	(0.0001)
Friend*Severe	0.050**	0.064**	0.026	
	(0.020)	(0.025)	(0.036)	
Neigh*MedNec	0.152***	0.200***	0.073	
	(0.045)	(0.057)	(0.077)	
Communicable*Severe	0.029	0.001	0.096**	−0.208***
	(0.019)	(0.024)	(0.039)	(0.041)
Communicable*Neigh	0.005	−0.005	0.023	
	(0.021)	(0.027)	(0.039)	
Friend*MedNec	−0.091**	−0.150***	0.021	
	(0.043)	(0.057)	(0.071)	
Observations	12864	9312	3552	8576
Individuals	268	194	74	268
Log-L	−3218.62	−2273.53	−899.38	−1478.64
Inclusive Value (λ)	0.661***	0.701***	0.629***	
L-R Test for IIA in CL model	24.64***	13.87***	7.52***	

Notes: [a]Analyzed using a nested-logit model.   [b]Analyzed using a conditional-logit model.

*** = p < 0.01; ** = 0.01 < p < 0.05; * = 0.05 < p < 0.10

Table 4: Probability of Contributing versus Not Contributing for Defined Choice
Alternatives

| | Other Treatment | | | Own Treatment |
| | Full | | | Full |
Scenario[a]	Sample	Altruistic	Individualistic	Sample
$25 Contribution				
Baseline[b]	0.487	0.647	0.103	0.217
Communicable	0.632	0.794	0.136	0.402
Severe	0.668	0.813	0.168	0.617
Medically Necessary	0.661	0.808	0.169	0.801
Friend	0.676	0.834	0.149	
Fr, Comm, Sev, Med Nec	0.958	0.984	0.658	0.961
$100 Contribution				
Baseline[b]	0.476	0.635	0.100	0.202
Communicable	0.622	0.786	0.132	0.380
Severe	0.658	0.805	0.163	0.594
Medically Necessary	0.651	0.800	0.164	0.785
Friend	0.667	0.827	0.145	
Fr, Comm, Sev, Med Nec	0.956	0.983	0.650	0.957
$1000 Contribution				
Baseline[b]	0.346	0.485	0.068	0.077
Communicable	0.490	0.665	0.091	0.168
Severe	0.529	0.691	0.113	0.325
Medically Necessary	0.521	0.684	0.114	0.546
Friend	0.538	0.721	0.100	
Fr, Comm, Sev, Med Nec	0.928	0.969	0.548	0.881

[a]Other-treatment scenarios are defined by 5 attributes: relationship (friend, stranger), communicability (communicable, non-communicable), location (distant city, neighborhood), severity (mild), severe), and medical necessity (medically necessary, not medically necessary). Own-treatment scenarios are defined by the subset of 3 attributes: communicability, severity and medical necessity.

[b]The baseline scenario is the lowest-probability set of attributes: stranger, non-communicable, distant city, mild, not medically necessary. Each scenario listed changes only the attribute indicated while keeping other attributes at the baseline level.

Table 5: Willingness-to-Pay ($): Other- and Own-treatment Choices

	Other-Treatment[a]	Own-Treatment	Difference[b] (p-value)
Friend	959.9 (79.87)		
Communicable	1095.4 (81.64)	446.9 (95.53)	0.000
Severe	1508.7 (101.3)	1193.2 (128.7)	0.019
Medically Necessary	1410.1 (158.3)	2091.4 (203.6)	0.003

[a]Standard Errors in parentheses; computed by the delta method (Greene, 2003).
[b]Computed using the combinatorial test for the statistical difference between the two WTP values.

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Appendix 1: The Stated-preference Survey Instrument

PREFERENCES SURVEY [1]

Background Information

Scenario

Although Canada's publicly funded health care system covers most physician and hospital services free of charge, it provides either no coverage or only limited coverage for many other types of health care. Examples of such services outside the universal public insurance plan include prescription drugs, physiotherapy, counseling by a clinical psychologist and dental care. These uncovered services can be either medically or not medically necessary. Although some Canadians have private health insurance that covers some of these services, such coverage is often very limited; in addition, many Canadians have no such private insurance and must pay the full cost of such services. This can impose a sizable financial burden on many individuals and families.

In response to this, imagine that a registered charitable organization has been created to assist individuals in obtaining a specific treatment for such non-covered services. Donations to the organization are distributed on a case-by-case basis to individuals who have applied for financial assistance to pay for the cost of the treatment. In each case, the charitable organization verifies that it is effective in treating the individual's condition and ensures there is no other reasonable, lower-cost way of treating the condition.

On the next few screens, we describe a series of scenarios pertaining to individuals who are eligible to receive donations through the charity to assist in paying for a treatment. In each scenario we describe a number of characteristics of the individuals and their conditions. In each case we are interested in your willingness to contribute to the charity the amount indicated to ensure that an individual can receive treatment.

Attributes

As noted, each scenario you see will be described by a set of characteristics of the individuals who seek the treatment and the condition they have.

Characteristics of the Individual Who Seeks Treatment and the Condition

Characteristic 1: **Relation** of the individual to you

> *Friend*: The individual is a friend of yours.
> *Stranger*: The individual is a stranger to you.

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[1] This presents the choice scenario, attribute descriptions and, for each section of the survey, one example of the choice screens seen by subjects completing the survey. The survey was designed and administered online in Limesurvey.

Characteristic 2: **Communicability** of the condition

 Communicable: The condition the individual has is highly communicable. That is, the condition is easily spread from person-to-person by direct physical contact (e.g., handshake) or indirect contact (e.g., germs left on a door handle, countertop, etc.).
 Not Communicable: The condition the individual has is non-communicable. That is, it cannot be spread from person-to-person.

Characteristic 3: **Location** of the individual

 Neighbourhood: The individual lives in your neighbourhood.
 Distant City: The individual lives in a distant city.

Characteristic 4: **Severity** of the condition

 Severe: Severity of the condition is such that the individual's ability to function is seriously impaired and the individual is not able to carry out some usual daily activities.
 Mild: Severity of the condition is such that the individual's ability-to-function is not impaired.

Characteristic 5: **Medical necessity** of the condition

 Medically Necessary: Condition is judged by health professionals to be medically necessary. That is, the treatment is expected to improve the health of the individual.
 Not Medically Necessary: Condition is judged by health professionals to not be medically necessary. That is, the treatment is not expected to improve the health of the individual, but it will improve the individual's overall sense of well-being.

Characteristic 6: Amount of your **contribution**

 $15
 $25
 $100
 $200
 $1000
 $2000

Part 1: Scenarios Involving the Treatment of Others

As we have described, some health care services are not covered by Canada's publicly funded health care system. Please click the link [Background Information](#) if you would like to review the background information.

Imagine that a registered charitable organization has been created to assist individuals in obtaining health care services not covered by the public health care system. In this section, we present a series of scenarios which ask you to make a choice between four options. Three individuals have been approved to receive donations through this charity. Relevant characteristics of the individuals, the treatment and the donation amounts requested are specified. Individuals are identical in all other respects.

Choice Problem

For each scenario we give you four options regarding a possible contribution and ask that you select one option: Option A (contribute and treat Individual 1), Option B (contribute and treat Individual 2), Option C (contribute and treat Individual 3) or Option D (which is to not make a contribution to any of the three individuals). For each of options A, B and C, making the contribution will ensure this individual obtains the health care treatment because of assistance provided by the charity; if no contribution is made (Option D) none of the three individuals will obtain financial assistance through the charity and none will be treated. There are no right or wrong answers.

A few things to note when making your decisions:

- Imagine that you are making the contributions out of your own pocket.

- Treat each decision independently. Your decision in one scenario should not affect your decision in another scenario.

- There are no right or wrong answers.

To help you understand the questions, we provide an example on the next screen.

Example

Here is an example of the kind of decision you will be asked to make concerning the treatment of others. Four options will appear on your computer screen. **[2]**

Example: Characteristics	Option A: Individual 1	Option B: Individual 2	Option C: Individual 3	Option D
Relation	Friend	Stranger	Stranger	
Communicability	Communicable	Not Communicable	Communicable	
Location of Individual	Distant City	Neighbourhood	Neighbourhood	Do not donate to any individual.
Severity	Severe	Mild	Mild	
Medical Necessity	Medically Necessary	Not Medically Necessary	Medically Necessary	
Contribution	$50	$1000	$200	$0

Please select the option that represents your most preferred choice among options A, B, C and D:
     O: Option A
     O: Option B
     O: Option C
     O: Option D

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[2] Subjects saw tables identical to these in the online Limesurvey version

Explanation

If you choose Option A, you indicate that, of the four options listed, you would most prefer to contribute $50 to fund the medically necessary treatment of a friend who lives in a distant city and suffers from a severe, communicable condition.

If you choose Option B, you indicate that, of the four options listed, you would most prefer to contribute $1000 to fund the treatment of someone you don't know living in your neighborhood who suffers from a mild, non-communicable condition that is not considered medically necessary but for which treatment will improve the person's overall sense of well-being.

If you choose Option C, you indicate that, of the four options listed, you would most prefer to contribute $200 to fund the medically necessary treatment of someone you don't know living in your neighbourhood who suffers from a mild, communicable condition.

If you choose Option D, you indicate that, of the four options listed, you would most prefer to not contribute to funding the treatment of any of the three individuals.

Note that we have created reminder pop-up windows to help you keep track of the characteristics. Simply click on any of the characteristic labels for helpful information.

(For Firefox users: please note, if you accidently click the back button, you may need to refresh and re-send data in order to continue.)

On the following 12 screens, we present 12 different scenarios that are similar to this example. For each of the scenarios, please choose the most preferred of the four options. Remember there are no right or wrong answers.

Part 1: Scenarios Involving the Treatment of Others[3]

Question 1: Characteristics	Option A: Individual 1	Option B: Individual 2	Option C: Individual 3	Option D
Relation	Stranger	Stranger	Stranger	
Communicability	Not Communicable	Not Communicable	Not Communicable	
Location of Individual	Neighbourhood	Distant City	Distant City	Do not donate to any individual.
Severity	Mild	Severe	Mild	
Medical Necessity	Medically Necessary	Medically Necessary	Not Medically Necessary	
Contribution	$100	$2000	$25	$0

Please select the option that represents your most preferred choice among options A, B, C and D:
   O: Option A
   O: Option B
   O: Option C
   O: Option D

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[3] Only one question appeared on screen at a time, automatically followed by the next question once a choice was made and "submit" button pressed. Participants were unable to go back to revise responses.

Part 2: Scenarios Involving Your Own Treatment

We are now going to switch gears slightly. As we have described, some health care services are not covered by Canada's publicly funded health care system. Please click the link Background Information if you would like to review the background information.

Please imagine now that YOU have a condition such as that described by the characteristics and that there is a treatment that will effectively treat your condition, but is not publicly covered. Further, you do not have any private insurance to help pay for the treatment. You must pay the full cost yourself to receive the treatment. In each scenario listed below we describe a condition in terms of four characteristics: communicability of the condition, medical necessity of the condition, severity of the condition if not treated, and the cost you must pay to obtain the treatment.

Choice Problem

For each decision scenario you have two options: either purchase treatment at the cost indicated (Option A) or leave the condition untreated and pay nothing (Option B).

Again, please note a few things when making your decisions:

- Imagine that you are paying the full cost for the treatment out of your own pocket.

- Treat each decision independently. Your decision in one scenario should not affect your decision in another scenario.

- There are no right or wrong answers.

To help you understand the questions, we provide an example on the next screen.

Example

Here is an example of the kind of decision you will be asked to make concerning your own treatment. Two options will appear on your computer screen.

Example: Characteristics	Option A	Option B
Communicability	Communicable	
Severity	Severe	You choose not to seek treatment: you pay nothing and you remain in the condition described.
Medical Necessity	Medically Necessary	
Cost of Service to You	$50	$0

Please select the option that represents your preferred choice between options A and B:
      O: Option A
      O: Option B

Explanation

If you choose Option A, you indicate that you prefer to pay $50 for the treatment of a medically necessary, severe, communicable condition.

If you choose Option B, you indicate that you prefer not to seek treatment, you pay nothing and you remain with the condition.

On the following 16 screens we present 16 different scenarios similar to this example. Please choose the more preferred of the two options. Remember there are no right or wrong answers.

Part 2: Scenarios Involving Your Own Treatment[4]

Question 1: Characteristics	Option A	Option B
Communicability	Not Communicable	
Severity	Mild	You choose not to seek treatment: you pay nothing and you remain in the condition described.
Medical Necessity	Not Medically Necessary	
Cost of Service to You	$15	$0

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[4] Only one question appeared on screen at a time, automatically followed by the next question once a choice was made and "submit" button pressed. Participants were unable to go back to revise responses.

Part 3: Scenarios Involving Money Sharing

In this section, we present some hypothetical choices about money. Your choices affect the amount of money you receive as well the amount of money received by a random person with whom you have been hypothetically matched. You do not know who this other person is.

For each question we present two options and ask you to choose one. Each option describes an amount of money that you get as well as an amount of money the other person gets.

For some options, you, the other person, or both of you may receive negative amounts (i.e. lose money). These are indicated by negative signs (i.e. -$5.00 means a loss of $5.00). All amounts are in Canadian dollars.

Imagine that at the same time you are making your choices the other person is answering the same questions, making choices as to how they would split money between themselves and you.

After you have made all of your choices, the final amount of money you would hypothetically "receive" is the total of all amounts that you get from *your* choices plus the total of all amounts that you get from *the other person's* choices. Similarly, the final amount the other person gets is the total of the amounts that you decided to give them through your choices plus the amounts that they decided to give themselves through their choices.

To help you understand, we provide an example on the next screen.

Here is an example of the kind of decision you will be asked to make. Two options will appear on your computer screen.

Option A		Example	Option B	
You Receive	Other Receives		You Receive	Other Receives
$9.70	-$2.60		$10.00	$0.00

You must select either Option A or Option B:
      O: Option A
      O: Option B

Explanation:

If you choose Option A, you receive $9.70 and the other person loses $2.60.

If you choose Option B, you receive $10.00 and the other person receives nothing.

On the following 24 screens, we present 24 different scenarios similar to this example. You must choose either Option A or Option B.

Remember there is no right or wrong answer.

Part 3: Scenarios Involving Money Sharing[5]

Option A		Q1	Option B	
You Receive	Other Receives		You Receive	Other Receives
$7.10	$7.10		$5.00	$8.70

You must select either Option A or Option B:
      O: Option A
      O: Option B

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[5]Subjects completed 24 money-sharing questions as part of the values-orientation component.