HOW DO PEOPLE VALUE LIFE?

INCONSISTENCIES AND MECHANISMS

by

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ABSTRACT OF THE DISSERTATOIN

How Do People Value Life?

Inconsistencies and Mechanisms

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Dissertation Director:

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This dissertation research examines the decision processes underlying how people value lives saved in situations of resource scarcity. Three policies a person could use are examined: (1) treating all lives equally, (2) prioritizing people who will gain the most benefit (e.g. additional life years) from an intervention, and (3) prioritizing young people regardless of the additional life years they have left. These metrics imply different strategies for health resource allocation, especially when such resources are scarce. Vaccination scenarios were used to probe which metrics lay people use in different situations and how the type of question influences the metric they used. In direct questions, people were asked about their general principles (e.g., all lives are equal, prioritize the young, etc.). In indirect questions, people were given an allocation problem (e.g., there are 1000 people at risk but only 500 vaccines; who should get the vaccines?)

Two hypotheses were tested. **Hypothesis 1:** People show systematic inconsistencies in life-evaluating metrics they endorse when they are asked to express their views directly versus indirectly. **Hypothesis 2:** The above stated inconsistencies are caused by different goals. A moral goal is activated when people face the direct question, leading to preference for life-evaluating metrics consistent with established moral principles, such as equality; in contrast, an efficiency goal is activated when people face the indirect question, leading to preference consistent with maximizing efficiency, such as the "years-left" metric. The broader impacts of this research derive from the fact that the public's support for health policies may be malleable: While the pro-young tendencies may drive support for specific policies for how to prioritize scarce health resources (i.e. the 2009 H1N1 vaccine was prioritized for people under age 25), such tendencies may be concealed in more direct measures, where prioritizing life explicitly seems a more apparent contradiction to the oft-cited norm that "all lives are equal". Studying these inconsistencies provides important information on how to design public health policies and how to present them to the public.

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Last but not least, I want to dedicate this dissertation to Rex Wright, who changed my life by opening the door of Psychology for me.

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INTRODUCTION

Whose lives should be saved when it is impossible to save all? This question has been the topic of many philosophical and psychological discussions. One aspect of the question is illustrated in the famous "trolley problem" (Foot, 1967; Thomson, 1985), which presents a dilemma between letting 5 people die and killing one individual deliberately to save the 5 individuals. This problem has been used to understand the rules people use in moral reasoning, especially about utilitarianism, intentionality and responsibility with regard to saving lives (Bartels, 2008). Separately, another, and more practical aspect of the question is, when the number of lives to be saved is equivalent, who should be saved among the population? For example, how should a limited vaccine supply be allocated among the population during a pandemic flu? This dissertation discusses this latter aspect of the question.

When medical resources are allocated among the population, aside from the question of who is more at risk for morbidity and mortality, and who is more responsive to intervention (Galvani, Medlock, & Chapman, 2006), a basic question remains: How do people quantify the outcome of health interventions—the metric for evaluating life? Potential metrics include the number of lives saved, the number of life years gained, and the number of quality adjusted life years (QALYs) gained (Pliskin, Shepard, & Weinstein, 1980). Another possible metric is one that values people according to their age per se (the number of years they have lived so far, or "years-lived"), valuing the young over the old regardless of the number of years they have left to live. These metrics imply different optimal policies. The number-of-lives metric requires that the optimal policy maximize the number of individuals being saved, assuming no priority in saving certain individuals

over others. Under a life-years-saved metric, however, one would prioritize younger individuals, to the extent that they have a greater number of years left to live. We call this a "years-left" metric in this paper. The QALYs metric is similar but prioritize lives of healthy compared with ill individuals, given the same life expectancy, and assigns value to interventions that improve quality of life even if they do not extend life. The "years-lived" metric reflects a tendency to prioritize younger individuals, just because they are young, and have not yet lived their "fair innings" of life (Chasteen & Madey, 2003; Williams, 1997a).

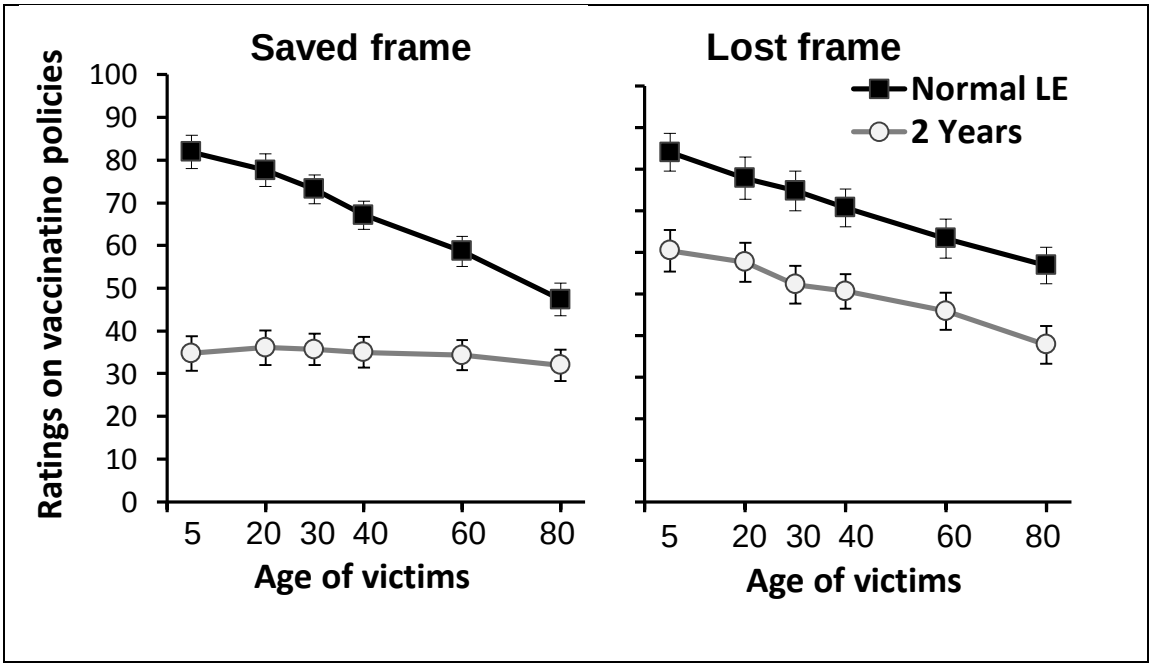
Previous studies indicate that the public values the lives of young people more than those of older people (Busschbach, Hessing & de Charro,1993; Cropper, Aydede & Portney, 1994; Johannesson & Johansson, 1997; Lewis & Chamy, 1989; Ratcliffe, 2000; Rodriguez & Pinto, 2000; Tsuchiya, Dolan & Shaw, 2000). People may value younger versus older individuals for a number of reasons (Rodriguez & Pinto, 2000). Not only do young people have more "years left" to live, and thus receive more benefit from a life-saving intervention, they also have fewer *years lived* so far, and thus deserve their "fair innings" (Williams, 1997b). For example, a 20-year old has about 3 times as many years left as one who is 60 (assuming an average life expectancy of 80 years); however, saving one 20-year-old is viewed as equivalent to saving seven 60-year-olds (Cropper et al., 1994), which indicates greater value for younger individuals even beyond what the "life-years saved" metric would predict. This response pattern may stem from a sentiment that the death of a younger person is perceived as more tragic and unjust than the death of an older person (Chasteen & Madey, 2003), indicating some support for the "fair innings" rationale.

There is still extensive debate among bioethicists as to whether age should be taken into account in healthcare allocation (Evans, 1997; Williams 1997 a, b). In reality, public health policies that do use age as a resource allocation criterion usually do so because of different transmissibility of disease or efficacy of intervention among different age groups (Galvani et al., 2006), such as the 2009 H1N1 vaccine distribution policy (people under age 25 were prioritized because they do not have prior immunity and thus, were most susceptible to H1N1). On the other hand, the "years-left" metric has been adopted by government agencies such as the Food and Drug Administration (U.S. Food and Drug Administration, 2006), and QALYS has been recommended by the Panel on Cost-Effectiveness in Health and Medicine recommendations (Weinstein, Siegel, Gold, Kamlet, & Russel, 1996), although the use of QALYS in cost-effectiveness studies is still low (Räsänen et al., 2006). The public's preference for the lives of younger people beyond the "years-left" metric, however, has not been accepted as a rational metric to evaluate health interventions in government policies, possibly due to the controversial moral implications of holding young people as more "deserving" the chance to live than older people.

Li , Vietri, Galvani & Chapman (2010) demonstrated a framing effect on the use of life-evaluating metrics among both college-age and nationally representative samples (Figure 1). In the study, half of the participants read about 12 vaccine distribution policies that will save 500 out of 1000 potential victims from flu death, the other half of participants read about the same 12 policies, whose consequences were 500 out of 1000 potential victims dying from flu. The 12 policies varied on the age (5-80) and life-expectancy (LE) (normal LE, versus 2 years left to live) of target victims. Participants

rated policies on how acceptable they were, which served as an index for how much value they placed on the lives of victims involved in each policy. The results (Figure 1) showed that when vaccine distribution policies were described in terms of lives saved, people judged them using a "years-left" metric, prioritizing young targets only when they have more years to live, but not when they have the same number of years left (2 years) as older targets; in contrast, when the policies were described in terms of lives lost, people judged them based on a "years-lived" metric, prioritizing young targets even if they have no more years left to live than old targets. In addition, although participants valued young targets more than old targets in general, younger participants did so even more than older participants.

Figure 1. *From Li et al (2010). College participants' ratings of acceptability of vaccine distribution policies as a function of target victims' age (5-80), life expectancy (normal, or 2 years), and question framing ("lives saved", or "lives lost"). Results from a national sample showed similar patterns.*



The results from Li et al. (2010) demonstrate that people do not value all lives equally, but instead, used either the "years-left" or "years-lived" metric depending question framing. In the study, the metric by which participants evaluated life was indirectly inferred from their judgments of the vaccine distribution policies. We refer to such assessment of life-evaluating metric as the "indirect measure." However, it is unclear whether in a more direct assessment, such as in a question directly asking people how lives should be evaluated, they would openly endorse the "years-left" or "years-lived" metric. We suspect not, because of the seemingly unshakable moral principle that "all lives are equal". As written in the United States Declaration of Independence "All men are created equal" (Declaration of Independence, 1776), people place tremendous value on equality, sometimes to the extent that they would rather save fewer lives to achieve such an ideal (Ubel, Dekay, Baron & Asch, 1996). However, given the "years-left" and "years-lived" metrics demonstrated in Li et al. (2010), it is likely that an individual may hold conflicting metrics when evaluating lives: They may feel morally obliged to say all lives should be valued equally, while assigning greater weight to lives of younger people when allocating resources.

Overview

This dissertation includes a series of studies that test two hypotheses. Chapter 1 tested Hypothesis 1: People will demonstrate systematic differences in the metric they use to evaluate life depending on whether they are asked to express their views directly or indirectly. Chapter 2 examined the mechanisms of such inconsistency, as proposed in Hypothesis 2: Such systematic differences are due to the moral versus efficiency goals activated in the direct and indirect measures, respectively.

CHAPTER 1: ARE PEOPLE CONSISTENT IN HOW THEY VALUE LIFE?

In Chapter 1, three studies tested whether people show systematic differences in the metric they use to evaluate life depending on whether they are asked to express their views directly or indirectly on how to value life (Hypothesis 1). Study 1 used the vaccine distribution task from Li et al. (2010) in the indirect measure, inferring the metric participants used to evaluate life from ratings of policies targeted at 12 different victim groups; the direct measure simply asked participants to choose explicit descriptions of the "all lives equal", "years-lived" and "years-left" metrics. Study 2 modified the indirect measure to include only 2 victim groups, so that metrics could be more clearly inferred, and Study 3 tested the robustness of the inconsistency between direct and indirect measures by using more similar versions of the two measures.

Study1

In this study, we administered an indirect measure and a direct measure of how people value lives to the same group of participants. The indirect measure was taken from Li et al (2010), and the direct measure asked participants to choose from descriptions of 3 metrics: "all lives equal", "years-left" and "years lived". Participants' ratings in the indirect measure were used to deduce the metric they used, and this metric was compared to the metric they chose in the direct measure to test response inconsistencies. The study was conducted among a nationally representative participant sample.

Methods

Participants

We recruited participants via a commercial survey company Survey Sampling International (SSI), as in Li et al (2010). There were 1039 participants ranging from 18-

89 years old (M = 48.42, SD = 15.57). The age distribution was representative of the U.S. adult population.

Procedures

The study was conducted on the Internet. See Appendix for original questionnaire. First, we administered an indirect measure to determine which metric participants use to evaluate life. Participants read a hypothetical scenario about a flu epidemic and rated 12 vaccine distribution policies. This scenario was taken from Li et al (2010), with minor modifications. The scenario described a pandemic Swine flu in a large hospital. The flu outbreak would result in 1000 deaths, and there were limited flu vaccine supplies to distribute among these potential victims. As in Li etl al (2010), participants saw 12 vaccine distribution policies, either in a "lives saved" version or a "lives lost" version: For half of the participants, vaccination policies were described as saving 500 lives, and for the rest of the participants, policies were described as resulting in 500 deaths (out of the 1000 deaths expected if no intervention were undertaken). Age and life-expectancy of potential flu victims were also manipulated as in Li et al (2010): Each policy targeted 500 people belonging to one of 6 age groups (5, 20, 30, 40, 60 and 80 years old), all of whom either had a normal life expectancy (taken from Arias, 2007) or 2 years left to live due to pre-existing health conditions, resulting a 6 (age) × 2 (life expectancy: normal or 2 years) × 2 (framing condition: "lives saved" or "lives lost") mixed design within the indirect measure, with framing condition as a between-subject factor, and age and life expectancy status as within-subject factors. All 12 policies appeared on the same page, ordered from oldest to youngest and alternated between normal life expectancy and 2-year life expectancy, with the policy concerning individuals with a normal life

expectancy presented first[1]. Participants rated all policies on a scale ranging from 0 "*least acceptable"*, to 100 "*most acceptable"*.

Participants then encountered a direct measure of life-evaluating metrics on a separate page (see appendix). Participants read: "*When distributing medical resources, it is sometimes necessary to set priorities among lives. How do you think lives should be valued in such situations?*" and chose one among four options: *1) "all lives are equal; no one's life is worth more than others'."* 2) "*People who have more years to live should be valued more, because they benefit more from the intervention*." 3) "*Young people should be valued more, even if they do not have many years left to live, because they haven't lived a full life yet*." and 4) "*other*". The first 3 options represented the "all equal" "years left" and "years lived" metrics, respectively.

Results

In the policy rating task, the framing effect with "lives saved" versus "lives lost" versions of the questionnaire replicated results from Li et al. (2010), with rating patterns showing a "years left" metric in the lives saved version, and a "years lived" metric in the lives lost version (data not shown). Framing also affected the metric chosen in the direct measure in a similar way. The "years-left" metric was more popular in the saved version (26.3%) than in the lost version (19.3%), $\chi^2(df = 1, N = 1039) = 7.23$, $p = .007$, while "all lives equal" was less popular in the saved version (53%) than in the lost version (62%). Framing, however, did not affect inconsistency in responses between the direct and indirect measures in the analysis below, and data from both frames are collapsed.

[1] There was another manipulation that included presenting pictures of people at the age targeted by each policy to half of participants. This manipulation had no significant effect on either the direct and indirect measure, and did not affect the conclusion on inconsistency between measures, and thus, was not discussed further.

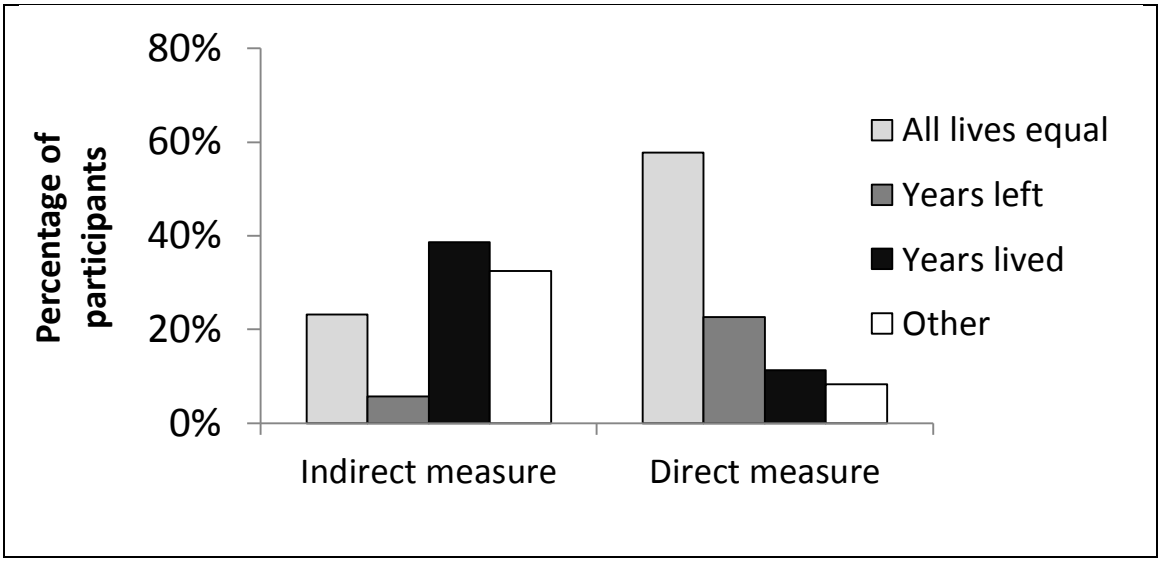
To identify participant's use of life-evaluating metrics in the indirect measure, each participant's 12 policy ratings (ratings in the "lives lost" framing condition were reverse-coded before analysis) were subjected to a regression analysis with target age and life expectancy status as the independent variables. The criteria to categorize participants on metric used in the vaccine distribution policy task are listed in Table 1. Following Li et al., a "years-left" metric means that greater values are assigned to lives with more years left to live, and was operationally defined as decreasing ratings to policies regarding victims with normal life expectancy as the age of victims increases, with identical ratings on policies targeting victims with the same number of years left (2 years); a "years-lived" metric means that greater values are assigned to young lives regardless of the number of years they have left, and was operationally defined as decreasing ratings on policies as the age of the victims targeted in the policy increases, even when their life expectancy was the same (2 years). The "all lives equal" metric was operationalized as identical ratings for all 12 policies.

Table 1. *Metric categorization criterion for the indirect measure in studies 1*

Metric	Regression Result
All lives equal	Exact same ratings for all 12 policies
Years-left	Exact same ratings for the 6 policies regarding targets with 2-year LE and negative regression coefficient for age regarding targets with normal LE
Years-lived	Negative regression coefficient for age regarding targets with 2-year LE
Other	other patterns

As illustrated in Figure 2 (collapsed across framing conditions), in the indirect measure, "years-lived" was the most frequently used metric (39%) as inferred from participants' rating patterns, and only 23% used the "all lives equal" metric. However, in the direct measure, "Years-lived" was only supported by a small number of participants (11%), while "all lives equal" (57.7%) was the most openly endorsed metric. We tested the inconsistency of metrics between the direct and indirect measures using the McNemar-Boker χ^2 statistic; $\chi^2 = 479.79$ ($df = 6$, $N = 1039$), $p < .001$. Thus, "all lives equal" was frequently endorsed directly but infrequently applied in the indirect policy rating task.

Figure 2. *Participants' use of life-evaluating metrics as deduced from ratings of vaccine distribution policies (indirect measure), and the choice of life-evaluating metrics when directly asked to choose among 4 options (direct measure) in Study 1. Figure represents collapsed data from the "lives-saved" and "lives-lost" frames.*



To examine whether participants' own age affected their choice of metric, we conducted multinomial logistic regressions on choice of metric (reference category =

"years-lived" metric) in the indirect and direct measures, respectively, with age as a predictor. In the direct measure, age was a positive predictor for choosing "all lives equal" metric over the "years-lived" metric, $B = .02$, $SE(B) = .01$, OR = 1.02, $p < .001$. Age also predicted choice of "other" metrics over the "years-lived" metric in the direct measure, $B = .03$, $SE(B) = .01$, OR = 1.03, $p = .002$, and in the indirect measure, $B = .01$, $SE(B) = .01$, OR = 1.01, $p = .01$. Age did not predict choice of the "years-left" metric over the "years-lived" metric. Thus, younger participants were more likely to demonstrate the "years-lived" metric, while older participants were more likely to show an "all lives equal" metric, or some other metrics, but were no more likely to show the "years-left" metric. As the "years-lived" metric is more in favor of young lives than the "all lives equal" metric, or the "years-left" metric, these results were consistent with findings from Li et al. (2010) that people show an ego-centric tendency when evaluating life, placing higher value on lives of people closer to their own age.

To examine whether participants' age had an effect on consistency, we categorized participants based on whether their responses between the direct and indirect measures were consistent or not, and conducted logistic regression on consistency with age as a predictor, but found no significant effect, $p > .8$.

Discussion

Results from Study 1 demonstrated a systematic inconsistency between the life-evaluating metrics participants used in the indirect measure (policy rating task) and the metric they chose in the direct measure: The "years-lived" metric was far less popular in the direct measure compared to the indirect measure, and the "all lives equal" metric was more popular in the direct measure than in the indirect measure. The study also

demonstrated an ego-centric tendency consistent with findings from Li et al. (2010), that is, although there was a general tendency to value young targets more than old targets, older participants evaluated targets of different ages more equally than younger participants do.

Study 1 provides evidence for our hypothesis that there are inconsistencies between what metric people use to evaluate life when faced with resource allocation tasks and what metric they say they would support when directly asked. However, the design in Study1 had some limitations. First, the criteria used for categorizing metrics in the indirect measures were not optimal. The regression analysis only gives a best fit, assuming only one metric, instead of a combination of metrics being used in the judgments of vaccine distribution policies or victim priorities. For example, when the age slope for victims with normal and those with 2-year life-expectancy (LE) were both negative, but different, it may indicate that participants placed some weight on "years-lived", but "years-left" was give some additional weight as well. This mixed strategy, however, was categorized as a "years-lived" metric based on the regression weights. This categorization scheme was used because a "mixed" indirect metric could not be easily compared to explicit metrics to judge consistency. Nevertheless, such rough categorization could potentially lead to overestimation of inconsistency. A second limitation is that it is simply less probable that ratings for 12 policies would be identical when ratings were given randomly, and the criteria for categorizing indirect metric as "all lives equal" may be too strict. These limitations were addressed in Study 2.

Study 2

The purpose of Study 2 is to demonstrate the systematic discrepancies between direct and indirect measures of life-evaluating metrics using a cleaner, simpler design. Inconsistency between direct and indirect measures was tested in 2 parts in Study 2 (Table 2), with Study 2A comparing "all lives equal" to age-sensitive metrics without distinguishing "years-left" and "years-lived" metrics, and Study 2B directly comparing the "years-left" and "years-lived" metrics. Study 2A mentioned only the age of two target groups in the indirect measure: When life expectancy (LE) is not mentioned, it is presumably natural for people to assume LE is normal, with 20-year olds having more years left than 60-year olds. A pro-young metric will lead to preference for saving 20-year olds while an "all lives equal" metric will lead to equal preference for the two victim groups. Study 2B reversed the assumption that younger people have longer LE by dictating that the older targets have more years left than the younger targets do, with the difference in the number of years left equal to the age difference (see Table 2). Thus, in Study 2B, a "years-left" metric should lead to preference for saving the older targets, while a "years-lived" metric should lead to preference for saving the younger targets. The indirect measure in both studies was presented in the "lives saved" frame. Direct measure in both studies described the relevant metrics explicitly, and both direct and indirect measures used forced choice questions. To exclude the possibility that the description of the "all lives equal" metric in the direct measure was misinterpreted, we changed the wording to "*All lives should be valued equally, regardless of age*", making it explicit that the question at hand was about age.

The direct and indirect measures were administered to the same individuals, so that consistency can be measured. The order of the two measures was counterbalanced,

resulting in a 3 (metric) × 2 (measure type: direct vs. indirect) × 2 (order: direct first vs. indirect first) mixed design, with metric and measure type as within-subject variable, and order as a between-subject variable.

Table 2. *Indirect & Direct Measures of Life-evaluating Metrics in Study 2(See exact wording in Appendix)*

Indirect measure	Direct measure
Study 2A: "All equal" vs. Age-related	
A) save 500 20 year olds.	A) more important to save young
B) save 500 60 year olds.	B) more important to save old
C) equally important	C) All lives are equal, regardless of age
Study 2B: "Years-left" vs. "years-lived"	
A) save 500 25 y.o. with 5 years to live	A) save young, regardless of # of years left
B) save 500 50 y.o. with 30 years to live	B) save those with greater # of years left, regardless of age.
C) equally important to save	C) Age and # of years left equally important

Methods

Participants

We recruited participants from an Internet survey panel Amazon Mechanical Turk. Participants received a small monetary compensation for completing the survey. Study 2A included 103 participants (34 males, 69 female), with age ranging from 18 to

68 (*M* = 34.28, *SD* = 12.32); Study 2B included 103 participants (44 males, 59 females), with age ranging from 18 to 63 (*M* = 32.25, *SD* = 10.93).

Questionnaires

The study was conducted on the Internet. In both Studies 2A and 2B, participants saw both the direct and indirect measures, which were presented in 2 separate web pages. Half of participants completed the direct measure prior to the indirect measure, and the order was reversed for the rest of the participants. The questionnaires were programmed so that participants were unable to alter their response to the first measure once they were directed to the second measure.

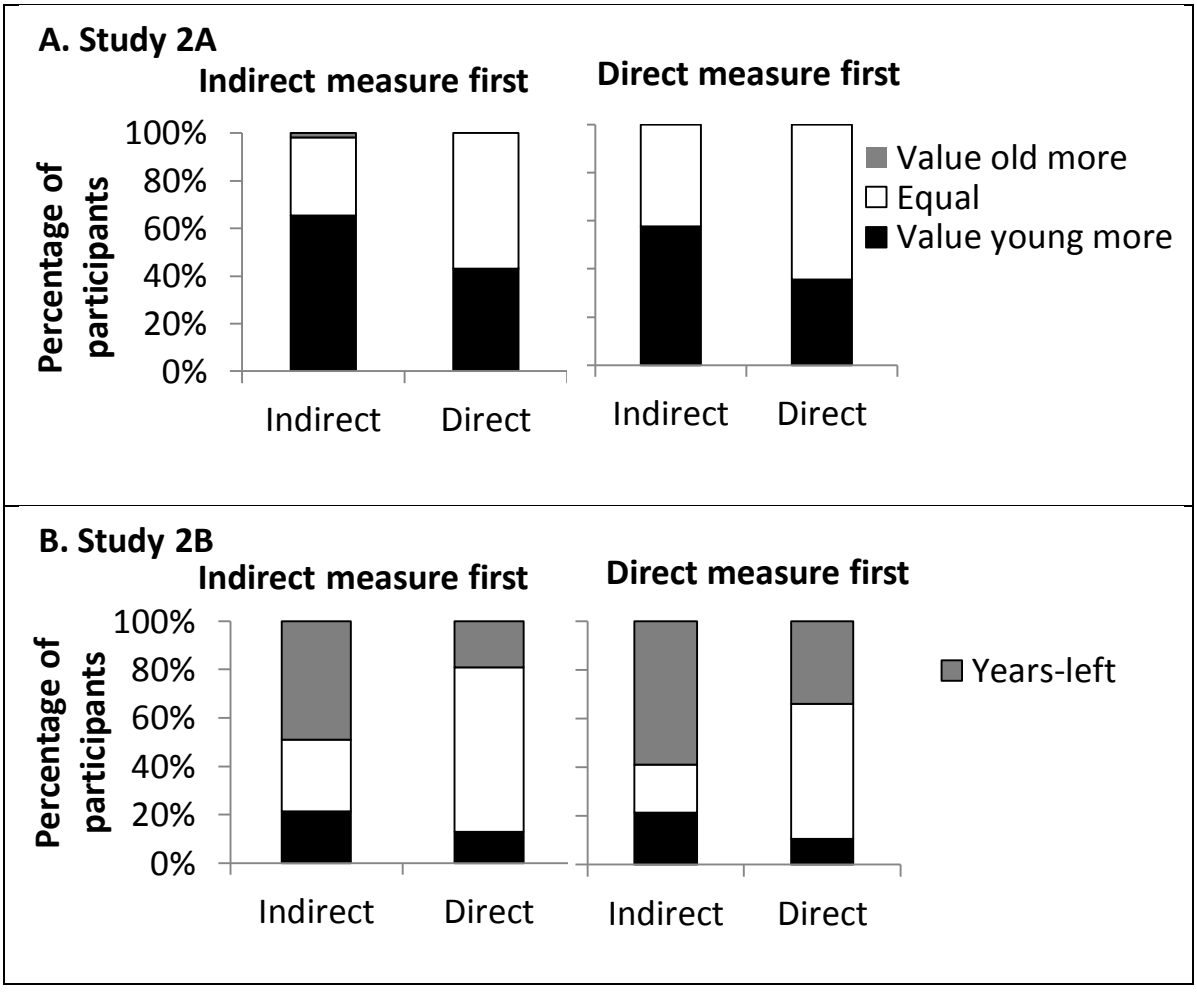
The indirect measure in Study 2A presented a scenario about vaccine distribution during an epidemic of a fatal flu, similar to Study 1 (see Appendix), but only used the "lives saved" frame. We asked participants to "Consider the outcomes of 2 vaccine distribution policies". The outcomes of two policies read "*500 20-year old people will be saved*" in Policy 1, while "*500 60-year old people will be saved*" in Policy 2. Participants were asked to choose among the following statements: "*Policy 1 is better*", "*Policy 2 was better*", or "*They are equally good*". The direct question asked how they think lives should be valued in circumstances where medical resource is limited, as in the direct measure in Study 1, but presented only 3 options: "*Young people should be valued more*", "*Older people should be valued more*", or "*All lives should be valued equally, regardless of age*".

Questionnaires in Study 2B were similar to those in Study 2A. In the indirect measure, however, outcomes of the two policies were changed to "*500 25-year-old people will be saved, all of whom have 5 more years to live, due to pre-existing health*

conditions" in Policy 1, and "*500 50-year-old people will be saved, all of whom have 30 more years to live.*" in Policy 2. Options in the direct measure were also changed to be parallel to metrics examined in the indirect measure, including "*People with greater number of years left to live should be valued more, regardless of age.*" (years-left), "*Young people should be valued more, regardless of the number of years they have left to live*" (years-lived), and "*Age and number of years left to live are equally important in evaluating whose lives are more important to save.*"

Results

Figure 3. *Percentage of participants choosing each metric in the indirect and direct measures in Studies 2A and 2B.*



As illustrated in Figure 3A, response patterns were similar between the two order conditions in Study 2A. Collapsing across order conditions, the majority of participants valued young victims more (62%) when responding to the indirect measure, while only 40% of them did that in the direct measure; "All lives are equal", however, was the most popular metric (60%) in the direct measure, but was favored by only 37% of participants in the indirect measure. Only 1 response in the indirect measure and none in the direct measure indicated that old victims should be valued more. The metric × measure χ^2 test was significant when this response was excluded (including it results in empty off-diagonal cells, which make $\chi 2$ tests impossible), McNemar's $\chi 2$ (1, n = 102) = 18.24, p < .001, and this result holds for both order conditions, p < .05 for both. Figure 3B shows similar patterns across order conditions in Study 2B. Collapsing across order conditions, the majority of participants (61%) in the direct measure indicated that "years-lived" and "years-left" were equally important, but only 24% did that in the indirect measure; in contrast, "years-left" was the most popular metric in the indirect measure (54%), but was much less popular in the direct measure (27%), McNemar's $\chi 2$ (3, n = 103) = 32.61, p < .001. This result also holds in both order conditions, p < .01 for both.

To examine whether participants' own age and gender had an impact on their choice of metric, we conducted logistic regressions in Study 2A, using age and gender to predict choice of metric in the indirect and direct measures, respectively, as predictors (we excluded the one participant who preferred to save older victims, and thus, leaving "pro-young" and "all lives equal" as the only choices). In Study 2A, age and gender were both significant predictors in the indirect measure, such that older participants and

females were both more likely to use the "all lives equal" metric over the "pro-young" metric, $B = .06$, $SE(B) = .02$, OR = 1.06, $p < .01$, and $B = 1.14$, $SE(B) = .52$, OR = 3.12, $p = .03$, respectively; The similar is true in the direct measure, with age being a significant predictor, $B = .05$, $SE(B) = .02$, OR = 1.05, $p = .01$, and gender being a marginally significant predictor, $B = .87$, $SE(B) = .45$, OR = 2.39, $p = .053$. In Study 2B, we conducted multinomial logistic regressions using age and gender to predict choice in the indirect and direct measures, respectively. Results show that gender had no effect on choice. Age was a positive predictor for choosing the "years-left" metric over the "years-lived" metric, but only in the indirect measure, $B = .08$, $SE(B) = .03$, OR = 1.08, $p = .01$. Age did not predict choice of option that indicated "years-left" and "years-lived" were equally important in either measure. We also examined whether participants' age and gender affected consistency in Studies 2A and 2B, but as in Study 1, found no significant effect, $p > .4$ for age and $p > .8$ for gender in both studies.

Discussion

These results clearly demonstrate that people are inconsistent with regard to which metric should be used to evaluate life in terms of allocation of scarce health resource. Specifically, When asked about policies regarding a specific vaccine allocation problem, participants were prone to assign more value to young people or people with greater number of years left; when asked about general principles in evaluating lives, participants were prone to indicate that "all lives are equal", or that "years-lived" and "years-left" are equally important to consider in such evaluations. Such inconsistency is

striking given that participants answered both types of questions back to back, and that the difference persisted regardless of the order of the questions[2].

Although the general findings of inconsistency were the same between Studies1 & 2, there were some differences in the results. While the "years-lived" metric was the most popular metric in the indirect measure in Study 1 (used by 39% of participants), it was the least favored metric in the indirect measure in Study 2B (used by 22% of participants). Such difference reflects different categorization criteria in the indirect measure between the two studies. In Study 1, a "years-lived" metric was inferred when younger victims were valued more even though they had the *same* number of years left as older victims. On the other hand, Study 2B defined the use of "years-lived" metric as the choice that favors younger victims with *fewer* years left over older victims with *more* years left. Thus, showing the "years-lived" metric in Study 1 means that *some* weight was given to the number of years the victims have already lived (years-lived), above and beyond the number of years they have left to live, but showing such metric in Study 2B means that more weight was given to "years-lived" than to "years-left", because these two metrics were directly contrasted in the latter study.

Both Studies 1&2 used hypothetical vaccine allocation scenarios to elicit participants' use of life-evaluation metric in the indirect measure, and asked participants to choose among descriptions of the metrics in the direct measure. One could argue, however, that the direct and indirect measures differ in many ways, and the

[2] We replicated these results in a study using undergraduate participants. In that study, we also measured individual differences in preference for consistency prior to the experiment, using the brief form Preference for Consistency scale (PCS-B) from Cialdini et al. (1995), which includes 9 items such as "*The appearance of consistency is an important part of the image I present to the world*", "*It is important to me that those who know me can predict what I will do*". However, whether participants gave same or different responses in the direct and indirect measures had no relationship to their scores on PCS-B.

inconsistencies may be due to differences that are irrelevant to the indirect or direct nature of the questions. In Study 3, we addressed this issue by modifying the direct measure to be similar to the indirect measure in all aspects except that it still states principles in evaluating lives, and tested whether responses in the direct and indirect measures still differ from each other.

Study 3

In this study, we tested whether the inconsistencies between direct and indirect measures we have demonstrated so far were merely an artifact due to differences in the wording instead of the indirect and direct nature of the measures. To do so, we used similar indirect measures as in Study 2, but modified the direct measure to include the same hypothetical vaccine scenario as in the indirect measure, while still retaining the "direct" nature by describing different metrics in the same general principle format as the direct measure used in Study 2. To further equate the direct and indirect measures, responses in both measures were recorded as choice among favoring either one of 2 policies, or a neutral option. We included two different wordings of the neutral option in the direct measure along with the indirect measure in a between-subject design. The indirect measure and two versions of the direct measure were manipulated between subjects. As in Study 2A & 2B, Study 3A focused on age-dependent versus "all lives equal" metrics, and Study 3B posed the "years-left" against "years-lived" metrics.

Methods

Participants

Both Studies 3A and 3B were conducted at campus bus stops in a large state university. In Study 3A, 201participants completed a survey, 96 were males and 105 were

females; 98% were college students, 4 were graduate students, and 1 did not indicate school status. Participants' age ranged from 17 to 41 (only 3 participant was more than 30 years old), mean age = 20.29, *SD* = 2.92. Study 3B included 161 participants, among whom 66 were males and 95 were females; 98.8% were college students, 1 was graduate students, and 1 was a faculty member. Participants' age ranged from 17 to 35, mean age = 19.72, *SD* = 2.18.

Questionnaire

In both Studies 3A & 3B, participants were randomly assigned to receive either the indirect measure or one of 2 versions of the direct measures (see Appendix for original questionnaire). The indirect measure in Study 3A & 3B was identical to that in Study 2A &2B except minor changes in the scenario[3].

The 2 versions of the direct measure in Study 3A used the exact same scenario as in the indirect measure, but instead of asking participants to consider 2 policies that save either 20-year olds or 60-year olds, as in the indirect measure, we asked them to "*consider 2 policies on vaccine distribution, with regard to how the lives of potential victims should be valued to set priorities in receiving the vaccine*", and listed 2 policies that either said "*Younger people should be valued more*" or "*Older people should be valued more*". Like the indirect measure, the response was recorded in a choice among 3 options: "*Policy 1 is better"*, "*Policy 2 is better"*, and a 3rd option that was either "*All lives should be valued equally, regardless of age*" (Version 1), or "*They are equally good*" (Version 2), depending on condition. The first version was meant to include the same wording of principles used in the direct measure in Study 2A and the second version was

[3] In both Studies 3A & 3B, the scenario described a "new form of fatal influenza" instead of "Swine flu". In Study 3A, there was also a minor change in the order of sentences and we emphasized "infection is always fatal" in addition to describing the virus as "fatal".

designed to be even more similar to the indirect measure by providing the exact same wording in the 3 options as in the indirect measure.

In Study 3B, the 2 versions of indirect measure included the same scenario as the indirect measure, but presented 2 policies that either said "*Young people should be valued more, regardless of the number of years they have left to live"* or "*People with greater number of years left to live should be valued more, regardless of age*". Similar to the 2 versions in Study 3A, responses in the direct measure were recorded in choice among 3 options, with 2 options that said "*Policy 1 is better"* or "*Policy 2 is better"*, and a 3rd option that said "*Age and number of years left to live are equally important in evaluating whose lives are more important to save*" in Version 1, or "*They are equally good*" in Version 2.

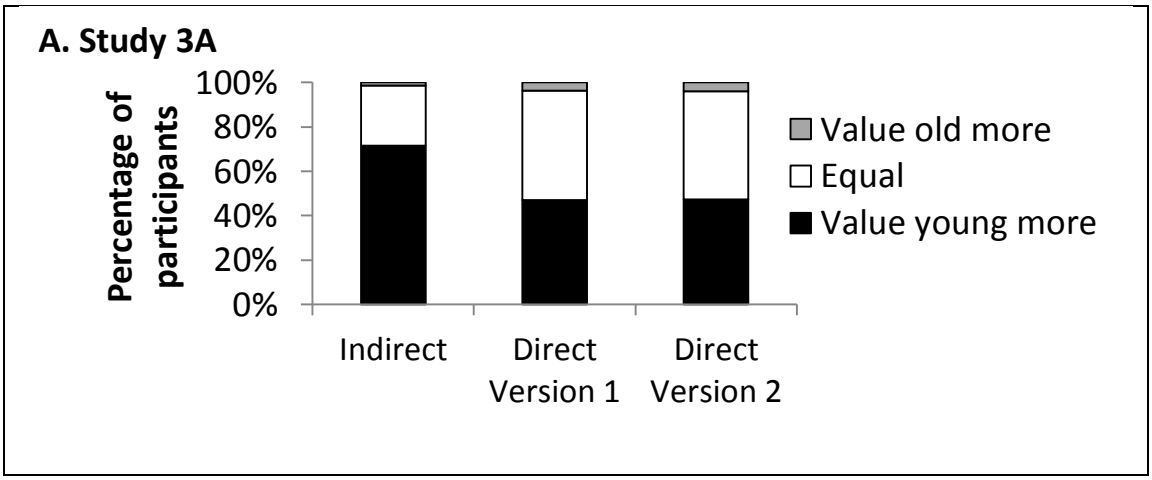
Results

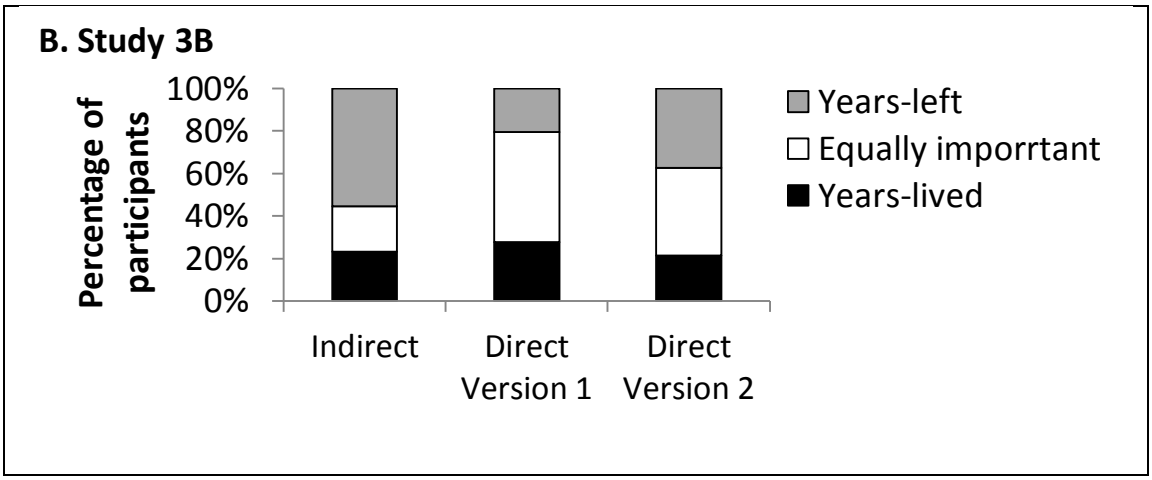
As illustrated in Figure 4A, responses differed across the indirect measure and 2 versions of the direct measure in Study 3A, Fisher's exact test = 11.67, $p = .01$[4]. Specifically, 72% of the participants in the indirect measure favored young victims and 27% indicated saving young and old victims were equally good, while in both of 2 versions of the direct measure, the neutral option that indicated the "all lives equal" metric was the most popular choice (49% in both versions), with only 47% of participants (in both versions) favoring the young victims. The difference between indirect measure and each version of the direct measure was significant, Fisher's exact test = 7.93, $p = .01$ for Version 1 and Fisher's exact test = 9.16, $p < .01$ for Version 2, while the 2 versions of direct measure did not differ from each other, $p > .99$.

[4] Pearson's chi-square test was not used in the analysis in Study 3A because the expected number of participants in some cells was smaller than 5.

Similarly, Figure 4B shows the different response patterns in the indirect and 2 versions of direct measure in Study 3B, $\chi 2$ (4, n = 161) = 16.27, p < .01. While the majority of participants in the indirect measure favored the "years-left" metric (55%) and only 21% chose the option indicating that "years-left" and "years-lived" metrics were equally important, this pattern was reversed in Version 1 of the direct measure, with 20% and 52% choosing the "years-left" and "equally important" options, respectively, $\chi 2$ (2, n = 110) = 16.04, p < .001. Version 2 of the direct measure also reversed response patterns from the indirect measure, but to a lesser extent, where 37% and 41% chose the "years-left" and "equally important" options, respectively, and the difference to the indirect measure only approached statistical significance, $\chi 2$ (2, n = 107) = 5.28, p =.07.

Figure 4. *Percentage of participants choosing each option in the indirect measure and 2 versions of the direct measures in Studies 3A & 3B*





Discussion

Results from Study 3 excluded the explanation that inconsistencies found in Studies 1&2 were due to wording differences between the direct and indirect measures that were irrelevant to their direct and indirect nature. When the direct measure was modified to be almost identical to the indirect measure, except descriptions of life-evaluation metrics were used instead of victims of specific age groups, response patterns still differed between the direct and indirect measures in similar ways as demonstrated in Study 2. Study 3 was conducted between-subjects due to multiple versions of the direct measure, and therefore technically, the differences between measures indicate a framing effect instead of inconsistencies. Still, the findings suggest that the discrepancy between these measures was robust despite changes in wordings.

To summarize, Studies 1-3 demonstrated that people use different metrics to evaluate life when they are asked directly versus indirectly, using various methodology and participant samples. What might have caused such inconsistencies? We speculate that the direct and indirect measures may activate different goals, which in turn lead to

preference for a metric consistent with such goals. Chapter 2 discusses the underlying mechanisms of the inconsistencies shown so far.

CHAPTER 2: WHY ARE PEOPLE INCONSISTENT IN HOW THEY VALUE LIFE?

In Studies 1-3, the indirect measure involves a specific task of allocating limited vaccines among specific groups of potential recipients. This may bring people to the mindset of completing the task successfully, which lead them to allocate the resource in an efficient manner. To the extent that efficiency means maximizing gains per unit of input, and life-years is a salient dimension of gains in that context, people may seek to maximize the number of life years saved by the intervention, and thus prioritize young people and those with more years left to live. On the other hand, the direct measure poses a question about the principles by which lives should be valued, which may activate thoughts about moral beliefs in such matter, as moral standards are inherently about principles. People may feel obliged to choose the "all lives are equal" option because it is an instilled social norm. Thus, Hypothesis 2 of this dissertation proposes that people will hold an active efficiency goal when they encounter the indirect measure, and choose a metric consistent with efficiency goal (e.g., the "years-left" metric); in contrast, the direct measure will activate a moral goal, which will in turn lead to choice of metric consistent with the moral goal (e.g., the "all lives equal" metric).

Note that, although the term "efficiency" can take on many different meanings, it represents a consequentialist perspective in this paper, and specifically refers to the output/input ratio on the society level with regard to resource allocation. On the other hand, we use the term "moral" to represent deontological principles. Although equality is one but many moral principles, it is the main moral principle we propose will be activated

in people's mind in the direct measure, because no other moral principle is as relevant to resource allocation problems presented in the paper.

To test the hypothesis that moral versus efficiency goals lead people to choose goal-consistent metric in the direct and indirect measures, we conducted the next two studies. In Study 4, we examined whether people view the "all lives equal" metric (favored in the direct measure) as more consistent with a moral goal, whereas the "years-left" metric (favored in the indirect measure) as more consistent with an efficiency goal. In Study 5, we directly primed participants with moral versus efficiency goals to see if they show differential preference for metrics the same way as they did in the direct and indirect measures, respectively.

To further understand why people have inconsistent responses in the direct and indirect measures of how to value life, Study 6 tested whether peoples' evaluation of young versus old lives varies depending on the specific ages of the victims, and specifically, when comparing children and adults versus between young and old adults. Study 6 also investigates how being a parent influences such preference.

Study 4

The purpose of Study 4 is to test whether people consider some metrics in evaluating lives as more consistent with the moral standards in the society (doing what is right), while others more consistent with the goal of efficiency, or maximizing benefit of given resources (best use of resources). Specifically, we hypothesize that the metric participants favored in the direct measure in Studies 1-3 (i.e., the "all lives equal" metric) falls into the former category, whereas the metric participants favored in the indirect measure (i.e., "years-left" metrics) falls into the latter. To test this hypothesis, we asked

participants to indicate whether each of the metrics investigated in Studies 1-3 is more consistent with the moral goal or the efficiency goal. As in previous studies, Study 4A examined the "all lives equal" metric against age-dependent metrics, and Study 4B compared the "years-left" and "years-lived" metrics. We presented participants with the metrics in either the indirect format, or the direct format, which we modified from Studies 3A & 3B, respectively (see Methods).

Methods

Participants

We recruited participants from an Internet survey panel Amazon Mechanical Turk. Participants received a small monetary compensation for completing the survey. Study 4A included 66 participants (33males, 33 female), with age ranging from 18 to 79 (M = 30.1 2, SD = 11.57); Study 4B included 76 participants (38 males, 38 females), with age ranging from 18 to 66 (M =34.93, SD = 14.06).

Questionnaire

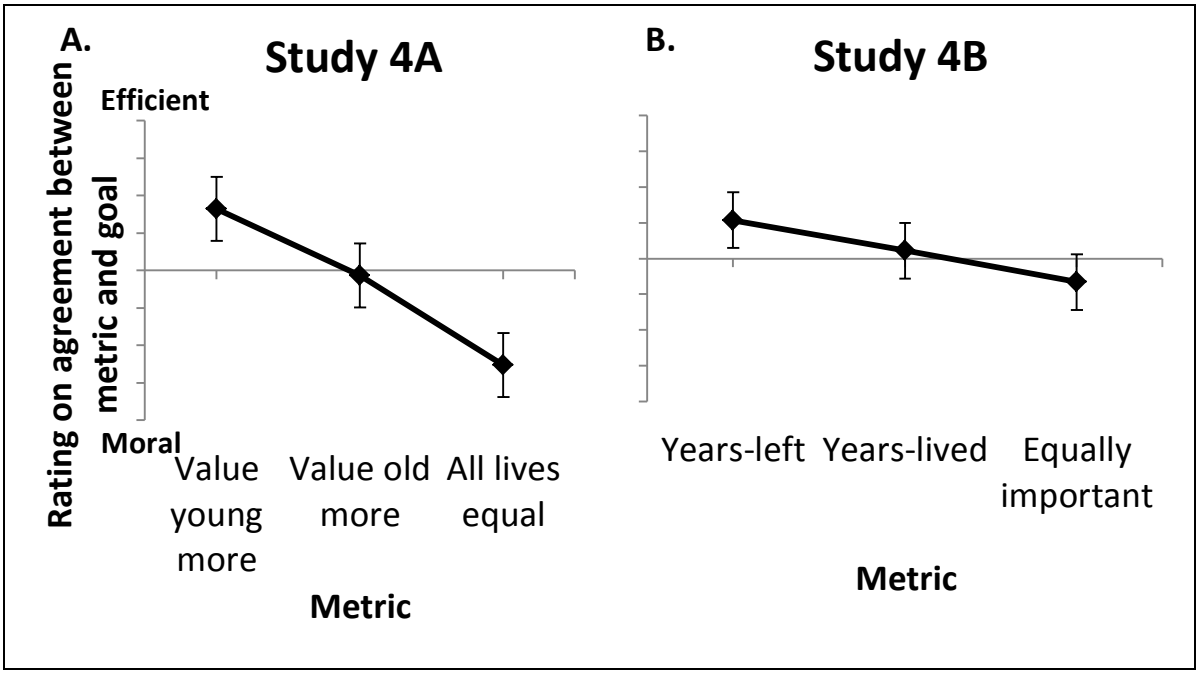
In both Studies 4A & 4B, participants were randomly assigned to receive either the indirect measure or the direct format of the metrics. The measures were modified from Studies 3A& 3B (the first versions of the direct measure was used and modified slightly, see Appendix). Instead of presenting 2 policies and asking participants to choose among 3 options that favored either policy or a showed indifference, we presented 3 policies that corresponded to the 3 options in Study 3. The third policy in the direct measure was "all lives are equal, regardless of age" in Study 4A, and "age and number of years left to live are equally important in evaluating whose lives are more important to save" in Study 4B. In both Studies 4A&4B, the third policy in the indirect measure stated

250 people from either group of victims will be saved; the equal distribution of lives saved between victim groups presents a new way of showing equality, compared to Study 2.

Instead of asking participants which policy was better, we told them "*In this context, the moral standard of our society may be in conflict with the goal of efficiency (maximizing benefit given available resources)",* and asked them whether each policy is more consistent with the former or the latter, with the definitino "*Moral = doing what is right; Efficient = best use of resources*". We measured responses on a sliding scale from -5 to 5 that showed "moral" on one end and "efficient" on the other, with the direction of the scale counterbalanced (see Appendix for actual scale).

Results

Figure 5. *Ratings on sliding scale for whether each metric was more consistent with efficiency or moral goals in Studies 4A (A) and 4B (B). Error bars: 95% within-subjects CI (Loftus & Masson, 1994).*



In both Studies 4A & 4B, we coded "efficiency goal" as positive and "moral goal" as negative, and analyzed scores on the sliding scale in a 3 (metric) × 2 (measure format: direct vs. indirect) × 2 (scale direction) mixed design ANOVA, with metric being the only within-subject variable. Results show that measure type had no main or interaction effects in either study. Scale direction interacted with metric, but did not change the general direction of results. For simplicity, Figure 5 presents mean scores on the sliding scale for each metric collapsed across measure type and scale direction. In Study 4A (Figure 5A), metric had a significant main effect, F (2, 124) = 26.79, $p < .001$. "Value young more" was rated as more consistent with the efficiency goal than the moral goal, with mean rating above the indifference point, M = 1.86, SD = 3.51, t (65) = 3.61, $p < .001$. In contrast, "all lives equal" was rated as more consistent with the moral goal than the efficiency goal, M = -2.53, SD = 3.081, t (65) = 6.66, $p < .001$. Mean rating for "value old more" did not differ from the indifference point, M = -.14, SD = 2.87, ns.

In Study 4B (Figure 5B), metric also had a significant main effect, F (2, 144) = 5.85, $p < .01$. The "Years-left" metric was rated as more consistent with the efficiency goal than the moral goal, with mean rating above the indifference point, M = 1.08, SD = 3.26, t (75) = 2.88, $p < .01$. Mean rating for "years-lived" metric did not differ from the indifference point, M = -.14, SD = 2.87, ns, and the policy treated "years-lived" and "years-left" as equally important was rated marginally more consistent with the moral goal versus the efficiency goal, M = -.66, SD = 3.29, t (75) = 1.76, p =.09.

Discussion

The results in Study 4 support our hypothesis that people view the "all lives equal" metric as more consistent with the moral goal, and the "years-left" metric as more

consistent with the efficiency goal. In Study 4A, the pro-young policy was also viewed as more consistent with the efficiency goal, an expected result since young people in general have more years left. In Study 4B, participants also rated policy that indicated the "years-left" and "years-lived" metrics were equally important as more "moral" than the "years left" and "years-lived" metrics. It is possible that they perceived this policy as similar to the "all lives equal" metric. These results are consistent with our general hypothesis that people view the metric favored in the indirect measure as more consistent with efficiency goal, and those favored in the direct measure as more consistent with the moral goal, given participants in Studies 2A &3A also favored young lives in the indirect measure, and in Studies 2B &3B, favored the "years-left and years-lived are equally important" policy in the direct measure.

To further test the hypothesis that moral versus efficiency goals lead to the inconsistent responses in the direct and indirect measures demonstrated in Studies 1-3, we conducted Study 5, in which we primed participants with moral or efficiency goals, and measured how many vaccines participants allocated to each of two groups of potential recipients.

Study 5

Studies 5 explored the goal hypothesis for inconsistencies between the direct and indirect measure by priming people with moral or efficiency goals directly, to see if goal priming lead to the same effect as exposing people to the direct or indirect measures.

In Study 5, we used a vaccine allocation scenario similar to the indirect measure used in Studies 2B-4B: The two groups of potential vaccine recipients differed in both age and remaining life-expectancy, so that one group were younger victims who had

fewer years left to live, and the other were older victims who had more years left to live (see Appendix). The dependent measure in Study 5 was how participants divided 100 vaccines among 200 potential recipients, with 100 recipients in each group. We used a sliding scale that showed number of vaccines assigned to each group with the restriction that they add up to 100. This scale allowed participants to divide the available vaccines between the two groups in any way they wanted, including an even distribution, without making any distribution pattern overly salient (because participants had to come up with a way to distribute the vaccines themselves, instead of choosing among available distribution methods).

Pilot study the included recipient groups from Studies 2B-4B showed that participants using this sliding scale overwhelmingly preferred to save "50-year-olds with 30 years to live" over "25-year olds with 5 years to live", thus creating a ceiling effect. In order to reduce such ceiling effect, we modified the age and remaining life years in the two victim groups to "20-year olds with 5 years to live" and "50-year-olds with 20 years to live" as potential victims in the two groups, respectively. Despite the change, allocating the vaccines in favor of the former group still indicates a preference for the "years-lived" metric, while allocation in favor of the latter group indicates preference for the "years-left" metric, and equal allocation between the two groups corresponds to an "all lives equal" metric. We expect that moral goal priming would lead to allocation patterns more consistent with the "all lives equal" metric, that is, equal allocation between the two groups, and efficiency priming would lead to allocation patterns more consistent with the "years-left" metric, that is, in favor of "50-year-olds with 20 years to live".

Methods

Participants

One hundred and sixty-nine participants were recruited from an Internet survey company (Survey Sampling International, SSI) in exchange for a chance to win cash or other rewards from the survey company. We excluded 6 out of 43 participants who gave irrelevant responses in the open-ended moral priming task, and 7 out of 59 who did so in the open-ended control task (see Procedures below), leaving 156 out of the original 169 participants in the final analysis. Among the 156 participants in the final analysis, 75 were males and 81 were females; participants' age ranged from 19 to 85, $M = 46.58$, $SD = 17.44$; 79% of participants were white, 5% were black, 3% were Asian, and 13% were multi-racial or belonged to other race; 29% were single, 54% were married or in domestic partnership, and 17% were separated/divorced or widowed; 54% were employed and 46% were not. Participants' median household income was in the $40,000-49,999 bracket, and mean education was at college level.

Procedures

The study was conducted on the Internet. Participants were randomly assigned to one of 3 priming conditions. In the moral priming condition, we told participants "*Please write down 10 democratic ideals they think this country was founded on*". In the efficiency priming condition, participants were presented with a hypothetical hospital location problem, where a new hospital was to be built on a highway that connected two cities that were 60 miles apart, with 2000 expected hospital visits per year from City A, and 1000 from City B. Participants were told that the most efficient location should result

in the least total miles traveled by residents of the two cities combined, and they were presented with 3 options from which they could choose, all illustrated in diagrams: Location 1 was 20 miles from City A and 40 miles from City B; Location 2 was 30 miles from each city; Location 3 was 40 miles from City A and 40 miles from City B. After participants indicated their choice, they were presented with the correct answer (first option) and calculations of total miles traveled in each option. In the control condition, participants were asked to write down names of 10 books they read in high school.

After participants completed their respective priming task, all participants were presented with a hypothetical vaccine distribution scenario, modified from the indirect measure in Studies 2-4. The scenario no longer mentioned flu, but rather, described the epidemic as caused by a virus, and the vaccines as protecting people from this non-specified virus (see Appendix). Participants were told they were a consultant on a panel at the local health department that was setting up policies in vaccine distribution, and was faced with a decision to allocate 100 vaccines among the following 200 potential victims, including "*100 20 year old people. If they hadn't died from the virus, they would be expected to live another 5 years on average, due to pre-existing health conditions.*" and "*100 50-year-old people. If they hadn't died from the virus, they would be expected to live another 20 years on average, due to pre-existing health conditions."* They were also told that "*Everyone has the same chance of infection, and the vaccine is equally effective for all potential victims*". Responses were recorded in two sliding bars, each indicating the number of vaccines allocated for one of the two victim groups. The sliding bars automatically restricted the total number of vaccines for the two groups to be exactly 100, and the default position of both bars was set at 0.

Manipulation checks were included at the end of the survey. We asked participants to rate how much they agree with each of 5 statements, presented in random order: 1) *"It is morally wrong to place priority on some people's lives over others'."* 2) *"I would feel guilty not giving everyone equal access to medical resources."* 3) *"Everyone deserves an equal chance in receiving medical resources, even if equal distribution of such resources results in fewer total life-years saved among potential victims."* 4) *"Health care policies must consider efficiency when allocating medical resources."* 5) *"Health policies should focus on how to minimize cost and maximize benefit among the population."* Ratings were recorded on a scale from 1 "*strongly disagree*" to 7 "*strongly agree*". Ratings for the first 3 statements were combined and averaged to represent participants' moral considerations, while ratings for the last 2 statements were averaged to represent participants' efficiency considerations.

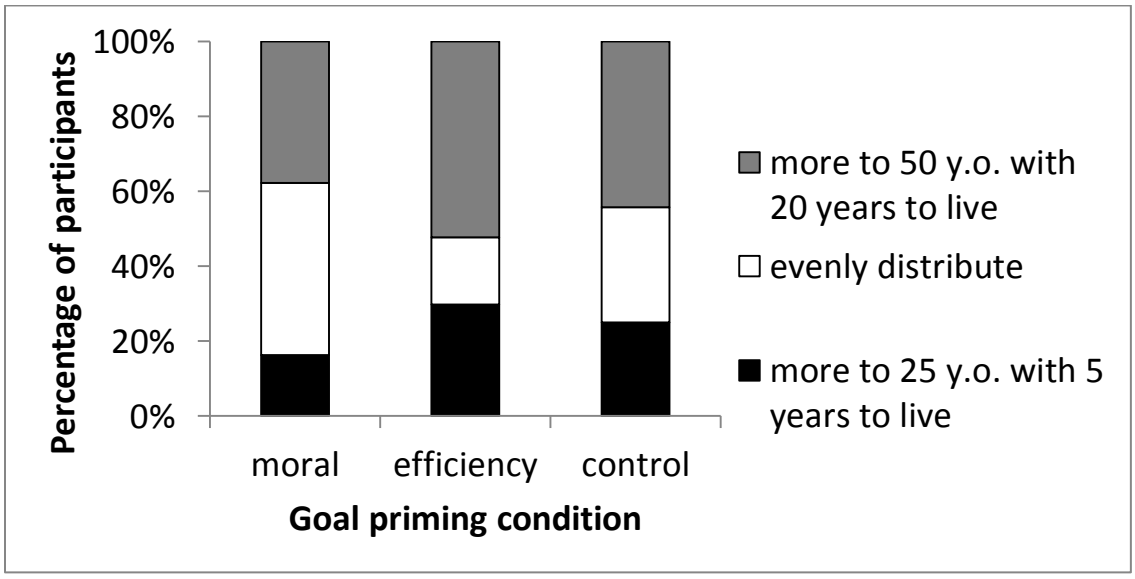
Results

Priming effects

We categorized responses into 3 patterns: evenly distributing 100 vaccines between the two groups, allocating more vaccines to 50 year-old with 20 years to live, and allocating more vaccines to 25 year-olds with 5 years to live. We used this categorization instead of the original responses in continuous scale because the unique pattern of equal allocation could not be distinguished in the continuous scale. Figure 6 shows the percentage of participants falling into each category in the moral goal, efficiency goal and control priming conditions. As expected, the response patterns differed across the priming conditions. In the moral goal condition, 46% of participants

distributed the vaccines evenly between 2 victim groups, and 38% favored the older group with more years left to live. This pattern, however, was reversed in the efficiency goal condition, with 18% distributing vaccines evenly between groups, and 52% favoring the older group with more years left. Responses in the control condition fell somewhere in between those in the two priming conditions, with 31%, 44% and 25% showing equal distribution, favoring the old with more years left, and favoring the young with fewer years left, respectively. The allocation pattern × condition $\chi 2$ test for was significant, $\chi 2$ (4, n = 156) = 9.50, $p < .05$, although $\chi 2$ test contrasting each priming condition with control was not significant, $p > .25$ for both contrasts.

Figure 6. *Percentage of participants allocating vaccines in favor of 50-year-olds with 20 years to live, 20-year-olds with 5 years to live, or evenly between the two groups in Study 5*



Ratings on the manipulation check questions were analyzed using one-way ANOVA. Mean ratings on the moral consideration scale and efficiency consideration

scale did not differ across priming conditions, $p > .50$ for both. The failure for the efficiency consideration check questions to show an effect of priming may be due to lack of clarity in conveying moral or efficiency concerns in the statements.

Individual differences

We also examined whether demographic differences (including age) affected the use of metric in Study 5. We conducted a multinomial logistic regression, using participants' age, gender, ethnicity (white vs. minority), education level, household income level as predictors for the type of allocation they demonstrated, with "allocating more to 20 year olds with 5 years to live" as reference category. Age was a significant predictor for allocating more to 50 year olds with 20 years to live compared to reference category, $B = .03$, $SE(B) = .01$, $OR = 1.03$, $p < .05$, and a marginally significant predictor for evenly distributing vaccines between the two groups compared to reference category, $B = .03$, $SE(B) = .02$, $OR = 1.03$, $p = .06$. In addition, there were two marginally significant predictors: Higher household income and being white (vs. minority) tended predict preference for 50 year olds with 20 years to live, $B = .20$, $SE(B) = .11$, $OR = 1.22$, $p = .07$, and $B = .95$, $SE(B) = .53$, $OR = 2.59$, $p = .07$, respectively. Being white also had a tendency to predict equal distribution of vaccines $B = 96$, $SE(B) = .57$, $OR = 2.61$, $p = .09$.

Discussion

Study 5 provides additional evidence that the inconsistencies produced by the direct and indirect measures were due to different goals activated in those measures. Priming people with a moral goal produced an effect similar to that of presenting people

with the indirect measure—a tendency to allocate life-saving vaccines equally between victim groups; priming people with an efficiency goal produced a contrasting effect, like that in the direct measure—a tendency to prioritize victims with more years left to live. Combined with results from Study 4, these results support the goal explanation to response inconsistency shown in Studies 1-3, that is, the indirect measure activates an efficiency goal in participants' mind, which in turn lead them to prefer the metric consistent with this goal—the "years-left metric"; the direct measure, however, activates a moral goal, which in turn leads to preference for the "all lives equal" metric, because it is consistent with the moral goal.

The results on demographic predictors are consistent with findings from Studies 1&2 that participants' own age ego-centrically influences the evaluation of life, as age positively predicted both preference for the older recipient group and even allocation, compared to preference for the younger targets. The results about race and income as marginal predictors are difficult to interpret, and call for additional studies.

In the study, we operationalized equal allocation between the two victim groups as indicating an "all lives equal" metric. Admittedly, equal allocation can also be interpreted as differential weighting for "years-left" and "years-lived", so that a 30-year difference in age (between 20- vs. 50-year olds) is equivalent to a 15-year difference in life-expectancy (between 5 and 20 years left to live). We cannot exclude this explanation, but it is unlikely that this exact ratio of tradeoff between years-lived and years-left could become more popular after moral priming, as there is no explicit moral standard describing this ratio of tradeoff.

Study 6

Studies 1-3 demonstrated inconsistencies in the way people evaluate life, as well as individual differences in such evaluations. Over all, when probed indirectly in a specific allocation task, people tend to value young lives and individuals with more years left, but would readily state "all lives are equal" when directly asked about principles. Studies 4 & 5 demonstrated that such inconsistencies can be attributed to the different goals activated in these two types of measures on how people value life. There is, however, another issue in such consistencies: The direct measure described age and life-expectancy in a general term, while the indirect measure used specific age groups. It is possible that people hold some general principles in evaluating life without thinking about specific ages, but such principles may be dominated by considerations of victims' specific age and life expectancies in the indirect measure. This brings the question of whether peoples' evaluation of young versus old lives varies depending on the specific ages of the victims. Specifically, Study 6 investigates whether preference between younger and older lives would change when the comparison is between children and young adults, versus when it is between younger adults and older adults. We hypothesized that it would, and if the age difference stays the same, preference for younger over older lives could be more pronounced when the young victims are children. This is because children's lives may be viewed as qualitatively different from adults' lives: They can seem more vulnerable, innocent, and would be especially sad to lose, even compared to when they are young adults.

The results in Studies 1, 2 and 5 on ego-centrism suggest that people may prefer to save lives whose age are closer to their own. Another form of ego-centrism, however,

could occur when people evaluate lives whose ages are close to their own children's. Therefore, we hypothesize that parenthood status would modify the preference for children: We expect parents of small children to view the lives of children as more valuable than their non-parent peers do, but we do not expect parents and non-parents to differ in evaluating lives of adults. In Study 6, we tested this hypothesis by recruiting middle-aged participants who either have children or don't have children, and measured their preference for saving young versus old lives, where the comparison is either between children and adults, or between younger and older adults, as manipulated between-subjects.

Methods

Participants

We recruited 219 participants from a commercial survey company Survey Sampling International (SSI), who were between 38 and 43 years of age, $M = 40.69$, $SD = 1.48$, and either had children below 20 years old but no older children ($n = 105$), or had no children of any age ($n = 114$).

Questionnaire

In an Internet survey, participants were randomly assigned to receive one of two versions of the questionnaire. Both versions included a question similar to the indirect measure used in Study 2A: They had the same scenario as in Study 2A, except the potential recipient groups were "10 years old" versus "35 years old" in one version, and "35 years old" versus "55 years old" in another version. There was no mentioning about the expected life years of the recipients. Participants responded by indicting whether they

thought the policy that saves the young victims was better, the one that saves the old victims was better, or they are equally good, same as in Study 2A.

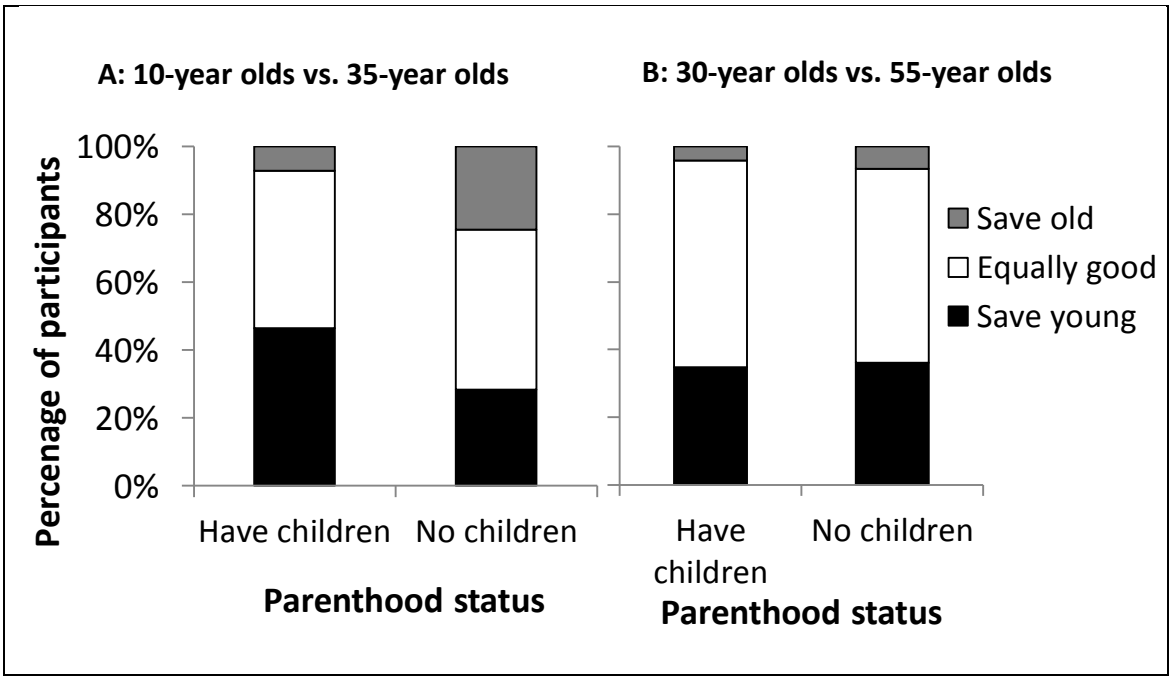
Results and Discussion

To test whether people prefer children's lives over adults' to a greater extent than they prefer younger adults' lives over older adults', we performed a choice × questionnaire condition $\chi 2$ test, and the result was significant, $\chi 2$ (2, n = 219) = 7.00, p = .03. Despite the significant difference in overall preference pattern, the preference for young victims was similar between conditions, with 35% of participants favoring 10-year olds over 35-year olds, and 35% of participants favoring 30-year olds over vs. 55-year, and $\chi 2$ test that categorized choice into "prefer young" and "prefer old or equal preference" was not significant, $\chi 2$ (1, n = 219) = .11, p = .74. Apparently, the difference in overall choice pattern was due to more participants favoring older victims in the 10- versus 35-year old condition compared to 30- versus 50- year old latter condition (16% vs. 5%).

To explain the lack of difference in preference for younger groups in the two conditions, and to examine whether parenthood status affected response patterns, we conducted choice × parenthood status $\chi 2$ tests for each condition separately. Figure 7 shows the proportion of participants choosing each option, separated by participants' parenthood status and condition. The results show that responses in the 10- versus 35-year olds condition were significantly influenced by parenthood status: Among participants who had children below 20, 46% chose to save 10-year olds and 7% chose to save 35-year olds; Among those who had no children, however, only 28% chose to save

10-year-olds, and 25% chose to save 35-year olds, $\chi 2$ (2, n = 109) = 7.66, p = .03. Such difference, however, evaporated in the 30- and 55-year old condition, with both parents (35%) and non-parents (36%) favoring 30-year olds over 55-year olds (4% of parents, and 7% of non-parents), Fisher's exact test $p > .85$. Thus, while parents placed higher values on the lives of 10-year olds than non-parents do, non-parents valued the lives of 35-year olds more than parents, and they showed similar patterns in evaluating lives of 30 year olds versus 55-year olds. Apparently, the overall result that more participants favored older victims in the 10- versus 35-year olds condition compared to the 30- versus 50- year olds condition was mainly driven by non-parents.

Figure 7. *Percentage of parents and non-parents in Study 6 who chose to save young victims, old victims or indicating saving either is equally good, when the age of victims were 10 versus 35 (A), or 30 versus 55 (B).*



We also conducted multinomial logistic regression for each condition, using demographic factors to predict choice. Participants' gender, parenthood status, age, education and household income were included in the regression, and choice of the policy favoring young victims was used as reference category. Confirming results from the $\chi 2$ test, in the "10-year olds vs. 35-year olds" condition, being non-parents was a significant predictor for favoring the 35-year olds compared to 10-year olds, $B = 2.06$, $SE(B) = .74$, $OR = .13$, $p = 01$. In addition, we found household income to be a marginally significant negative predictor for valuing 10-year olds and 35-year olds equally, compared to favoring 10-year olds, $B = -.22$, $SE(B) = .11$, $OR = .80$, $p = .05$. Household income, however, was not a significant predictor for equal preference between 30-year olds and 55-year olds. Given that Study 5 found household income had a tendency to predict preference for "years-left" metric but did not predict equal allocation, it is difficult to interpret such finding in a meaningful way. Gender, age, and education were not significant predictors in the "10-year olds vs. 35-year olds" condition

In the "30- vs. 55-year olds" condition, age had a tendency to positively predict preference for the 55-year olds, $B = .63$, $SE(B) = .36$, $OR = 1.87$, $p = 08$. This is striking given the little variability in participants' age (38-43), and means that among middle-aged people within this age range, being closer to 43 years old vs. 38 years old shifted their preference towards 55 year olds over 30 year olds. This is consistent to the ego-centric tendency demonstrated in Studies 1, 2 & 5. No other demographic factors were significant predictors in the "30- vs. 55-year olds" condition.

General Discussion

The findings presented above provide compelling evidence for the first hypothesis we proposed in the beginning of this paper, that is, there is a robust inconsistency in the way people value life under resource scarcity: When people face a specific allocation problem in a hypothetical scenario, they place higher values on lives of young people and people with greater number of years left, indicating age-dependent and a "years-left" metric; when they are directly asked about principles in evaluating life, however, an "all lives equal" metric is favored. Study 1 uncovered such inconsistency in a nationally representative sample, using a 12-policy paradigm in the indirect measure. Studies 2 supported such findings in an adult sample using a more straightforward 2-policy indirect measure and an improved direct measure, and Study 3 showed that the inconsistency in Study 2 was robust to changes in wording and format among a college student sample. These findings were parsimonious, as they indicate the inconsistency was due to the indirect and direct nature of the measures, where metric was inferred from preference between specific groups of victims in the indirect measure, but was directly described in the direct measure. The results were also generalizable to the public, as the different studies using a nationally representative sample, a convenient adult sample, and a college student samples all pointed to the same conclusion.

Clearly, the direct and indirect measures lead to different responses in how to value life. A question that we did not address was: Exactly what differences in these measures lead to such divergent responses? The indirect and direct measures differ in many ways. For example, even between the most similar versions of such measures in Study 3 (indirect measure and Version 2 of direct measure, see appendix), the two policies in the indirect measure stated "500 20-year-old people will be saved" and "500

60-year-old people will be saved", and the two policies in the direct measure (version 2) stated " younger people should be saved" and "older people should be saved". The numbers in the indirect measure may have made the potential victims more concrete, and prompted people towards a more analytical, system 2-type thinking (Kahneman, 2003), which could produce responses more consistent with consequentialism and efficiency than the direct measure does. On the other hand, the difference between the term "will" and "should" in the indirect and direct measures may also account for the different response patterns, because "will" merely describes what practically happens, and "should" indicates what we want to happen, and thus, prescribes matters in an ideal state. In a separate study, we added another version of the survey to the above direct (version 2) and indirect measures of Study 3A to test whether numbers alone accounted for the inconsistency effect. The new version of the indirect measure was the same as the original two versions, except the policies stated "a large number of younger people will be saved" or "an equally large number of older people will be saved". Results showed that this new version lead to a response pattern that is somewhere in between the original direct and indirect measure, but was significantly different more both. Thus, the presence of numbers did contribute to the inconsistency effect, but even when numbers were removed, inconsistency remains in responses to the direct and indirect measures, suggesting the wording "will" versus "should" was also responsible.

Studies 4&5 investigated the mechanisms of the inconsistencies between indirect and direct measures, and found that participants viewed the "all lives equal" metric, which was usually popular in direct measures, as more consistent with the moral goal, while the "years-left" metric, which was favored in the indirect measure, as more

consistent with the efficiency goal. In addition, priming participants with moral goal lead to preference for an "all lives equal" metric, while priming people with an efficiency goal promoted preference for the "years-left" metric. These results suggest that the different responses in the direct and indirect measure are likely due to the different goals activated by these measures: While the indirect measure activates an efficiency goal, the direct measure activates a moral goal. Granted, this explanation is not complete without direct evidence that efficiency and moral goals are indeed activated in the indirect and direct measures, respectively. However, the best way to measure efficiency versus moral goals in the context of health resource allocation may be to measure whether participants choose a metric consistent with the efficiency goal, or one consistent with the moral goal, which was exactly what the indirect and direct measures did.

The national samples used in Studies 1, 2 , 5& 6 allowed analysis on how demographic factors influence the way people value life. Results showed a consistent ego-centric tendency, where participants gave favorable evaluations of lives closer to their own age. Other demographic factors also showed some weaker influences on how people value life, but the findings are inconclusive and call for future studies. This ego-centrism was also present in another form in Study 6, where parents, in contrast to non-parents of similar age, had a stronger preference for lives of children over lives of young adults, but did not differ from non-parents when comparing lives of younger and older adults. Thus, when people value lives of different ages, ego-centrism are not restricted to one self, but rather, is transferrable to close others, at least to their children. The ego-centrism demonstrated in these studies may be pure selfishness: "I want my life be saved in such situation, and I will choose accordingly". Another explanation to such ego-

centrism, however, could be that people are just more familiar with their own age group, and find it easier to imagine victims closer to their own age. Such familiarity and vividness makes it easier to come up with reasons for why it is important to save them, compared to other age groups.

There are limitations in the current research. For example, all studies in this paper utilized vaccine allocation as a proxy to how people value lives, with the assumption that vaccine is a scarce health resource that everyone should want when faced with disease risks. However, people may have various beliefs and attitudes about vaccination per se, and the willingness to assign vaccine to certain groups may not align perfectly with willingness to save their lives. For example, people may assume older people need the vaccines more because they less likely to overcome the infection. The scenarios used in our studies attempted to eliminate such assumptions by stating the disease (flu) was fatal (i.e., equal risk of dying if infected), and that everyone was equally susceptible to infection (i.e., equal risk of becoming infected). However, participants' prior assumptions may still get over-extended to such scenarios, and undermine our inference for how they value life from their allocation choices. Some participants may even have a negative attitude against vaccination in general, which will cause their responses to further deviate from their life-evaluation metrics. Such limitations can be addressed in future studies that expand the scenarios to include other types of life-saving resources.

Another limitation of the current research is the use of American participants only. Conceivably, culture can play a large role in how we value lives of different ages, and how much we value equality. The current findings cannot speak to how people from other cultures value lives. In fact, elderly people in eastern countries such as China,

where the author grew up, receive more respect and support in the society, and therefore, may be valued higher than younger people. Cross-cultural differences in how people value life is another rich area for future research.

The term "moral" or "efficiency" used in this paper may cause some confusion as well. As mentioned in the beginning of Chapter 2, here, the term "moral" is used to represent deontological principles, and the most relevant deontological principle in the context of this paper is equality; the term "efficiency" is used to represent consequentialist principles, and refers to maximizing returns per unit of input. Morality, however, can take on many different meanings, and may include both equality and efficiency. In fact, in Kohlberg's 6-stage of moral development (Kohlberg, 1958; 1976; Kohlberg, Levine, & Hewer, 1983), people in stage 5 of moral development (driven by social contract and individual rights, promoting general welfare, accepting of inevitable compromises) would strive for efficiency, and those in stage 4 of moral development (driven by social order, obedience, judging right or wrong according to certain central ideals) would strive for equality, as equality is one important social ideal our society upholds. Thus, the results in this paper should not be taken as claiming the morally superior action is to value all lives equally, or the reverse, because the "moral" and "efficiency" labels used in this paper is more specific than the general meanings conveyed in these words.

The findings in this paper provide important information on how to design public health policies, how to present such policies to the public, and how to avoid ego-centric biases on the part of policy makers. For example, although the public holds a general pro-young tendency, which may drive support for specific policies on how to prioritize scarce

health resources (i.e. the 2009 H1N1 vaccine was prioritized for people under age 25), such policies may not enjoy the same support when described in general terms. To elicit support for policies that maximize efficiency in the allocation of health resources, policy makers may want to use recommendations for specific age groups, or present other efficiency-maximizing policies in non-taboo domains to prime people with the goal of efficiency. The priming effect in the current research, however, may not work for people who have strong prior convictions about how lives should be valued, and thus, the best target may be undecided sectors of the public. To prevent ego-centrism from biasing policies, we should avoid the practice of delegating the duty of policy making to a homogeneous group of policy makers, but instead, sample opinions from a wide range of age groups.

To better understand the public's opinion on the issue of how lives should be valued, no single measure can tell the whole story. And therefore, when public opinion is consulted, an important lesson to remember is that what the question says may speak more than what the answer does.

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APPENDIX: Questionnaires

Study 1: Indirect measure

"Lives saved" version

Imagine a large hospital with patients facing a Swine Flu pandemic. If no one is vaccinated, then 1,000 people would be expected to die from the Swine flu. Based on the limited vaccine supplies, there are 12 vaccination policies in consideration, all of which are expected to save some people from Swine Flu death. But the different policies differ in terms of who is saved.

Please rate the following vaccination policies from 0 (least acceptable) to 100 (most acceptable).

1. 500 people die from the flu, all are age 80. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 8 years on average.

2. 500 people die from the flu, all are age 80. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

3. 500 people die from the flu, all are age 60. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 22 years on average.

4. 500 people die from the flu, all are age 60. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

5. 500 people die from the flu, all are age 40. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 39 years on average.

6. 500 people die from the flu, all are age 40. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

7. 500 people die from the flu, all are age 30. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 48 years on average.

8. 500 people die from the flu, all are age 30. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

9. 500 people die from the flu, all are age 20. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 58 years on average.

10. 500 people die from the flu, all are age 20. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

11. 500 people die from the flu, all are age 5. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 73 years on average.

12. 500 people die from the flu, all are age 5. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

"Lives lost" version

Imagine a large hospital with patients facing a Swine Flu pandemic. If no one is vaccinated, then 1,000 people would be expected to die from the Swine flu. Based on the limited vaccine supplies, there are 12 vaccination policies in consideration, all of which are expected to result in fewer than 1,000 deaths. But the different policies differ in terms of who dies.

Please rate the following vaccination policies from 0 (least acceptable) to 100 (most acceptable).

1. 500 people are saved from flu death, all are age 80. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 8 years on average.

2. 500 people are saved from flu death, all are age 80. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

3. 500 people are saved from flu death, all are age 60. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 22 years on average.

4. 500 people are saved from flu death, all are age 60. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

5. 500 people are saved from flu death, all are age 40. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 39 years on average.

6. 500 people are saved from flu death, all are age 40. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

7. 500 people are saved from flu death, all are age 30. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 48 years on average.

8. 500 people are saved from flu death, all are age 30. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

9. 500 people are saved from flu death, all are age 20. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 58 years on average.

10. 500 people are saved from flu death, all are age 20. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

11. 500 people are saved from flu death, all are age 5. They are otherwise in good health, so if they hadn't died from the flu they would be expected to live another 73 years on average.

12. 500 people are saved from flu death, all are age 5. They have serious health conditions, so if they hadn't died from the flu they would be expected to live another 2 years on average.

Study 1: Direct Measure

When distributing medical resources, it is sometimes necessary to set priorities among lives. How do you think lives should be valued in such situations? [Choose one from the following]

- ❑ All lives are valued equally; no one's life is worth more than others'.
- ❑ People who have more years to live should be valued more, because they benefit more from the intervention.
- ❑ Young people should be valued more, even if they do not have many years left to live, because they haven't lived a full life yet.
- ❑ Other (Please specify if you chose "Other")

Study 2A: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 20-year-old people will be saved.
- Policy 2: 500 60-year-old people will be saved.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 2A: Direct measure

When distributing medical resources, it is sometimes necessary to set priorities among lives, especially when the medical resource is limited.

How do you think lives should be valued in such situations? **(Check only one)**

- ❑ Younger people should be valued more.
- ❑ Older people should be valued more.
- ❑ All lives should be valued equally, regardless of age.

Study 2B: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 25-year-old people will be saved, all of whom have 5 more years to live, due to pre-existing health conditions.

- Policy 2: 500 50-year-old people will be saved, all of whom have 30 more years to live.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 2B: Direct measure

When distributing medical resources, it is sometimes necessary to set priorities among lives, especially when the medical resource is limited.
How do you think lives should be valued in such situations? **(Check only one)**

- ❑ People with greater number of years left to live should be valued more, regardless of age.
- ❑ Young people should be valued more, regardless of the number of years they have left to live
- ❑ Age and number of years left to live are equally important in evaluating whose lives are more important to save.

Study 3A: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Without the vaccine, everyone in the region (regardless of their age and health status) is equally susceptible to infection and infection is always fatal.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 20-year-old people will be saved.
- Policy 2: 500 60-year-old people will be saved.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 3A: Direct measure-Version 1

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Without the vaccine, everyone in the region (regardless of their age and health status) is equally susceptible to infection and infection is always fatal.

Consider the following 2 policies on vaccine distribution, with regard to how the lives of potential victims should be valued to set priorities in receiving the vaccine.

- Policy 1: Younger people should be valued more.
- Policy 2: Older people should be valued more.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ All lives should be valued equally, regardless of age

Study 3A: Direct measure-Version 2

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Without the vaccine, everyone in the region (regardless of their age and health status) is equally susceptible to infection and infection is always fatal.

Consider the following 2 policies on vaccine distribution, with regard to how the lives of potential victims should be valued to set priorities in receiving the vaccine.

- Policy 1: Younger people should be valued more.
- Policy 2: Older people should be valued more.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 3B: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 25-year-old people will be saved, all of whom have 5 more years to live, due to pre-existing health conditions.

- Policy 2: 500 50-year-old people will be saved, all of whom have 30 more years to live.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 3B: Direct measure-Version 1

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the following 2 policies on how to evaluate the lives of potential victims, as priorities need to be set in vaccine distribution:

- Policy 1: Young people should be valued more, regardless of the number of years they have left to live
- Policy 2: People with greater number of years left to live should be valued more, regardless of age

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ Age and number of years left to live are equally important in evaluating whose lives are more important to save

Study 3B: Direct measure-Version 2

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.
A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the following 2 policies on how to evaluate the lives of potential victims, as priorities need to be set in vaccine distribution:

- Policy 1: Young people should be valued more, regardless of the number of years they have left to live
- Policy 2: People with greater number of years left to live should be valued more, regardless of age

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Study 4A: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death. Consider the outcomes of 3 vaccine distribution policies:

- **Policy 1: 500 20-year-old people will be saved.**
- **Policy 2: 500 60-year-old people will be saved.**
- **Policy 3: 250 20-year-old people will be saved, and 250 60-year-old people will be saved.**

In this context, the moral standard of our society may be in conflict with the goal of efficiency (maximizing benefit given available resources). What do you think of each policy, with regard to whether it is more consistent with the moral standard of our society, or more consistent with the goal of efficiency? Please indicate your response by dragging the sliding bar to the desired position on the scale below.

Moral = doing what is right
Efficient = best use of resources

Study 4A: Direct measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death. Consider the following 3 policies on how to evaluate the lives of potential victims, as priorities need to be set in vaccine distribution:

- **Policy 1: Younger people should be valued more.**
- **Policy 2: Older people should be valued more.**
- **Policy 3: All lives should be valued equally, regardless of age.**

In this context, the moral standard of our society may be in conflict with the goal of efficiency (maximizing benefit given available resources). What do you think of each policy, with regard to whether it is more consistent with the moral standard of our society, or more consistent with the goal of efficiency? Please indicate your response by dragging the sliding bar to the desired position on the scale below.

Moral = doing what is right
Efficient = best use of resources

Study 4B: Indirect measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death. Consider the outcomes of 3 vaccine distribution policies:

- **Policy 1: 500 25-year-old people will be saved, all of whom have 5 more years to live, due to pre-existing health conditions.**
- **Policy 2: 500 50-year-old people will be saved, all of whom have 30 more years to live.**
- **Policy 3: 250 25-year-old people will be saved, all of whom have 5 more years to live, due to pre-existing health conditions. And 250 50-year-old people will be saved, all of whom have 30 years to live.**

In this context, the moral standard of our society may be in conflict with the goal of efficiency (maximizing benefit given available resources). What do you think of each policy, with regard to whether it is more consistent with the moral standard of our society, or more consistent with the goal of efficiency? Please indicate your response by dragging the sliding bar to the desired position on the scale below.

Moral = doing what is right
Efficient = best use of resources

Study 4B: Direct measure

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status. A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death. Consider the outcomes of 3 vaccine distribution policies:

- **Policy 1: Young people should be valued more, regardless of the number of years they have left to live**
- **Policy 2: People with greater number of years left to live should be valued more, regardless of age**
- **Policy 3: Age and number of years left to live are equally important in evaluating whose lives are more important to save."**

In this context, the moral standard of our society may be in conflict with the goal of efficiency (maximizing benefit given available resources). What do you think of each

policy, with regard to whether it is more consistent with the moral standard of our society, or more consistent with the goal of efficiency? Please indicate your response by dragging the sliding bar to the desired position on the scale below.

Moral = doing what is right
Efficient = best use of resources

Study 4 Scales

(Scale Direction 1: Efficiency on the right end of scale)

[-5 = Most consistent with moral standard; 5 = Most consistent with efficiency goal]

(Scale Direction 2: Moral on the right end of scale)

[-5 = Most consistent with moral standard; 5 = Most consistent with efficiency goal]

Study 5

Dependent measure

Suppose a new virus has emerged in this region and is extremely infectious. Anyone who becomes infected will die, and everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

You are invited to serve as a consultant in a panel at the local health department that is setting up policies in vaccine distribution. You are faced with the following decision

The health department needs to allocate a batch of 100 vaccines among the following 200 potential victims:

- 100 20 year old people. If they hadn't died from the virus, they would be expected to live another 5 years on average, due to pre-existing health conditions.

- 100 50-year-old people. If they hadn't died from the virus, they would be expected to live another 20 years on average, due to pre-existing health conditions.

How many vaccines will you recommend to be allocated to each group? [The numbers must add up to 100 vaccines]

Note: Everyone has the same chance of infection, and the vaccine is equally effective for all potential victims.

Study 6

Version 1

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 10-year-old people will be saved.
- Policy 2: 500 35-year-old people will be saved.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.

Version 2

Suppose a NEW form of fatal Influenza (Flu) virus has emerged in this region and is extremely infectious. Everyone in the region is equally susceptible to infection, regardless of their age and health status.

A vaccine is fully effective against this new form of flu. But there are not enough vaccines to save everyone from flu death.

Consider the outcomes of 2 vaccine distribution policies:

- Policy 1: 500 30-year-old people will be saved.
- Policy 2: 500 55-year-old people will be saved.

Which of the following do you agree? **(Check only one)**

- ❑ Policy 1 is better
- ❑ Policy 2 is better
- ❑ They are equally good.