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CONTINGENT VALUATION ANALYSIS OF WILLINGNESS TO PAY TO REDUCE CHILDHOOD OBESITY

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ABSTRACT

Several recent surveys have asked Americans whether they support policies to reduce childhood obesity. There is reason for skepticism of such surveys because people are not confronted with the tax costs of such policies when they are asked whether they support them. This paper uses contingent valuation (CV), a method frequently used to estimate people's willingness to pay (WTP) for goods or services not transacted in markets, applied to unique data from New York State, to estimate the willingness to pay to reduce childhood obesity. The willingness to pay data have considerable face validity; they correlate in predictable ways with observed characteristics of respondents. The mean WTP of New Yorkers for a 50% reduction in childhood obesity is $47.25, which implies a total WTP by New York residents of $692.3 million. This vastly exceeds the implied savings in external costs, suggesting that the public supports public health initiatives not only to reduce external costs, but also altruistically. Despite the large WTP relative to the savings in external costs, the WTP estimated using the CV techniques in this paper are somewhat lower than those implied by previous surveys that did not use CV methods.

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Introduction

Over the past three decades the prevalence of overweight among American youth has risen dramatically. The Centers for Disease Control and Prevention define childhood overweight[2] as a body mass index[3] (BMI) above the 95th percentile for children of the same age and gender (benchmarked against the historic BMI distribution[4]). Since 1970, the fraction overweight has almost quadrupled among children aged 6-11 years and more than doubled among adolescents aged 12-19 years (Ogden et al., 2002). As of 2003-2004, 17.1 percent of children aged 2-19 are clinically overweight, a figure more than three times greater than the *Healthy People 2010*[5] goal of 5 percent (Ogden et al., 2006; U.S. DHHS, 2000). Public health and medical organizations have responded by encouraging the passage of a wide variety of policies aimed at preventing or reducing obesity among youths; the most notable example may be the Institute of Medicine's 2005 report, *Preventing Childhood Obesity: Health in the Balance* (IOM, 2005).

In part to determine how much support there is for such policies to reduce childhood obesity, several surveys have been conducted recently to determine how Americans perceive childhood obesity. A summary of these surveys is provided in Table 1. From the time of the earliest listed survey (March 2003) until the survey conducted for this paper (Feb-March 2006, the methodology of which is described in a subsequent

[2] The highest weight classification for adults is "obese" but in order to avoid stigmatizing youth with that label, the highest weight classification for children is "overweight." In this paper I use the two terms interchangeably.
[3] Body mass index (BMI) is calculated as weight in kilograms divided by height in meters squared.
[4] The historic data for child and adolescent BMI-for-height come from the National Health Examination Surveys II (1963-65) and III (1966-70), and the National Health and Nutrition Examination Surveys I (1971-74) and II (1976-80); U.S. DHHS (2002), Table B.
[5] *Healthy People 2010* states U.S. national health objectives, identifies the most significant preventable threats to health, and establishes national goals to reduce these threats by the year 2010 (U.S. DHHS, 2000).

section), almost all of the surveys find that at least two-thirds of respondents indicate that childhood obesity is a "major" or "serious" problem.[6]

A limitation of such survey questions is that it is easy for respondents to describe any issue as a serious problem. One might be more convinced if respondents expressed a willingness to pay for reductions in childhood obesity. A few surveys have attempted to measure this, although in ad hoc ways. In the American Public Health Association (APHA) poll of 2003, 56% of Americans said they would support "a small increase in their local tax" to provide free fruit and vegetable snacks in school lunchrooms (Widmeyer Polling & Research, 2003). In the Harvard Forums on Health poll of 2003, 76% of respondents said they would support school-based policies to reduce childhood obesity if it meant an increase in their taxes, and 42% said they would pay more than $100 a year in taxes to support such efforts (Lane, Snell, Perry & Associates, 2003). Lee and Oliver (2005) found that 64% were willing to pay $50 more a year in taxes to support more nutritious school lunches.

These questions, while an improvement, have limitations. First, none of the questions specified both the policy's costs (in dollars) and benefits (in terms of reductions in childhood obesity), which makes it difficult for survey respondents to evaluate such proposals. Second, the Contingent Valuation (CV) literature has established that asking a series of questions that progressively narrow the bounds on willingness-to-pay (known as the double-bounded model) provides more efficient estimates of WTP than simply asking

[6] The exceptions are the two surveys conducted by RTI (rows 4 and 5), in which fewer than 50% of respondents responded that they thought childhood obesity was a "very serious" problem; fewer people may have agreed with that statement because it was a yes/no question about a strong opinion ("very serious" instead of "serious") instead of a question that allowed the respondent to indicate a degree of agreement.

a yes/no question about a willingness to pay a single amount (Hanemann, Loomis, and Kanninen, 1991).

This paper estimates willingness to pay for reductions in childhood obesity using the double-bounded Contingent Valuation model. It follows the recommendations of the NOAA committee on CV (Arrow et al., 1993) and recent guidelines for conducting CV analyses (Whitehead, 2006). As a result, this paper is able to answer three major research questions. First, how much are people willing to pay to reduce youth obesity? Within this over-arching question, I am also interested in knowing whether willingness to pay varies with characteristics such as household income, number of children, respondent's weight, opinion of current tax levels, political leanings, and perception of whether youth obesity is a major problem.

The second research question is: how do these willingness-to-pay estimates compare to results of surveys that simply ask public support for anti-obesity initiatives? Are the responses to previous surveys that did not ask people to consider the costs of such policies biased in favor of finding greater support for such policies? The third research question is: how do the willingness to pay estimates compare to the external cost savings that would result from reducing childhood obesity?

The results of this paper are useful for both researchers and policymakers. For researchers, it is a relatively rare application of the CV method to estimate the public's valuation of a health policy. For policymakers, it is useful for assessing how much citizens value reductions in childhood obesity.

The Contingent Valuation Method

Policymakers are often interested in how the public values goods and services that are not traded in the marketplace. These values can be estimated using contingent valuation (CV) methods, in which carefully-designed survey questions elicit respondents' willingness to pay (Michell and Carson, 1989; Carson and Hanemann, 2005; Alberini and Kahn, 2006). CV methods have been applied widely in environmental economics (Carson and Hanemann, 2005), in particular to estimate the value consumers assign to wilderness areas that they will never experience firsthand, which are called "passive-use" values.

The litigation surrounding the 1989 Exxon Valdez disaster led both the state of Alaska and Exxon to conduct CV studies of the damaged environmental assets and to assess the accuracy and usefulness of CV studies in general. Around that time, the National Oceanic and Atmospheric Administration (NOAA) appointed an expert panel that included the Nobel-Prize winning economists Kenneth Arrow and Robert Solow and charged it with studying whether CV methods can provide reliable information about passive-use values.

The NOAA panel concluded that CV methods can generate useful information (Arrow et al., 1993) and issued the following recommendations to maximize the reliability of CV estimates: 1) Use of a probability sample; 2) using face-to-face or telephone interviews but not mail surveys; 3) measuring willingness to pay rather than willingness to accept; 4) careful pretesting of the CV questionnaire; 5) phrasing CV questions in the form of hypothetical referenda in which respondents are told how much they would have to pay in increased taxes if the measure passed and are then asked to cast a simple yes or no vote; 6) providing a "would not vote" option in addition to the

"yes" and "no" vote options on the referendum; 7) breaking down willingness-to-pay by a variety of respondent characteristics such as income, interest, and attitudes; 8) reminding respondents of their actual budget constraint when considering their willingness to pay. The survey questions designed for this paper adhered to each of these recommendations.

In recent years, CV has been increasingly applied to topics in health economics (Donaldson, Mason, and Shackley, 2006; Olsen and Smith, 2001) and several recent papers apply the CV method to obesity. Busch et al. (2004) estimate willingness to pay for a smoking cessation treatment that does not result in weight gain. Narbro and Sjostrom (2000) estimate the willingness to pay for obesity treatment, Roux et al. (2004) use CV to estimate the value of community-based weight loss programs, and Finkelstein et al. (2005) estimate willingness to pay for bariatric surgery. This paper complements this previous literature in that while others estimated willingness to pay for treatment of own obesity, this paper estimates adults' willingness to pay to reduce childhood obesity. Moreover, rather than valuing a medical procedure, this paper estimates the willingness to pay for a public policy, which can be interpreted as a measure of support for the policy.

This paper uses the double-bounded CV model, in which survey respondents are asked a sequence of questions that progressively narrows down the willingness to pay, because this method has been shown to generate more efficient estimates than those based on a single question (Hanemann, Loomis, and Kanninen, 1991). This method is superior to the early but now abandoned method of simply asking an open-ended question about willingness to pay. For example, researchers found that people commonly

gave "protest answers" to open-ended questions, responding with zeros or extremely high values (Haab and McConnell, 2002). Asking simple yes/no questions eases the burden on the respondent, decreasing the number of protest answers, and the "would not vote" option allows protest answers to be submitted without introducing bias in estimates of WTP.

We assume that each person *i* has a willingness to pay for reductions in childhood obesity that is equal to Y_i^* and is related to the person's characteristics X_i in the following way: $Y_i^* = X_i\beta + \varepsilon_i$ where ε_i is assumed to be mean zero and normally distributed. We do not observe Y_i^* but based on responses to a series of CV questions, we know that the willingness to pay of person *i* lies in the interval [Y_{i1}, Y_{i2}]. Therefore, the likelihood contribution of the individual is $\Pr(Y_{i1} \le Y_i^* \le Y_{i2})$ or $\Pr(Y_{i1} \le X_i\beta + \varepsilon_i \le Y_{i2})$. For left-censored data (for which an upper, but not lower, bound is known), the likelihood contribution is $\Pr(X_i\beta + \varepsilon_i \le Y_{i2})$ and for right-censored data (for which a lower, but not upper, bound is known) it is $\Pr(Y_{i1} \le X_i\beta + \varepsilon_i)$. The maximum likelihood function is estimated using the interval regression command intreg in STATA 9.2. Whereas a probit regression estimates the probability that a latent variable exceeds a certain threshold, the interval regression estimates the probability that a latent variable exceeds one threshold but is less than another threshold; i.e., it estimates the probability of the latent variable lying in a certain interval.

Data: Empire State Poll (ESP)

The questions regarding willingness to pay for policies to reduce childhood obesity were written by the author and included in the 2006 Empire State Poll (ESP). The Empire State Poll is a survey of adults (aged 18 and over) who live in New York State that is conducted annually by the Survey Research Institute at Cornell University. The survey sample consists of a random digit dial list and it is representative of the population of adults in New York State; every listed telephone household in New York State has an equal chance to be included in the sample, and once a household is selected each adult in the household has an equal chance to be included in the sample.

Telephone surveys took place between February 2, 2006 and March 19, 2006. All interviews were conducted using a Computer Assisted Telephone Interviewing (CATI) software system. The 2006 Empire State poll had 800 respondents, which implies that there is only a 5% chance that random variations in the sample cause the results to vary by more than 3.5 percentage points.

The cooperation rate for the ESP 2006 was 62.2%, and the American Association of Public Opinion Research definition of response rate was 25.2%.[7] These cooperation and response rates are consistent with those of other recent surveys of New York State residents (Nisbet, 2006).

Survey response rates, particularly those for random-digit dialing surveys like the ESP, fell during the 1990s (Biener et al., 2004). This is of potential concern, because if the non-respondents differ in important ways from respondents then survey results may

[7] For each survey, the American Association for Public Opinion Research recommends reporting a host of response rates, cooperation rates, refusal rates, and contact rates, the definitions of which can be found in that organization's Standard Definitions (AAPOR, 2000). For the ESP 2000, response rates 1 and 2 were both 23.5%, and response rates 3 and 4 were both 25.2%. Cooperation rates 1 and 2 were both 58.7%, and cooperation rates 3 and 4 were both 62.2%. Refusal rate 1 was 14.3%, refusal rate 2 was 15.3%, and refusal rate 3 was 17.2%. Contact rate 1 was 40.0%, contact rate 2 was 42.9%, and contact rate 3 was 48.2%.

be biased. To investigate the impact of increased non-response on survey results, two recent papers altered response rates by changing the number of repeat attempts at contact (one experimentally ex ante and another ex post using call-record histories), and both found little effect of increased non-response on estimates of consumer sentiment (Curtin et al., 2000) or a wide range of other topics commonly covered in surveys (Keeter et al., 2000). A comparison of surveys of smoking prevalence over time also found no evidence that increased non-response affected the representation of population sub-groups (Biener et al., 2004).

The random digit dial of the ESP includes cell phones, but cell phone users tend to not to participate in phone surveys since it costs them air time. A Pew Research Center study found that the rise in the percentage of Americans with only a cell phone (estimated now to be 7-9% of the public) has a "minimal" impact on survey results (Pew Research Center, 2006; 1).

ESP 2006 sample weights are used in each regression so that results are generalizable to all New York State residents. It is a strength that this study utilizes a sample that is representative of a state population. Many CV studies use samples of convenience, producing results that cannot be easily generalized.

The ESP collects a host of demographic, labor market, and other variables. In addition, each respondent to the ESP 2006 was asked a series of three CV questions to ascertain their willingness to pay to reduce childhood obesity. Prior to the 2006 ESP, the Survey Research Institute conducted a pretest of the CV questions; based on the responses the CV questions were revised (see Appendix for details). In its final form on the ESP 2006, the opening CV question read:

> Suppose there is a new voter referendum in your town. The referendum will enact policies that will reduce youth obesity in your town by 50% (set aside for now how it will reduce youth obesity, but assume it will do so with certainty). If the referendum passes, you and everyone else will have to pay $X more in taxes every year. Given your current budget, would you vote for or against this referendum?
>
> __ FOR __ AGAINST __ WOULD NOT VOTE

This question adheres to each of the NOAA expert panel recommendations: 1) It is asked of a probability sample; 2) it is asked through a telephone interview, not a mail survey; 3) it measures willingness to pay rather than willingness to accept; 4) the CV questions were pretested and revised in light of feedback; 5) the CV questions were phrased in the form of hypothetical referenda in which respondents are told how much they would have to pay in increased taxes if the measure passed and are then asked to cast a simple yes or no vote; 6) a "would not vote" option is provided; 7) later in this paper we break down estimated willingness-to-pay by a variety of respondent characteristics such as income, interest, and attitudes; 8) respondents are reminded to consider their actual budget when deciding their willingness to pay.

In the first of the series of CV questions, the value of $X was $50. If respondents answered that they would vote against the referendum, they were asked a follow-up question in which they were asked how they would vote if their taxes would instead rise by a lesser amount. Respondents who answered that they would vote for the referendum were asked in a follow-up question how they would vote if their taxes would instead rise by a higher amount. A second follow-up question (the third question in the series) further narrowed down the respondents' willingness to pay. Based on their responses to these three questions, respondents ended up in one of the following categories, where the first

number indicates the lower bound, and the second the upper bound, of willingness-to-pay in dollars: $(-\infty, 10)$, (10, 25), (25, 40), (40, 50), (50, 75), (75, 100), (100, 200), $(200, \infty)$; see Figure 1.[8] Table 2 provides summary statistics for the regression sample used in this paper.

Empirical Results

We first provide a basic description of the responses to the CV questions, and then present results from interval regressions. Of the respondents in the regression sample, Figure 1 indicates that the modal category was (0, 10); 36.3% of respondents answered that they would be willing to pay less than $10 a year to reduce childhood obesity by half (see Figure 1). The next largest group of respondents is in the highest category of willingness to pay; 15.9% responded that they would be willing to pay $200 or more in taxes a year to halve childhood obesity. The remaining 47.8% of respondents had WTP that lay somewhere in between $10 and $200 per year.

To estimate the mean WTP of the sample, and to test how WTP varies with observed respondent characteristics, we estimate a series of interval regressions. The regressors include: number of children in the household and indicator variables for white (omitted category is nonwhite), female (omitted category male) household income over $50,000 (omitted category is household income less than $50,000), and whether respondent is obese.[9] We also included a proxy for beliefs about childhood obesity as a

[8] One could instead define the absolute lower bound as zero, but this would rule out the possibility that some respondents could be so opposed to the policy that they would have to be paid (in the form of a tax cut) in order to support the policy.

[9] Weight and height are self-reported in the Empire State Poll, so we correct for reporting error in these variables using validation data from the National Health and Nutrition Examination Survey III; see Cawley and Burkhauser (2006).

policy issue. This proxy fell into one of two categories: either a measure of the respondent's perception of obesity, or a measure of their political beliefs more generally. The proxies that measured the respondent's perception of obesity included: 1) an indicator for whether the respondent said they believe youth obesity in the U.S. is a major problem (the omitted category is stating that youth obesity is either a minor problem or not a problem at all); 2) indicators for whether the respondent thinks youth obesity is among the most important (least important) problems facing American youth (the omitted category is "somewhere in the middle"); 3) indicators for whether the respondent said that, of a fixed budget to spend on combating public health problems facing American youth, youth obesity should receive a greater than even share or less than even share (the omitted category is an even share relative to other public health problems); and 4) indicators for whether the respondent thinks obesity is primarily due to individual choices or genetics (the omitted category is thinking obesity is primarily due to environment).

The proxies that measured the respondent's general political beliefs included: 1) an indicator variable for whether the respondent rated the tax situation in New York State as poor (the omitted category is rating it fair, good, or excellent); 2) an indicator variable for whether the respondent self-identified as liberal, and another for whether respondent self-identified as a conservative (the omitted category is "middle of the road"); 3) indicator variables for whether the respondent self-identified as a Democrat or a Republican (the omitted category is independent).

Results are presented in Tables 3 (models using a proxy for perception of obesity) and 4 (models using a proxy for political beliefs more generally); each model varies only in which of the proxies for support for anti-obesity policies is included. These tables list

coefficients, elasticities (for coefficients that are statistically significant in any model presented in the table), and standard errors in parentheses. Statistical significance is indicated using asterisks. Table 3, column 1 includes the baseline results, in which the proxy for policy support is an indicator for reporting that childhood obesity is a major problem. Based on these regression results, the mean estimated willingness to pay for a 50% reduction in youth obesity is $47.25. This is the mean WTP associated with the model reported in column 1 of Table 3, and the mean WTP estimated in the other models varies only slightly because in each regression the mean error is zero and each regression line passes through the mean.

It is reasonable to ask whether, since the CV questions are hypothetical, respondents are giving random answers simply to get through the survey faster. The NOAA committee offered two suggestions to address this issue. First, include as an optional answer "Would not vote", so people can speed through the survey if they wish without generating nonsensical WTP. Second, the NOAA committee recommended that researchers investigate the face validity of the responses. In the present context, that involves testing whether willingness to pay for reductions in youth obesity varies in logical ways with observed characteristics, such as household income, number of children, respondent's weight, opinion of current tax levels, and perception of whether youth obesity is a major problem.

The results in Tables 3 and 4 indicate that the WTP recorded in ESP 2006 vary in logical ways with observables and therefore have considerable face validity. For example, in column 2, obese respondents have a WTP that is 15.6% higher than the non-obese (in other regressions, the difference in WTP associated with obesity is not

statistically significant although the point estimates are large). In column 1, each additional child in the household is associated with a 15.8% higher WTP. Also in column 1, a household income over $50,000 per year is associated with a 37% higher willingness to pay.

In Table 3, column 1, those who report perceiving youth obesity as a "major problem" in the US report a 201% higher WTP. In column 2, those who think youth obesity is among the most important problems facing American youth report a 28.7% higher WTP, while those who rank it as among the least important problems have a 45.9% lower WTP. Moreover, in column 3, those who report that a greater-than-even share of the public health budget should be devoted to youth obesity as opposed to other youth health concerns have 42.1% higher WTP, and those who report that a less-than-even share should be devoted to youth obesity have a 51.1% lower WTP. Finally, in column 4, those who think that obesity is primarily due to individual choices report 50.4% lower WTP than those who think obesity is primarily due to the environment, while those who think that obesity is primarily due to genetics report 11% lower WTP.

In Table 4, column 1, those who report that they describe the tax situation in New York State as "poor" report a 52.5% lower WTP. In column 2, self-described liberals have a 30.9% higher WTP than those who say they are politically "middle of the road"; self-described conservatives are not significantly different than moderates. In column 3, Democrats have a WTP that is 25.2% higher than independents, and Republicans have a WTP that is 17.3% lower than independents. In summary, WTP is generally correlated in expected ways with observable characteristics – both those relating to obesity and those relating to politics and taxes.

Proceeding under the assumption that the WTP data are valid and useful, we next compare our estimated mean WTP to related results found by other researchers. In the Harvard Forums on Health poll of 2003, 76% of respondents said they would support school-based policies to reduce childhood obesity if it meant an increase in their taxes, and 42% said they would pay more than $100 a year in taxes to support such efforts (Lane, Snell, Perry & Associates, 2003). Lee and Oliver (2005) found that 64% were willing to pay $50 more a year in taxes to support more nutritious school lunches. These questions are not directly comparable to the CV questions in this paper, in part because neither previous survey explicitly stated the benefit of the policy in terms of a specific reduction in childhood obesity. However, even if respondents interpreted both proposed policies as generating a 50% reduction in childhood obesity, the results of this paper still imply a lower WTP than that found by either previous study. While the Harvard Forums on Health poll found that 42% said they would pay more than $100 a year in taxes to reduce childhood obesity, in the ESP 2006 only 29% reported a WTP in that range. Lee and Oliver (2005) find that 64% were willing to pay $50 or more a year, whereas in the ESP 2006 only 45.7% had a WTP in that range. To the extent that respondents to the previous surveys were expecting less than a 50% reduction in youth obesity as a result of these proposed policies (which seems likely), the gap between the WTP found by this paper and those implied by earlier papers widens further.

What explains this discrepancy? In part it may be due to previous surveys asking questions that related to WTP but did not follow the accepted standards for accurately estimating CV (Arrow et al., 1993). For example, previous questions did not explicitly state the benefits of the program, and both previous surveys asked a single question rather

than a series of questions designed to narrow down WTP (i.e. the double-bounded model). This is not a criticism of either previous survey, since neither intended to do or claimed to do a CV analysis. However, it may explain the difference in results.

Despite the fact that the WTP found in this paper are somewhat less than that implied by earlier surveys, the aggregate WTP is substantial. The mean WTP in this study was $47.25, and the U.S. Census estimates that the adult population in New York State in 2005 was 14.65 million, which implies a total WTP by New York State residents of $692.3 million per year.

We next investigate how this estimated total WTP compares to the potential benefits of reducing childhood obesity by half. The benefits from such a reduction fall into three categories: 1) savings from decreased external costs imposed on society by obese children; 2) utility benefits from a decreased risk of obesity for children to whom one is related or knows, which we'll call weak altruism; and 3) utility derived from a decreased risk of obesity for other children, which we'll call strong altruism. We're unable to identify or calculate these last two benefits separately so we'll lump them together under the term altruism.

Next, we compare the total WTP of New Yorkers for reductions in childhood obesity to the expected savings that would result from the reduction in childhood obesity due to lower external costs imposed through public health insurance (Medicaid and the State Children's Health Insurance Program or SCHIP) or private group health insurance. If New Yorkers are well-informed about the external costs of childhood obesity, then we should find that the total WTP for obesity reductions is at least as high as the external cost savings that would result. The external costs of childhood obesity can be

decomposed into two categories: the external costs imposed during childhood, and those imposed during adulthood. We consider each of these in turn.

We first calculate the external costs associated with obese children today. Johnson, McInnes, and Shinogle (2006) calculate that each overweight child each year causes $12.09 (in 1998 dollars) in additional health care expenditures; adjusted to May 2006 dollars it equals $15.11. I assume that all of these additional costs represent externalities imposed on the public through public health insurance programs like Medicaid and the State Children's Health Insurance Program or through private group health insurance (no group health insurance adjusts premiums to reflect the clinical weight classification of covered minors).

We next multiply the $15.11 per-overweight-child external cost by the number of overweight children in New York State. The U.S. Census estimates that New York was home to 4.5 million youths under the age of 18 in the year 2005, and the CDC reports that 11% of New York State high school students were clinically overweight in 2005 (CDC, 2006). Assuming that the prevalence of overweight among high school students was the same among younger youths, the total number of overweight New York State youths is roughly 495,000. Multiplying the number of overweight New York youths by the $15.11 in additional health care costs for each overweight youth generates an external cost of childhood obesity in New York State of $7.5 million. Since the CV question asked about reducing childhood obesity by half, the associated savings would presumably be half of the total external costs to Medicaid, or $3.8 million.

We next consider the savings associated with decreased adult obesity in the future. Serdula et al. (1993) survey the literature and find that the maximum percentage

of adult obesity that can be attributed to childhood obesity (i.e. the Population Attributable Risk) in the four studies that made such calculations were: 8%, 10% and 12% (two estimates from one paper), 13%, and 22%. Taking the average of these estimates, we assume that 13.0% of adult obesity is attributable to childhood obesity. We assume that if childhood obesity fell by half, adult obesity would fall by 6.5% (half of 13.0%) in the long run. Finkelstein et al. (2004) estimate that the total external costs of adult obesity in New York State in 2003 were $4.93 billion in 2003 dollars (which includes costs to both Medicaid and Medicare). In 2006 dollars this equals $5.426 billion. (The consequences of obesity for health expenditures are much greater for adults than children.) A 6.5% reduction in adult obesity is expected to save 6.5% of that amount, or $352.7 million. However, a 6.5% reduction in adult obesity will not occur immediately; that is the long-run reduction after today's youth have matured through the age distribution. As a result, the value today of these future savings is far less than $352.7 million. Moreover, we acknowledge that projections of savings in future decades are likely to be highly inaccurate because of future changes in costs and technology.

These estimates of savings from external costs help put in context the willingness of New York State residents to pay for reductions in childhood obesity. Although the savings today from reducing childhood obesity by half is estimated to be $3.8 million per year, New Yorkers are willing to pay $692.3 million per year for such a reduction. Even when one adds in the undiscounted savings from decreased external costs associated with less adult obesity in the future, the annual savings total $356.5 million, still far less than New Yorkers' WTP of $692.3 million.

Conclusion

This paper uses Contingent Valuation methods applied to unique data to estimate the willingness to pay for reductions in childhood obesity. The WTP data collected have considerable face validity; a higher willingness to pay for reductions in childhood obesity is reported, on average, by those who have more children in their household, have higher household income, perceive childhood obesity as a major problem, and self-identify as liberal or a Democrat. Lower willingness to pay is reported, on average, by those who think childhood obesity is one of the least important problems facing American youth, who think obesity is primarily due to individual choices or genetics, who disapprove of the current tax situation, and who self-identify as Republican.

The mean WTP by New Yorkers for a 50% reduction in childhood obesity is $47.25, which implies a total WTP by New York residents of $692.3 million, which vastly exceeds the related savings in external costs from halving childhood obesity in New York and is even greater than the future annual savings from both lower childhood and lower adult obesity. This suggests that the public supports public health initiatives not only to reduce external costs, but also altruistically. Despite the large WTP relative to the savings in external costs, the WTP estimated using the CV techniques in this paper are somewhat lower than those implied by previous surveys that did not use CV methods, which underscores the importance of adhering to CV survey criteria when estimating WTP.

A strength of this paper is that the data, from the Empire State Poll of New York, generalize to the entire state of New York, as many CV surveys are administered to convenience samples. However, a limitation is that these results do not generalize to the

U.S. as a whole. It is not clear whether these WTP estimates are higher or lower than those for the nation as a whole. On the one hand, New York State residents are heavily taxed and therefore at the margin may be less willing to pay for any public policies than residents of other states. On the other hand, New York State is also relatively liberal and may have, unconditionally, stronger preferences for these types of policies.

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Appendix
Modifications of Survey Based on Pre-test

The Empire State Poll conducted a pretest of the CV questions in January 2006; 23 individuals were interviewed. They were administered draft versions of the CV questions and were asked to explain why they responded as they did. The pretest respondents' answers regarding why they would vote for or against the hypothetical referendum in the willingness-to-pay question indicated that they were weighing the costs and benefits of the proposal. Examples:

** I think the $50 is too excessive and the $10 range I could cope with.*

** I am an endocrinologist and I see it all of the time. I think it is a big problem and in the long run it will cost a lot more if we simply let it go.*

** We are taxed virtually to death where we live. A little more here and a little more there add up.*

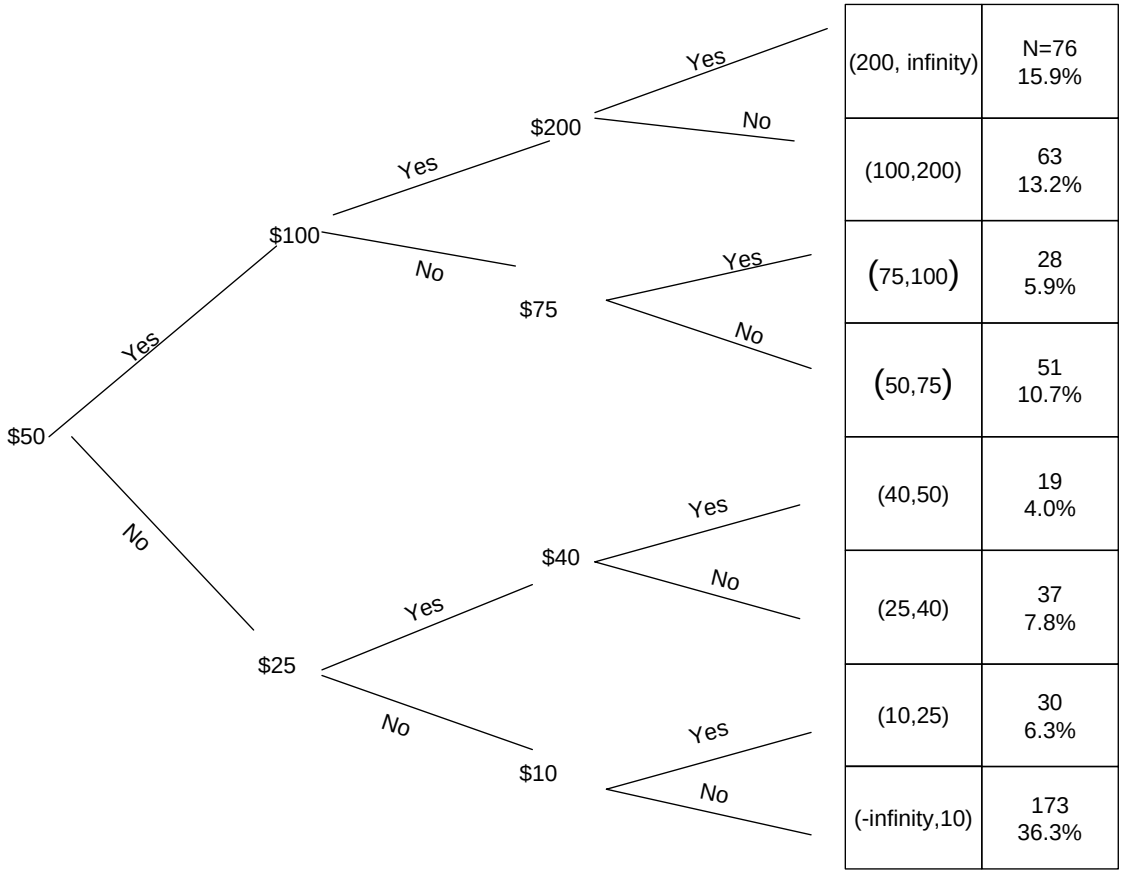
** I feel it's each person's own responsibility, so other people shouldn't have to pay.*

** It gets out of hand for too much money. We have to put a cap on spending.*

Based on these responses, respondents appeared to understand the tradeoff they were being asked to consider. A similar open-ended question was included on the main ESP 2006 survey, and the responses again confirmed that respondents appeared to understand the tradeoff they were being asked to consider. A copy of the responses to this open-ended question is available upon request.

The pretest respondents' answers were used to modify the questionnaire in two ways. First, interviewers reported that respondents were asking *how* the policies on the referendum would reduce youth obesity. To address this, the question was revised to read in part "(set aside for now how it will reduce youth obesity, but assume it will do so with certainty)". Second, the follow-up CV questions were reworded to clarify that the extra amount will have to be paid every year in higher taxes, which made them consistent with the original question.

Figure 1: Sequence of Contingent Valuation Questions In Empire State Poll 2006
Regression Sample of N=477



(200, infinity)	N=76 15.9%
(100,200)	63 13.2%
(75,100)	28 5.9%
(50,75)	51 10.7%
(40,50)	19 4.0%
(25,40)	37 7.8%
(10,25)	30 6.3%
(-infinity,10)	173 36.3%

Notes: At each node, respondents were asked whether they would vote for a referendum to enact anti-obesity policies that would reduce childhood obesity by half if as a consequence of passage they would have to pay an additional amount in annual taxes equal to the amount listed at that node. The sequence of three questions gives us bounds on the respondent's willingness to pay for such policies.

Table 1: Recent Surveys on Significance of Childhood Obesity

Study Number	Researching Institution	Pollster	Sample Size	Sample Representative?	Dates of Survey	Results	Citation
1	American Public Health Association	Widmeyer Polling & Research	600	Yes – of U.S.	March 2003	82% concerned about childhood obesity, and 89% believe it is a serious problem	Widmeyer Polling & Research (2003)
2	Harvard Forums on Health	Lane Snell Perry & Associates	1,002	No	May-June 2003	74% believe childhood obesity is a major problem.	Lane Snell Perry & Associates (2003)
3	San Jose Mercury News/Kaiser Family Foundation	International Communications Research	1,175	Yes – of San Francisco Bay Area	Nov – Dec 2003	69% describe youth obesity as a major problem and an additional 26% believe it is a minor problem	San Jose Mercury News (2004)
4	Research Triangle Institute	Odom Survey Research Institute at the University of North Carolina	1,010	Yes – of U.S.	Jan 17 – March 6, 2004	41.5% perceive childhood overweight and obesity to be a very serious problem.	Evans et al., (2005)
5	Research Triangle Institute	Odom Survey Research Institute at the University of North Carolina	1,139	Yes – of U.S.	Sept – Oct 2004	47.4% perceive childhood overweight and obesity to be a very serious problem.	Evans et al. (2006)
6	Wall Street Journal	Harris Interactive	2,387	No	Feb 4-8, 2005	77% believe childhood obesity is a major problem and an additional 21% believe it is a minor problem.	Gullo (2005)
7	Cornell University	ILR Survey Research Institute at Cornell University	800	Yes – of New York State	Feb 2 – March 19, 2006	83% believe youth obesity is a major problem and an additional 13.3% believe it is a minor problem.	This paper

Table 2: Summary Statistics
Empire State Poll Regression Sample

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Lower Bound of Willingness to Pay	304	92.55	68.16	10	200
Upper Bound of Willingness to Pay	401	60.19	66.65	10	200
White	477	.77	.42	0	1
Female	477	.50	.50	0	1
Obese	477	.28	.45	0	1
Number of Kids in Household	477	.81	1.15	0	8
Household Income Over $50,000	477	.51	.50	0	1
Say Childhood Obesity is a Major Problem	477	.81	.39	0	1
Think Youth Obesity Among Most Important Problems Facing American Youth	477	.21	.41	0	1
Think Youth Obesity Among Least Important Problems Facing American Youth	477	.24	.43	0	1
US Should Devote Relatively Large Share of Public Health Budget to Obesity	477	.39	.49	0	1
US Should Devote Relatively Small Share of Public Health Budget to Obesity	477	.40	.49	0	1
Say Obesity Primarily Due to Individual Choices	477	.61	.49	0	1
Say Obesity Primarily Due to Genetics	477	.14	.34	0	1
Rate Tax Situation in NY State as Poor	477	.58	.49	0	1
Liberal	477	.37	.48	0	1
Conservative	477	.34	.48	0	1
Democrat	477	.43	.50	0	1
Republican	477	.27	.44	0	1

Note: if lower bound of willingness to pay is less than $10, it is set to missing. Likewise, if upper bound of willingness to pay is over $200, it is set to missing. All 477 observations are used in the regressions reported in Tables 3 and 4.

Table 3: Interval Regression Results of Willingness to Pay for 50% Reduction in Childhood Obesity Correlation with Perceptions of Obesity

	(1)	*(2)*	*(3)*	*(4)*
White	-3.257	3.453	6.872	-4.792
	(13.4)	(13.0)	(13.6)	(13.7)
Female	9.673	11.38	3.973	6.199
	(12.6)	(12.3)	(12.3)	(13.0)
Obese	20.83	26.82**	15.05	17.04
	ε = .123	ε = .156	ε = .087	ε = .097
	(13.3)	(13.5)	(13.1)	(14.2)
Number of Kids in Household	9.209*	7.134	4.723	8.636
	ε = .158	ε = .120	ε = .079	ε = .143
	(5.46)	(5.59)	(5.52)	(5.68)
Household Income > $50,000	34.12***	35.81***	46.27***	33.98**
	ε = .370	ε = .381	ε = .493	ε = .356
	(12.5)	(12.3)	(12.6)	(13.2)
Believe Youth Obesity in US is a Major Problem	116.3***			
	ε = 2.011			
	(17.8)			
Think Youth Obesity Among Most Important Problems Facing American Youth		65.58***		
		ε = .287		
		(17.1)		
Think Youth Obesity Among Least Important Problems Facing American Youth		-94.58***		
		ε = -.459		
		(16.1)		
US Should Devote Relatively Large Share of Public Health Budget to Obesity			50.02***	
			ε = .421	
			(17.4)	
US Should Devote Relatively Small Share of Public Health Budget to Obesity			-62.43***	
			ε = -.511	
			(17.5)	
Think Obesity Primarily Due to Individual Choice				-40.47**
				ε = -.504
				(15.8)
Think Obesity Primarily Due to Genetics				-38.56*
				ε = -.110
				(21.1)
Constant	-81.08***	16.60	13.76	50.13***
	(22.5)	(15.6)	(21.7)	(18.8)
Observations	477	477	477	477

Notes:

1) Elasticities appear below coefficient point estimates for coefficients that are ever statistically significant.
2) Standard errors appear in parentheses
3) Asterisks indicate statistical significance: *** p<0.01, ** p<0.05, * p<0

Table 4: Interval Regression Results of Willingness to Pay for 50% Reduction in Childhood Obesity Correlation with Political Preferences, Perception of Taxes

	(1)	*(2)*	*(3)*
White	4.342	1.417	12.02
	(13.9)	(13.8)	(14.0)
Female	3.041	3.897	5.213
	(13.2)	(13.1)	(13.0)
Obese	15.22	11.52	11.89
	(14.0)	(14.1)	(13.9)
Number of Kids in Household	8.753	8.882	8.372
	(5.72)	(5.54)	(5.87)
Household Income > $50,000	39.33***	32.46**	40.62***
	ε = .413	ε = .340	ε = .428
	(13.0)	(13.1)	(12.9)
Rate Tax Situation in NYS as Poor	-46.39***		
	ε = -.525		
	(13.5)		
Liberal		41.23**	
		ε = .309	
		(16.1)	
Conservative		-17.49	
		ε = -.120	
		(16.7)	
Democrat			26.83*
			ε = .252
			(15.0)
Republican			-33.91*
			ε = -.173
			(18.5)
Constant	38.18**	9.636	2.604
	(17.0)	(19.2)	(19.0)
Observations	477	477	477

Notes:

1) Elasticities appear below coefficient point estimates for coefficients that are ever statistically significant.
2) Standard errors appear in parentheses
3) Asterisks indicate statistical significance: *** p<0.01, ** p<0.05, * p<0