The willingness to pay to reduce school bullying

Pain Intheneck

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ABSTRACT

The number of programs used to reduce bullying in schools is increasing, but often with a lack of understanding of the effectiveness and monetary benefits. This paper uses a discrete choice experiment conducted in Sweden in the spring of 2010 to elicit the willingness to pay (WTP) to reduce school bullying. Non-parametric and parametric approaches indicate a mean marginal WTP of 5.95–8.48 Swedish kronor (€0.66–0.95) for each reduced victim of bullying. The aggregate societal WTP for each reduced statistical victim of bullying, referred to here as the value of a statistical bullying-victim (VSBV), is then 585,090–835,280 Swedish kronor (€65,446–93,431). The VSBV may be interpreted as the aggregate WTP to prevent one statistical case of a bullying-victim. The result may be used to conduct economic evaluations of antibullying programs, which is demonstrated here by a simple cost–benefit analysis of one of the most common antibullying programs. The VSBV may also be relevant for providing policymakers with useful information on taxpayers' preferred allocations to antibullying programs in general.

1. Introduction

A substantial share of children and adolescents attend a school where they are victims of direct and/or indirect bullying (Beaty & Alexeyev, 2008). Direct bulling includes teasing, taunting, threatening, hitting or name-calling, while examples of indirect bullying are leaving others out on purpose and spreading vicious rumors. Using a national representative sample of Swedish adolescents aged 15 in 2005/06, approximately 5% of the boys and 3% of the girls stated that they had been bullied repeatedly during the previous few months. These estimates are similar to earlier national studies dating back to 1997/98 (6% of boys and 4% of girls bullied) and 1993/1994 (5% of boys and 5% of girls bullied). The share of adolescents stating that they had been bullied during the last school year was higher, 11–14% in 2005/2006 (Danielson, 2006; Danielson & Sundbaum, 2003). There is more substantial variance in the international prevalence estimates of bullying, which tend to be between 5 and 15% (Beaty & Alexeyev, 2008; Christie, 2005). Most of these studies are based on a typical definition of bullying as outlined in an early work by Olweus; a pupil is bullied when (1) he/she is exposed, repeatedly and over time, to negative actions on the part of one or more of the other pupils, (2) the relationship between the bully and the bullied individual is characterized by an imbalance of power, and (3) the bully has the intention of doing harm (Limber, 2004; Olweus, 1978, 1993).

Being a victim of bullying is associated with low self-esteem, self-harm, suicidal intention, depression, loneliness and physical ill-health (Barker et al., 2008; Fekkes, Pijpers, Fredriks, Vogels, & Verloove-Vanhorick, 2006; Ferguson, Beatruais, & Horwood, 2003; Hawker & Boulton, 2000; Nansel, Craig, Overpeck, Saluja, & Ruan, 2004; Nishina, Juvonen, & Witkow, 2005; Rigby, 2003). It has also been shown that pupils who are bullied at a young age invest less in higher education compared to non-bullied control pupils (Brown & Taylor, 2008). On average, bullies,

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have poorer academic skills, perform below average in school, often lack empathy, are more likely to have substance abuse problems and face an increased risk of becoming criminals in adult life (Juvonen, Graham, & Schutser, 2003; Kaltiala-Heino, Rimpelä, Rantanen, & Rimpelä, 2000; Le, Miller, Heath, & Martin, 2005; Merrell & Isava, 2008; Nansel et al., 2001; Sourander et al., 2007).

Programs to reduce school bullying are on the increase, but there is often a lack of understanding of their effectiveness and monetary benefits. In 2007, the Swedish Ministry of Education and Research financed a project to summarize published data on the effectiveness of anti-bullying programs currently being used in Swedish schools. The preliminary results indicated that only 1 of the 21 antibullying programs in Swedish schools could be considered as evidence-based with proven efficiency in a proper evaluation (SNAE, 2007). In a similar context, the Swedish Council on Health Technology Assessment evaluation of 33 programs, used in Swedish schools to prevent mental ill-health among children, found that only seven programs had any evidence-based meaningful effects (SBU, 2010).

Antibullying programs are often described as being based on a "whole-school" approach, focusing on general interventions across all individuals, or an "individual-based" approach, targeting a small number of pupils that are considered to be at risk of being bullied or becoming bullies (e.g. disciplinary methods, parent training). A recent meta-analysis of 16 studies of school-based bullying-intervention ("whole-school" and "individual-level" programs) found that, for 10 out of 28 outcome variables, studies identified a significant reducing effect on bullying (Merrell & Isava, 2008). Another meta-analysis, only including "whole-school" anti-bullying programs, concluded that the majority of programs evaluated did not produce any significant beneficial effects (Smith, Schneider, Smith, & Ananiadou, 2004). A report on 59 studies documenting 30 different antibullying programs shows an average reduction rate in victimization (being bullied) of 17–23% (Ttofi, Farrington, & Baldry, 2008). The most important program elements for reducing bullying were disciplinary methods, videos, work with peers, parent training, cooperative group work and school yard supervision. Further, the number of elements and intensity of the programs were related to the size of the effect.

However, we have not been able to identify any studies that evaluate the total welfare effects of the intervention programs, i.e. none of the studies relate the costs of the interventions to the benefits.[1] If a region, municipality, school et cetera, plans to invest in an antibullying program, it is relevant to compare the benefits and the costs of the program in order to ascertain if the investment is worthwhile. A cost–benefit analysis requires both the costs and the benefits of the intervention to be monetized. If the present value of monetized benefits of the program is larger than the costs, according to the Hicks–Kaldor criteria, the program can be said to increase welfare. Costs of the antibullying programs are mostly personnel costs (training and implementation), and some programs may also include material costs (educational material et cetera). It is more difficult to value the benefits of an antibullying program, i.e. the economic value of reduced bullying, and market data cannot (at least directly) be used for this purpose.

In this paper we show how the benefits of an antibullying program can be valued by estimating the societal willingness to pay (WTP) to reduce school bullying. We apply a discrete choice experiment (DCE) using a stated preference method. As stated, this can be used as a measure to compare the implementation costs with the benefits and thus obtain an economic and welfare evaluation of antibullying programs. It may also provide policymakers with useful information on taxpayers' preferred allocations to antibullying programs. The rest of the paper is structured as follows: Section 2 describes the data collection and the DCE. Section 3 contains the descriptive statistics of the data, and Section 4 presents the econometric approach to estimating WTP. The results are shown in Section 5, and in Section 6 we show how the results can be used in economic evaluations of antibullying programs illustrated with a simple cost–benefit analysis of a common antibullying program. The paper is concluded with a discussion in Section 7.

2. Survey design

The data in this paper come from a stated preference (SP) survey conducted by mail in February 2010, with a reminder sent out three weeks later, in the municipality of Örebro in Sweden. The survey was sent to a random sample of 2001 individuals between the ages of 18 and 70 based on the Swedish Governments Personal- and Address-Register (SPAR), which includes all individuals with an address and currently living in Sweden. Örebro, situated approximately 200 km west of the capital Stockholm, has a population of 134,000, making it the seventh most populated municipality in Sweden. Most aspects of the demographic and socioeconomic characteristics of the municipality are in line with the national average (Örebro, 2010a).

We chose to implement the survey in a specific municipality in Sweden, using a "community analogy" in order to increase the respondents' association with the hypothetical good. This has been argued to increase both the likelihood of responding to the survey as well as the quality of responses (Kalman & Royston, 1997). There are drawbacks to using a specific municipality, since estimates of WTP may not be representative for the Swedish population. However, earlier work on WTP in terms of health risks in Sweden show no large geographical variation (Carlsson, Daruvala, & Jaldell, 2010), and we considered that the benefits of carrying out the DCE in a specific municipality would outweigh the costs.

The survey consisted of three different parts, (1) introduction of the concept of bullying and its prevalence in the municipality of Örebro and Sweden, (2) the actual

[1] The aforementioned study by Brown and Taylor (2008) finds that bullied pupils have lower life-time incomes, partly via lower levels of investment in higher education. Hence, this can be seen as a monetization of some of the consequences of bullying, but still the total welfare effects which we try to address here are larger than the human capital effects.

Question 1. Currently about 4 800 pupils attend grade 7 to grade 9 in the municipality of Örebro. You have the opportunity to vote on a program that would reduce the number of pupils being bullied according to the information given below.

Pupils being bullied without the program	480 pupils
Pupils being bullied if the program is implemented	100 pupils
Cost per tax payer	500 Swedish kronor

Are you in favor of the municipality implementing this program at the given cost?

☐ Yes ☐ No

Fig. 1. Example of one of the WTP questions (question 1 from survey version 1).

discrete choice experiment part, and (3) background questions on socio-economics.

The first part of the survey defined bullying, using the definition in the introduction in this paper; some of the potential consequences of bullying were also described. The respondents were informed that (annually) 1 out of 10 pupils are bullied in lower secondary schools, which was based on data from a public health survey carried out in the municipality. There were approximately 4800 pupils in lower secondary school in the municipality of Örebro (Siris, 2009) and, according to our assumption, 480 pupils were bullied each year.

The willingness-to-pay part of the survey was a discrete choice experiment with two attributes (*Risk Reduction* and *Cost*). The respondents were told that a particular (not identified) antibullying program could be implemented in the municipality to reduce the prevalence of school bullying. The program would be paid for by an increase in the municipal tax and the respondent could choose to vote either in favor of or against implementing the program.[2] The baseline bullying was the same in all scenarios (1 out of 10 = 480 pupils), the *Risk Reduction* attribute had three levels and the *Cost* attribute five levels, as summarized in Table 1. The *Risk Reduction* was described using frequencies rather than probabilities, considering that several population studies have documented respondents' difficulties in understanding WTP questions based on probabilities (Hammitt & Graham, 1999).

Combining the attributes and the attribute levels generated in total 15 choice sets/questions, which were randomly blocked into three survey versions containing five choice sets each, i.e. a full factorial design. Each respondent was randomly assigned to one of the three survey versions and hence answered five referendum questions. The respondents were asked to consider each new question as independent of the previous questions. We used a focus group consisting of approximately 50 individuals (undergraduate students at a university) when formulating the description of the attributes and the attribute levels. Moreover, a pilot questionnaire was sent to 100 randomly sampled individuals in the municipality of Örebro.

Table 1
Survey description: attributes and attribute levels.

Attribute	Attribute levels
Risk reduction	(1) 100 less bullied, (2) 240 less bullied, and (3) 380 less bullied pupils per school/academic year
Cost	(1) 200, (2) 500, (3) 1000, (4) 2000, and (5) 5000 Swedish kronor

Note: Baseline number of bullied pupils was 480 pupils per school/academic year.

Fig. 1 above shows an example of one of the questions given to respondents. The question is taken from survey version one (the first question out of five in this survey version), and the risk reduction in this specific question is 380 pupils (reducing bullying from 480 to 100 pupils) at a cost of 500 Swedish kronor (€55.9).[3]

3. Descriptive statistics

3.1. Response rates

Of the 2001 questionnaires, 29 (1.5%) were returned because they had not been sent to valid addresses. Of the remaining 1972 questionnaires we received 789 responses, i.e. a response rate of 39.4%. Of the returned questionnaires, 108 were returned blank and 19 had to be excluded due to missing information. The final sample available for use in the empirical estimation is based on answers from 662 respondents.

3.2. The willingness to pay/referendum question

Fig. 2 summarizes responses to the willingness to pay/referendum questions. It shows the share of respondents

[2] The discrete choice experiment could also be defined as a contingent valuation survey with repeated and independent binary choice questions using the referendum format as recommended by the NOAA panel (NOAA, 1993).

[3] 1 Euro (€) = 8.94 Swedish krona (SEK).

Table 2
Descriptive statistics of independent variables.

Independent variable	Description	Sample mean (Std. Dev.)	Mean Örebro	Mean Sweden
Female	=1 if female respondent	0.56	0.51	0.50
		(0.50)	(–)	(–)
Age	age in 2010	45.64	44.48	43.50
		(15.02)	(–)	(–)
Employed	=1 if respondent is currently employed	0.67	0.69	0.69*
		(0.47)	(–)	(–)
University education	=1 if respondent has any university education	0.51	0.41	0.35
		(0.50)	(–)	(–)
Household income	Household (pre-tax) income/month, in 1000 SEK	39.58	–	–
		(21.04)	(–)	(–)
Bullied children	=1 if respondent has bullied children	0.09	–	–
		(0.29)	(–)	(–)
Bullied	=1 if respondent bullied in school	0.25	–	–
		(0.43)	(–)	(–)
School staff	=1 if respondent is school staff	0.10	–	–
		(0.30)	(–)	(–)
Parent	=1 if respondent is parent	0.34	–	–
		(0.48)	(–)	(–)
Young children	=1 if respondent has children <6/7 years	0.20	–	–
		(0.40)	(–)	(–)
School children	=1 if respondent has children in Comp. School	0.20	–	–
		(0.40)	(–)	(–)
Older school children	=1 if respondent has children in Upper Sec. School	0.05	–	–
		(0.22)	(–)	(–)

Note: Employment statistics for Sweden (variable employed) refers to age category 20–74, all other data refer to age category 18–70 (which is the age range of our data collection).

that were in favor of implementing the antibullying program (answered "Yes") at the different *Cost* and *Risk Reduction* levels.

It can be seen in Fig. 2 that, in line with theoretical expectations, the share of yes-responses decrease as the cost increases. The three lines in Fig. 2 represent different levels of the risk reduction (risk reduction: 380 pupils, 240 pupils, 100 pupils). Also in line with theoretical expectations, the share of yes-votes is higher the larger the risk reduction (the line representing the risk reduction of 380 pupils is at the top, and the line representing the risk reduction of 100 pupils is at the bottom). Hence, our data shows sensitivity to scope, which is a standard validity test of a SP survey.

It should be noted that 260 (39.4%) respondents in the final sample either accepted or rejected all questions, i.e. answered yes (25.83%) or no (13.44%) to all five questions in the survey. Based on follow-up questions, we define 210 of these as protest responses and do not include them in conducting the WTP estimations.[4]

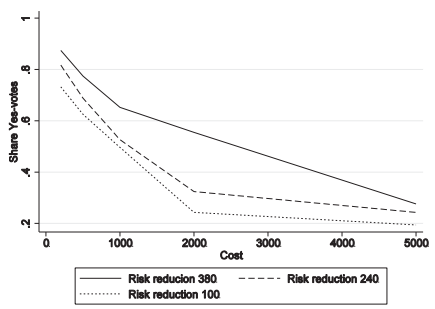

Fig. 2. Share of yes-votes at different cost levels and risk reductions. *Note*: The share of yes-votes represents the proportion of respondents voting yes on the WTP-question at different levels of cost and risk reduction.

3.3. Background variables

The third part of the survey contained questions on socio-economic and demographic characteristics of the respondent. These will be included in some of the WTP estimations in Section 5 as independent variables in explaining the likelihood of favoring the policy. Table 2 provides a summary.

In Table 2 we see that the share of females is 56 percent, the mean age is 46 years, 67 percent are employed and 51 percent have some form of university education (1 semester or more). To examine the representativeness of the sample we compare this to data for both the municipality of Örebro as well as for Sweden as a whole (Örebro, 2010b; SCB, 2010). Mean age and share of employment in the sample are similar and in line with the local and national average. But, as can be seen, we have some overrepresentation of females (56 versus 50 percent) and of respondents with some university education (51 versus 41 and 35 percent). Regarding income levels, a straightforward comparison is not easily available considering that we have data on household pre-tax

[4] Respondents who answered yes to all questions, and in a follow-up stated that this was due to "I think that the program should be implemented whatever the cost" and/or "I think that the questions are unclear", were considered to be protest responses. Respondents who answered no to all questions, and in a follow-up stated that this was due to "I think that the question is unclear" and/or "I do not think it is possible to reduce the risk of school bullying" were considered as protest responses.

income, whereas local and national household income data was readily available to us only as after-tax income. Based on an assumption that respondents pay an average Swedish income tax, the household income in the sample is somewhat higher than the local and national average.[5]

It is not uncommon for these types of surveys to have a slight overrepresentation of high-income and high-educated individuals. In estimating our models we also conduct sensitivity analyses using weights to account for the underrepresentation of lower-income and non-university educated respondents. We comment further on this in the discussion of our results but we generally find only minor effects on the estimation of WTP in the weighted analyses.

Finally, Table 2 also shows that 24.8% of the respondents reported that they had been bullied during their own school-time. It may be considered quite a higher number, but since the grade was not specified, this could have been in any grade from one to upper secondary school. At the same time 9.1% of the respondents stated that their own child was (or is being) bullied in school.

4. Econometric approach

The willingness to pay to reduce school bullying is estimated using both non-parametric and parametric approaches. In Section 4.1 we describe the distribution-free and less restrictive non-parametric approach, which we consider as a starting point providing a lower bound WTP estimate. In Section 4.2 we proceed with describing the parametric approach and its foundation in the random utility model.

4.1. Non-parametric approach: Kaplan–Meier–Turnbull

The foundation of the Kaplan–Meier–Turnbull distributional-free estimation can be traced to Turnbull (1976), but has been further developed and adjusted for WTP studies in e.g. Kriström (1990) and Haab and McConnell (1997). The only assumption that is required in this approach is that when a respondent votes yes to the antibullying program, his/her WTP is not less than the stated cost. The non-parametric approach gives a lower bound estimate of the WTP to reduce bullying, since the (conservative) assumption in the Kaplan–Meier–Turnbull approach is that the full mass of the distribution falls at the lower bound of the range of prices for each mass point, see e.g. Haab and McConnell (2002). The estimation is conducted using the ratio between the *Cost* and the *Risk reduction*, which we refer to as the bid ratio (BR_j), in the different choice sets j in the survey:

$$BR_j = \frac{Cost}{Risk\,Reduction}. \tag{1}$$

[5] In our sample mean pre-tax household income is 37,500 SEK per month, to compare with the local and national mean disposable household income at 20,830 and 18,300 SEK per month. Assuming a typical average tax rate in Sweden of about 32 percent would imply that household disposable income in our sample is about 25,500 SEK.

For each choice set j, the number of respondents answering the scenario is T_j and the number of respondents rejecting the choice is N_j. Hence, the share of respondents rejecting the choice j becomes:

$$F_j = \frac{N_j}{T_j}. \tag{2}$$

For increasing values of BR_j we expect F_j to be monotonically increasing. However, it is common that there are some deviations from this due to sampling, and in our case this happens at two different values of BR_j. A solution to the violation of a monotonically increasing F_j is to employ the pooled adjusted violators algorithm (PAVA). In situations when $F_j > F_{j+1}$, we pool these points together to get a monotonically increasing F_j. At the pooled points, the function will be:

$$F_j = F_{j+1} = \frac{N_j + N_{j+1}}{T_j + T_{j+1}}. \tag{3}$$

The pooled F_j, or the Kaplan–Meier–Turnbull estimator, is denoted as F_j^*. From this estimator we calculate the difference within the F_j^*, denoted as f_j^*:

$$f_j^* = F_j^* - F_{j-1}^*. \tag{4}$$

From Eq. (5) the expected lower bound WTP is calculated as:

$$E_{LB}[\mathrm{WTP}] = \sum_{j=0}^{M^*} BR_j \times f_{j+1}^*, \tag{5}$$

where M^* is the number of bid ratios (Haab & McConnell, 2002).

4.2. Parametric approach: random-utility model

Regarding the parametric approach the paper follows a standard approach in modeling discrete choice experiments based on the building blocks of Lancasterian consumer theory (Lancaster, 1966) and the random utility model (RUM) (Hanemann, 1984; McFadden, 1974). The structure of the RUM usually starts off by specifying a utility function that can be written as:

$$U_{ij} = V_{ij} + \varepsilon_{ij}, \tag{6}$$

where V_{ij} is the deterministic component and ε_{ij} is the stochastic component for the individual i in choice set j. The idea in the model is that the respondent will choose the alternative (in the different situations) that yields the highest utility (in our case vote yes or no to the antibullying program):

$$U_{iy} \geq U_{in} \quad \text{all } n \neq y \in A, \tag{7}$$

which shows that the individual i chooses the alternative y if it generates greater utility than the status quo alternative n over the alternative set, A (Ben-Akiva & Lerman, 1985; Hensher, Louviere, & Swait, 2000). By substituting in Eq. (6) and a similar structure for U_{in}, into Eq. (7) and rearranging in order to get the observable and unobservable components

on opposite sides, we have:

$$(\varepsilon_{in} - \varepsilon_{iy}) \leq (V_{iy} - V_{in}). \quad (8)$$

Considering that the left hand side of Eq. (8) is not observable, we have the probability that respondent i will choose the alternative y over n:

$$P[U_{iy} \geq U_{in}] \Rightarrow P[(\varepsilon_{in} - \varepsilon_{iy}) \leq (V_{iy} - V_{in})], \quad (9)$$

which implies that the difference between the alternatives is what matters, i.e. there has to be less difference in the V's on the right hand side than in the ε's on the left hand side (Ben-Akiva & Lerman, 1985). Eq. (9) may be seen as a general starting point for random utility models, and in order to proceed with estimation we must specify a parametric version, i.e. a functional form for the utility and distribution of the error, with the latter usually being assumed to be normal or logistic (Haab & McConnell, 2002).

A standard parametric version is the random utility model with a linear utility function based on a reasonable assumption that the marginal utility of income does not change depending on voting yes or no in the discrete choice experiment (the resulting income change for the respondent is relatively small). In the context of the discrete choice experiment of the paper, we specify the deterministic component of Eq. (6) with the attributes of the commodity and also include the covariates of the individuals (see Table 5):

$$V_{ij} = \beta_r R_{ij} - \beta_c C_{ij} + \delta X_i. \quad (10)$$

Here R and C refer to the attributes *Risk Reduction* and *Cost* in choice set j, respectively. Further, X_i is a vector of the individuals' covariates. By implementing Eq. (10) in Eq. (6) we have the following specification of U_{ij}:

$$U_{ij} = \beta_r R_{ij} - \beta_c C_{ij} + \delta X_i + \varepsilon_{ij}. \quad (11)$$

In the discrete choice experiment each respondent answers/votes yes or no in five different choice sets, which makes an assumption of independence across responses questionable. In order to allow for non-independence, we specify ε_{ij} in the following way (Butler & Moffitt, 1982):

$$\varepsilon_{ij} = \mu_i + \nu_{ij}\mu_i \sim N(0, \sigma_\mu^2)\nu_{ij} \sim N(0,1). \quad (12)$$

In Eq. (12) ε_{ij} includes an individual unobservable specific effect, μ_i, and reminding disturbance ν_{ij}, which is Gaussian distributed, independently of μ_i. This implies the correlation, ρ, between μ_i and ν_{ij} is:

$$Corr[\varepsilon_{ij}, \varepsilon_{ik}] = \rho = \frac{\sigma_\mu^2}{\sigma_\mu^2 + 1}, \quad (13)$$

which gives a Random Effects Binary Probit estimation model iff $\rho \neq 0$, and where $\rho = 0$ results in a pooled estimation. The ρ could be described as unobserved individual characteristics accounting for the propensity to vote in favor of the antibullying program or not (intra-class correlation) (StataCorp, 2009). Normalizing this model gives that the coefficient of the cost attribute is the inverse of the scale parameter, which may be used to recover the marginal WTP for the risk reduction (Cameron, 1988). From the estimation of the parameters in Eq. (11), the marginal expected WTP to reduce bullying in schools is estimated by using the parameter estimation *Risk Reduction* (β_r) and the parameter estimation of *Cost* (β_c)[6]:

$$E[\text{WTP}] = \frac{-\beta_r}{\beta_c}. \quad (14)$$

The negative sign in front of β_r is important in order to receive non-negative WTP-values due to the *expected* negative estimated parameter of β_c.

[6] In the estimation, the Cost scale is 100 Swedish kronor.

Table 3
Kaplan–Meier–Turnbull lower bound estimates with pooling.

BR_j	N_j	T_j	F_j	F_j^*	f_j	$E[\text{WTP}]_j$
0	–	–	0.000	0.000	0.000	–
0.526	12	113	0.106	0.106	0.106	0.000
0.833	25	115	0.217	0.196	0.090	0.047
1.316	30	165	0.182	Pooled	Pooled	–
2	37	170	0.218	0.218	0.021	0.018
2.083	54	115	0.470	0.391	0.174	0.347
2.632	54	161	0.335	Pooled	Pooled	–
4.167	84	170	0.494	0.494	0.103	0.214
5	68	115	0.591	0.510	0.016	0.068
5.263	78	171	0.456	Pooled	Pooled	–
8.333	121	161	0.752	0.752	0.241	1.205
10	97	115	0.843	0.837	0.085	0.711
13.158	139	167	0.832	Pooled	Pooled	–
20	139	163	0.853	0.853	0.016	0.159
20.833	139	163	0.853	0.853	0.000	0
50	159	169	0.941	0.941	0.088	1.835
50+	–	–	1.000	1.000	0.059	2.959

	Model A	Model B
Mean WTP	7.56 SEK (€0.84)	5.94 SEK (€0.66)
95% C.I.	(6.35–8.77)	(4.40–7.47)
Median WTP	4.17 SEK (€0.47)	5.26 SEK (€0.59)

Note: Individuals: 452.

5. Results

As outlined in the previous section, WTP is estimated using both non-parametric and parametric approaches. In the final set of respondents WTP is estimated by (Model A) excluding all the respondents who gave protest answers as indicated by the follow-up questions, and (in Model B) all respondents who gave protest answers and respondents who gave the same answer (yes or no) in all five choice sets (see Section 3.2).

5.1. Willingness to pay to reduce school bullying; non-parametric approach

Table 3 shows the basic information necessary to estimate WTP using a Kaplan–Meier–Turnbull approach as outlined in Section 4.1. F_j indicates that the data is not a monotonic increasing function over some of the BR_js, so the PAVA is employed to receive a monotonically increasing function; we end up having 12 different bid ratios.

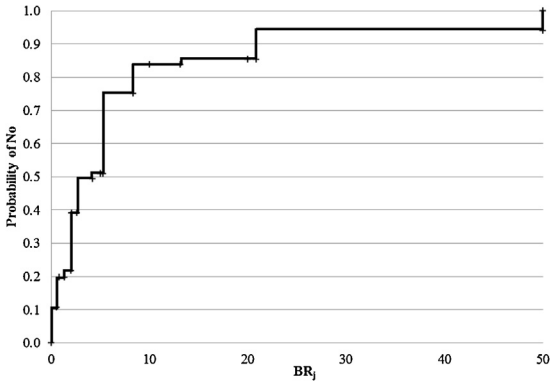

Fig. 3. The probability of a "no-response".

Table 4
Random effects binary probit estimations for WTP.

	Model A	Model B
Risk reduction	0.00378***	0.00394***
	(1.406)	(0.000)
Cost	−0.04967***	−0.04649***
	(0.003)	(0.003)
Constant	−0.216**	−0.248***
	(0.089)	(0.084)
$\mathrm{Ln}(\sigma_v^2)$	−0.647***	−1.638***
	(0.161)	(0.274)
Observations	2233	1983
Individuals	452	402
ρ	0.344***	0.163***
Mean WTP	7.60 SEK (€0.85)	8.48 SEK (€0.95)

Note: Standard errors in parentheses.
** $p < 0.05$.
*** $p < 0.01$.

By implementing Eq. (5) we get a lower bound mean WTP of 5.94–7.56 Swedish kronor (€0.66–0.85). Fig. 3 below graphically shows the Kaplan–Meier–Turnbull estimation.

In this case the area above the line represents expected lower bound WTP. As seen in Table 3 and Fig. 3, there are still respondents (about 5.9% in both subsamples) within the highest bid ratio (*Cost* of 5000 Swedish kronor for a *Risk Reduction* of 100 bullied pupils) who would pay for the antibullying program.

5.2. Willingness to pay to reduce school bullying: parametric approach

Table 4 shows the parameters of the estimations for the two subsamples (A and B), with the estimated WTP retrieved when implementing Eq. (14) for *Cost* and *Risk Reduction*.

Table 4 shows that the parameter estimates of *Cost* and *Risk Reduction* are statistically significant ($p < 0.01$ in both subsamples) and with the expected sign. Hence, a larger *Risk Reduction* increases the probability of voting in favor of implementing the antibullying program, and there is scale sensitivity in the response in line with theoretical expectations. A higher *Cost* decreases the probability of voting in favor, also in line with theoretical expectations. The *Constant* is significant at $p < 0.05$ in Model A and $p < 0.01$ in Model B, and the negative parameter of the *Constant* implies that the respondents infer a positive utility from staying at status quo. The additional statistics regarding ρ, as shown in Table 4, indicate a significant unobserved individual effect across the choices of voting in favor of the antibullying program. This gives support for the random effects structure as the preferred model over a more restrictive pooled estimation; the latter leads to inconsistent parameter estimates when there is significant unobserved individual effects (Cameron & Trivedi, 2009, 603 ff.).

The estimated WTP, using Eq. (14) based on the Random Effects Binary Probit estimations as shown in Table 4, implies an expected marginal mean WTP to reduce school bullying of 7.60 (Model A) and 8.48 (Model B) Swedish kronor (€0.85 and €0.95). The WTP estimate should be interpreted as the mean WTP to reduce one statistical case of bullying-victim.[7]

If we compare these estimates of marginal WTP with the non-parametric results in Section 5.1, they are 12–28% percent higher. As previously stated, it is expected that the non-parametric estimates are lower since the (conservative) assumption in the Kaplan–Meier–Turnbull approach is that the full mass of the distribution falls at the lower bound of the range of prices for each mass point, see e.g. Haab and McConnell (2002).

5.3. Individual determinants of voting in favor of the antibullying program

Table 5 shows the results from the Random Effects Binary Probit estimation when including the individual covariates to analyze individual determinants of voting in favor of the antibullying program. The two specifications shown in Table 5 differ with respect to how dummy variables regarding parenthood are added to the model. In Models 1A and 1B we include a single dummy variable capturing whether the respondent is a parent or not (*Parent*), whereas in Models 2A and 2B we add three dummy variables to model parenthood that differ depending on the age of the child/children. The argument for this is that parents of e.g. older pupils may have less interest in investing in antibullying programs compared to parents of younger pupils who have more expected remaining school years. As before, we also run models excluding protest responses (A), and excluding both protest responses and respondents who gave the same answer to all five choice sets (B).

The parameters of *Cost* and *Risk Reduction* are significant at $p < 0.01$ in both Models 1 and 2, with their expected

[7] We have also performed robustness tests of our chosen parametric specification, e.g. assuming log-normal and logistic specifications, and we only find minor differences across specifications (WTP varies less than 2 percent from the parametric estimates reported in the paper), which indicates "well-behaved" data.

Table 5
Random effects probit model including individual covariates.

	Model 1A	Model 1B	Model 2A	Model 2B
Risk reduction	0.004***	0.004***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Cost	−0.050***	−0.046***	−0.050***	−0.046***
	(0.003)	(0.003)	(0.003)	(0.003)
Female	−0.024	0.002	−0.027	−0.001
	(0.095)	(0.080)	(0.095)	(0.080)
Age	−0.003	−0.001	−0.002	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Household size	−0.013	0.001	−0.004	0.026
	(0.053)	(0.045)	(0.055)	(0.047)
Bullied children	−0.386**	−0.507***	−0.271	−0.391**
	(0.182)	(0.150)	(0.205)	(0.167)
Bullied	0.340***	0.266***	0.348***	0.275***
	(0.110)	(0.092)	(0.110)	(0.092)
Income	0.002	0.001	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
University education	0.168*	0.153*	0.169*	0.163**
	(0.095)	(0.079)	(0.095)	(0.079)
Employed	0.309***	0.189**	0.318***	0.211**
	(0.110)	(0.094)	(0.109)	(0.093)
School staff	−0.226	−0.249*	−0.228	−0.260*
	(0.163)	(0.137)	(0.163)	(0.137)
Parent	0.188	0.190	–	–
	(0.151)	(0.129)		
Younger children	–	–	0.153	0.082
			(0.147)	(0.123)
School children	–	–	0.049	0.022
			(0.160)	(0.132)
Older school children	–	–	−0.138	−0.158
			(0.248)	(0.220)
Constant	−0.526**	−0.487**	−0.555**	−0.540***
	(0.234)	(0.203)	(0.238)	(0.206)
$\mathrm{Ln}(\sigma_v^2)$	−0.809***	−1.933***	−0.814***	−1.935***
	(0.173)	(0.335)	(0.173)	(0.336)
Observation	2233	1983	2233	1983
Individuals	452	402	452	402
ρ	0.308***	0.126***	0.307***	0.126***

Note: Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

signs. The expected WTPs from these estimations do not significantly differ from those in Table 4 (not shown here).

Examining individual level variables, we find that the parameters for *Bullied*, *University Education* and *Employed* are statistically significant. Hence, an individual who has been bullied during his/her own school time, has a university education or is employed, has a higher probability of voting in favor of implementing an antibullying program. Somewhat surprisingly, the parents who previously have been victims of bullying have a lower likelihood of voting in favor of the program (statistically significant in three of four models). Also, individuals employed at a school have a lower likelihood of voting in favor of the program (statistically significant in the two models). Finally in Table 5 (as in Table 4), the result for ρ tells us that a random effects model is a preferred choice over a pooled estimation.[8]

5.4. Aggregate willingness to pay to reduce school bullying

A Pareto efficient allocation of an antibullying program, as a local public good, is where the sum of the absolute values of marginal rate of substitution equals the marginal cost of providing an extra unit of the good. Hence, in order to calculate the sum of the absolute values of the MRS we aggregate the average mean marginal WTP over the taxpayer population (which is 98,500 here). The mean WTP of 5.94–8.48 Swedish kronor implies an aggregate WTP per statistical bullying-victim of 585,090–835,280 SEK (€65,446–93,431).

The interpretation of this value can be seen in parallel to e.g. the value of life literature (Jones-Lee, 1974; Rosen, 1988), where the aggregate WTP of a (mortality) risk reduction is usually defined as the value of a statistical life and represents the aggregate ex ante WTP to prevent one unidentified fatality. In the same line of reasoning, the

[8] We have also performed regressions excluding the variables *Bullied* and *Bullied Children* since it may be that they are endogenous with respect to the dependent variable. Excluding these variables does not change signs or interpretations of the statistical significance in any of the other reported variables.

aggregate WTP as calculated here represents the aggregate ex ante WTP to prevent one unidentified victim of bullying, which we define as the *value of a statistical bullying-victim* (*VSBV*).

In applying this monetary value for policy evaluation it is necessary to consider the uncertainty in the WTP estimation. There is evidence that estimates of WTP from stated preference studies may suffer from hypothetical bias, i.e. respondents exaggerate their WTP when they give hypothetical responses. It is difficult to assess the extent of potential hypothetical bias but results from meta-analyses have shown that median hypothetical bias in experimental studies is 35 percent (Murphy, Allen, Stevens, & Weatherhead, 2005). Student samples have been shown to be associated with a higher hypothetical bias, so our non-student sample may have a smaller problem with hypothetical bias. But, in sum, applying the VSBV in policy applications should be associated with substantial sensitivity analyses (e.g. simulations) allowing for the VSBV to be in a range of values in order to account for uncertainty and the potential of hypothetical bias.

6. An application: cost–benefit analysis of an antibullying program

In order to demonstrate the application of the VSBV as calculated in the previous section, we perform a very simple cost–benefit analysis using the perhaps most well-known antibullying program: the "Olweus program". The Swedish National Agency for Education has estimated that the average cost per pupil for bullying prevention programs for a typical school with 300 pupils in Sweden ranges from 97,673 kronor per school and year ("Friends" antibullying program) to 416,787 kronor per school and year for the Olweus-program (SNAE, 2011). This cost includes direct costs of implementing the program (education, manuals, surveys, etc.), as well as indirect costs in the form of lost resources due to teacher hours being used for implementing the program.

Regarding the monetary benefits, we choose the most conservative VSBV estimate of 585,090 kronor per reduced case of bullying-victim. In a school with 300 pupils, we assume that 30 pupils are bullied throughout the school year. A meta-analysis has shown that the typical antibullying program has an effectiveness of 20% in reducing the number of victims of bullying (Ttofi et al., 2008), which in this example would translate to a reduction of 6 fewer pupils victimized at a total monetary benefit of 3.51 million SEK ($585{,}090 \times 6$). The benefit–cost ratio of this investment would then be approximately 8.4, i.e. the average return per unit of currency invested is 8.4.[9]

Based on the cost data described above, we can also see that the investment would pass a benefit–cost test as long as the effectiveness of the mentioned bullying program reduces the number of bullying-victims by at least 0.71 pupils, or an effectiveness rate of approximately 2.3%. Keeping the effectiveness rate constant, we can also see that the program would pass a benefit–cost test as long as the VSBV is above 69,500 SEK. Even though we have discussed the potential problem of hypothetical bias in the estimation of VSBV there is no support in the literature for the hypothetical bias being large enough to make the program in this example socially unprofitable. There are also other likely benefits of an antibullying program not included here, such as reduced crime costs and higher human capital investments, which would make the benefit–cost ratio of this program even more welfare increasing.

[9] Simply dividing total monetary benefits of 3,510,540 SEK with 416,787 SEK (total direct and indirect costs of the program). As long as this ratio is above unity, we have positive societal returns on the investment. Based on the Hicks–Kaldor criteria, this is interpreted as an increase in social welfare.

7. Discussion

This study estimates the WTP for an antibullying program to reduce bullying in Swedish schools. Estimates of mean marginal WTP range from 5.95 to 8.48 Swedish kronor (€0.66–0.95) using non-parametric and parametric approaches. Estimates using the non-parametric approach are lower, which is expected considering that, as outlined in Section 4, the non-parametric estimation implies placing a lower-bound on the WTP. The aggregate mean WTP for the local public good, which we define as the value of a statistical bullying-victim (VSBV), is calculated to be 585,090–835,280 Swedish kronor (€65,446–93,431). The VSBV may be interpreted as the aggregate ex ante WTP to prevent one statistical (unidentified) case of a victim of bullying.

The estimated WTP in this paper is policy-relevant partly due to the fact that it is a necessary input in economic evaluations of antibullying programs. In Section 6 we showed how the estimates of VSBV may be used in a cost–benefit analysis of an antibullying program for a typical Swedish school. Perhaps the most well-known antibullying program ("The Olweus program") is shown to be welfare increasing as long as the effectiveness of the program (i.e. the reduction in bullying due to the program) is at least 2.3%, or as long as the VSBV is at least 69,500 SEK (€7774). With the base assumptions of an effectiveness at 20% (Ttofi et al., 2008), the benefit–cost ratio is estimated at 8.4. Relating the estimated benefit–cost ratio to other school-based programs, its economic efficiency is in line with interventions such as the Perry pre-school program, Chicago Child–Parent Centers and Abecedarian program, all of which have been shown to deliver benefit–cost ratios ranging from 2.5:1 to approximately 10:1 (Barnett & Masse, 2007; Temple & Reynolds, 2007). As another example, an often discussed policy is reducing class-size and based on the estimates in Krueger (Krueger, 2003; Temple & Reynolds, 2007) it has been shown that a class-size reduction in the early years of elementary school has a benefit–cost ratio of approximately 2.8:1. However, it should also be mentioned that this as well as most other results from cost–benefit analysis of pre-school and school interventions mainly estimate program benefits as increased life-time earnings and in some cases also reduced crime costs; generally, they have not included monetary estimates of the improved "school social and health climate" per se; as is the focus of this paper. For example,

maybe parents and tax-payers have a positive WTP for smaller classes over and above the monetary benefits associated with increased life-time earnings. Including these types of benefits in other economic evaluations of pre-school and school interventions may imply that economic returns are even higher than reported in previous studies.

An additional policy relevance of the estimated VSBV may be seen regarding the fact that more and more municipalities are facing court orders to pay settlements to individuals for insufficient action to prevent bullying. The average settlement in Swedish cases is approximately 50,000 SEK (€5 593), with the highest amount so far being 207,600 SEK (€23 221) (DN, 2010). Hence, in comparison with the VSBV as estimated in this paper (585,090–835,280 SEK), the average settlements are significantly lower. Theoretically, the estimated VSBV is a measure of the (ex ante) WTP to prevent an unidentified victim of bullying, and it is not directly comparable to a situation with an identified victim in a court settlement. Nonetheless, it may still be interesting to compare the low court settlements with the VSBV as estimated in this paper in order to offer policy-makers and regulators useful information on taxpayers' preferred allocations to bullying reducing policies and regulations.

We have also examined individual covariates associated with a higher likelihood of voting in favor of the antibullying program, which is the case if the individuals self-reported being victims of bullying during their own time in school, and if they had a university education or were employed. The opposite case, one in which the individual covariates are associated with a lower likelihood of voting in favor of the antibullying program, arises when individuals self-reported having children who are or were victims of school-bullying, and if the individuals were either teachers or connected with the staff of schools. These results may be somewhat surprising; perhaps parents of children that have been bullied and victimized in school may consider that antibullying programs do not have a beneficial effect, or they may feel antipathy to the implementation of such programs after their own children already have been targeted as victims. That school staff have a lower WTP for the antibullying program may reflect, speculatively, that they fear the programs would take away time and resources from teaching. Admittedly, these are results that warrant further investigation requiring a more detailed set of data than is available to us. For example, the effectiveness of antibullying interventions have been shown to be dependent upon the attitudes of teachers (Frey, Jones, Hirschstein, & Edstrom, 2011; Nicolaides, Toda, & Smith, 2002; Olweus, 1993) and therefore it is important that these are aligned with the goals and purposes of antibullying programs in order to reach welfare increases if antibullying programs are implemented.

Regarding the validity of the study, it is found that a higher cost of the program is significantly related to a lower probability of voting in favor of implementing the program. A larger risk reduction is significantly related to a higher probability of voting in favor of the program. These two associations hold for different model specifications reported in Tables 4 and 5. A critical point with the stated preference method that needs to be discussed is potential sample bias and hypothetical bias. Regarding potential sample bias, we point out in Section 3.3 that we have a slight underrepresentation of university educated and male respondents. Since this may affect our estimated WTP, we have estimated WTP with probability sample weights to adjust for the underrepresentation. This affects WTP (downwards) by approximately 3–4 percent, which in this context we consider to be a rather small effect. As discussed in Section 5, a common concern regarding the validity of a stated preference study is hypothetical bias. A relatively large literature has indicated that respondents, on average, tend to overestimate their WTP in hypothetical compared to real situations. In a meta-analysis of experimental studies Murphy et al. (2005) report median hypothetical bias of 35% and a mean hypothetical bias much larger than that (a factor of two to three). Hence, it is possible to assume that, in the current study, there is a risk that the estimated WTP is an overestimation of the true WTP, which implies that economic evaluations or allocation issues based on the WTP estimates from SP studies should take this into consideration in e.g. sensitivity analyses. On the other hand, Murphy et al. (2005) indicate that hypothetical bias may be less of a problem in a study using a large non-student sample such as in this paper.

Finally, in order to put the number in a wider context as a test of "reasonableness", we the VSBV with official recommended parameter values for Swedish cost–benefit analysis of health improving policies. For example, the current official recommendation for the value of a statistical life is 22.3 million SEK (€2.49 million) whereas the recommended value for a statistical severe injury (hospital admission) is 3.7 million SEK (€415,000) (ASEK, 2012). Hence, the VSBV as estimated in this paper is approximately 16–23% of the officially recommended value of a statistical severe injury (which refers to an accident that requires hospital admission). These estimates are based on a large set of WTP studies using both stated- and revealed preference data. Given the negative health and social consequences of being a bullying-victim, we argue that these comparisons do not indicate an obvious validity problem with the VSBV estimates in this paper. To sum up, further studies may hopefully delve deeper into this issue in order to validate the results in this paper, which, as far as we know, is the first to estimate the societal WTP to reduce school bullying.

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