United States
Consumer Product Safety Commission

This document has been electronically approved and signed.

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Alberta E. Mills, Secretary

**DATE:** March 8, 2023

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**SUBJECT:** Proposed Draft Guidance for Estimating the Value per Statistical Life

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## I. INTRODUCTION

The Value per Statistical Life (VSL) is a widely used parameter in cost-benefit analysis, including regulatory analysis, that represents an individual's willingness to pay for reducing their risk of fatality. VSL values a reduction of fatality risk in monetary terms to be used for cost-benefit analysis; it is not an attempt to place a value on any individual life. In regulatory analysis, government economists typically apply VSL to measure the welfare impact of policies that reduce or increase fatalities.

The U.S. Consumer Product Safety Commission's (CPSC) Directorate for Economic Analysis (EC) is responsible for conducting all economic analyses for the agency, which includes regulatory analysis. Regulatory analysis may include a cost-benefit analysis of a proposed regulation. EC regularly uses VSL in its regulatory analyses of CPSC regulations. While the U.S. Office of Management and Budget and some executive branch agencies and departments have published guidelines on the application of VSL,[1] CPSC, as an independent agency, is not

[1] The U.S. Department of Transportation, U.S. Department of Health and Human Services, and the U.S. Environmental Protection Agency all recommend default VSL estimates in their official guidelines. The Office of Management and Budget provides general best practice guidance (OMB Circular A-4) to Federal executive branch agencies on regulatory analysis, including discussion of issues related to estimating VSL. While Circular A-4 recommends avoiding age-adjustment factors due to mixed evidence on age and VSL, it should be noted that since OMB published Circular A-4 (September 2003) 20 years ago, there has been new research studying an age-adjustment factor for children's VSL, including Robinson et al. (2019).

subject to these guidelines. This proposed document would establish and describe guidelines for CPSC on the application of VSL for its cost-benefit analysis, and in particular for its regulatory analysis. Specifically, this draft guidance will establish for CPSC a standard source for estimating VSL as well as guidelines for adjusting VSL for inflation, changes in real income (i.e., controlling for inflation), sensitivity analysis, and discounting.

This draft guidance document will prescribe a VSL estimate specifically for children, which differs from other established VSL guidance. Typically, government economists apply VSL uniformly to all fatalities that fall within the scope of the regulation being assessed. This approach has the advantage of simplicity. However, it systematically underestimates benefits for regulations that reduce fatality risks to children.[2]

It is widely observed that society prioritizes the safety of children over the adult population and invests significantly in child safety. For example, the large investments made on child safety such as the baby proofing industry,[3] safety caps on over-the-counter medicines,[4] and the additional certifications and licensing for child safety put upon daycares and schools. Accordingly, Congress has given CPSC special statutory mandates to protect children.[5] Research on individuals' willingness to exchange money to reduce fatality risks to children appears to align with these societal preferences. This draft guidance document defines an elevated VSL for children to more accurately assess the benefits of regulations that protect children from deadly outcomes.

## II. DISCUSSION

The purpose of this draft guidance is to: (1) provide background on relevant work CPSC has done to understand the issue of child VSL; (2) describe the current practice of using VSL in regulatory economics, both at CPSC and in other government agencies; (3) explain CPSC's reason for issuing VSL guidelines; (4) publish CPSC guidelines for VSL; and (5) request public comment on these VSL guidelines.

This draft guidance document will not discuss the valuation or averted costs associated with reducing non-fatal injuries. Some federal agencies and departments estimate the values or averted costs associated with reducing the risk of non-fatal injuries as a function of VSL. CPSC, however, determines the averted costs associated with non-fatal injuries through its Injury Cost Model, independent of VSL.[6] Therefore, this draft guidance document does not change CPSC's injury cost estimation approach.

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[2] The extent to which these estimates should be adjusted for older individuals (e.g., over age 65) is also an area of active research, but is not the focus of this current action.

[3] $14.21 billion market in 2022. https://www.businesswire.com/news/home/20220516005546/en/Baby-Safety-Devices-Market-Research-Report-2022---Global-Forecast-to-2027---ResearchAndMarkets.com

[4] Poison Prevention Packaging Act of 1970, Pub.L. 91-601 84 Stat. 1670.

[5] See, for example, Title I of the Consumer Product Safety Improvement Act of 2008, Pub.L. 110-314 122 Stat. 3016.

[6] For information on how CPSC estimates the cost of injuries, see: https://www.cpsc.gov/s3fs-public/ICM-2018-Documentation.pdf

## II.A. Background

VSL is usually derived from willingness to pay studies. These studies either use surveys to investigate individuals' willingness to exchange their own income for a change in their own risk, or examine real world behavior that reflects this trade-off, such as the change in income associated with a change in job-related risk. Individual willingness to pay estimates from these studies are then converted to a VSL estimate by dividing by the risk change. The framework of such a study requires participants to assess their own, or a situation's, risk of fatality and then place a monetary value on a change to that risk. For example, if a group of 10,000 individuals were willing to pay $900 each to reduce their risk of death by 0.01 percent in a given year, then in the aggregate that group of individuals would be willing to spend $9 million[7] to reduce the risk of one additional fatality in that year.

These studies usually estimate the value that adults place on reducing *their own* risk of fatality. Inherently, individuals' willingness to pay is a function of their real income, wealth, and other personal factors as well as the characteristic of the risk. This approach is not transferable to children, who do not control financial resources and may not understand or be able to express their willingness to pay for such reductions.

Assigning the same VSL for adults and children ignores evidence that society values the safety of children more than adults. For example, the large investments made on child safety such as the baby proofing industry,[8] safety caps on over-the-counter medicines,[9] and the additional certifications and licensing for child safety put upon daycares and schools. Failing to acknowledge the importance of child safety within society, and the research on individuals' willingness to exchange money to reduce fatality risks to children that aligns with these societal preferences, runs the risk of undervaluing the perceived benefits of regulations that protect children. Therefore, potentially disadvantaging regulations meant to protect the very lives of those whose safety society values most.

As an independent Federal agency tasked with protecting consumers from unreasonable risk of death and injuries from consumer products, many of the benefits of the agency's regulations are the reduction of risk from death among children.[10] Furthermore, CPSC's statutory authorities (such as sections 104 and 106 of Consumer Product Safety Improvement Act of 2008, Public Law 110-314, 122 Stat. 3016) and policy statements (see, e.g., 16 CFR 1009.8) direct the Commission to place a higher priority on preventing product related injury to vulnerable populations, which includes children. Therefore, CPSC has a statutorily based interest in

[7] $9 million = $900 ÷ 0.01% reduction in fatality = $9 million per expected death averted.
[8] $14.21 billion market in 2022. https://www.businesswire.com/news/home/20220516005546/en/Baby-Safety-Devices-Market-Research-Report-2022---Global-Forecast-to-2027---ResearchAndMarkets.com
[9] Poison Prevention Packaging Act of 1970, Pub.L. 91-601 84 Stat. 1670.
[10] Safety Standards for Magnets (87 FR 57756), Safety Standards for Operating Cords on Custom Window Coverings (87 FR 73144), and Safety Standards for Clothing Storage Units (87 FR 72598).

estimating the VSL for children, and ensuring it presents a comprehensive assessment of the benefits from regulation.

In 2018, Industrial Economics Inc. (IEc) conducted a criteria-driven literature review of studies estimating a VSL for children and drafted a report for CPSC that described its findings.[11] IEc found that "[t]he number of studies that explore the value of reducing children's risks has increased substantially in recent years. The results of these studies are diverse, but generally suggest that the value individuals place on reducing risks to children is greater than the value of reducing risks to adults" (IEc 2018). In 2019, a group of co-authors, that included the authors of this report published an update of this criteria-driven literature review in a peer-reviewed journal with some modifications from the 2018 report.[12] We refer to these two documents as the "valuation studies" in what follows for convenience.

The review applied two sets of criteria.[13] First, the authors developed selection criteria to identify studies for detailed review. These selection criteria were straightforward, intended to ensure that the studies measure a reasonably consistent outcome and are potentially suitable for application in analyses of U.S. policies. Second, the authors developed evaluation criteria to assess the quality and applicability of studies. These criteria required detailed review of each study, and some involve substantial professional judgment. The authors use these evaluation criteria to investigate the relative strengths of each study and the implications of including or omitting them from our analysis.

**Selection Criteria**

1. Written in English.
2. Publicly available.
3. Data collected within the past 30 years.
4. Data collected in a high-income country.
5. Values a change in risk (not a change in life expectancy).
6. Estimates willingness to pay (not willingness to accept compensation).

**Evaluation criteria**

1. Data collected more recently.
2. Data collected in the United States.
3. Based on a national sample.
4. Based on a probabilistic sample (not a convenience sample).
5. Provides evidence of validity.

Source: Robinson et al. (2019), Tables 1 and 2

The valuation studies found five publications that satisfied many of the evaluation criteria, which showed VSL for children exceeds the VSL for adults by a factor of 1.2 to 2.9, with a midpoint of

[11] Industrial Economics, Inc. "Valuing Reductions in Fatal Risks to Children", January 3, 2018, https://www.cpsc.gov/content/Valuing-Reductions-in-Fatal-Risks-to-Children

[12] Robinson, L., Raich, W., Hammitt, J., & O'Keeffe, L. (2019). Valuing Children's Fatality Risk Reductions. Journal of Benefit-Cost Analysis, 10(2), 156-177. doi:10.1017/bca.2019.10

[13] The starting point for developing these criteria was review of those previously used to evaluate adult VSL studies for application in U.S. regulatory analyses, which in turn were based on advice provided by previous expert panels. The authors adapted these criteria to focus on valuing risks to children aged 0–17.

roughly 2. The five studies with their estimate of children's VSL as a ratio to adult VSL are listed in Table 1.

**Table 1: Ratio of Child to Adult VSL from Selected Studies**

| STUDY | RATIO |
|---|---|
| Alberini and Scasny (2011) | 1.2 |
| Dickie and Gerking (2006) | 2.3 |
| Gerking, Dickie, and Vernosi (2014) | 1.6, 2.9 |
| Hammitt and Haninger (2010) | 2.0 |
| Hammitt and Herrera (2017) | 2.8 |

Source: Robinson et al, (2019) Table 4

Since the completion of these studies, CPSC has published three regulations in the Federal Register (FR) aimed at children's safety that included cost-benefit analysis: Safety Standards for Magnets (87 FR 57756),[14] Safety Standards for Operating Cords on Custom Window Coverings (87 FR 73144),[15] and Safety Standards for Clothing Storage Units (87 FR 72598)[16].[17] All three of the regulatory analyses estimated benefits that came primarily from preventing death and injury to individuals under 18 years old, but consistent with general Federal practice CPSC used VSL based on adults. However, in the cost-benefit analyses of custom window coverings and clothing storage units, CPSC also used child-to-adult VSL ratios from the above studies in the sensitivity analyses to evaluate the impact of an elevated VSL for children.

### II.B. Federal Agency Practice

CPSC regularly uses VSL in its regulatory analyses. While the Office of Management and Budget and some executive branch agencies and departments have guidelines on estimating and applying VSL, CPSC, as an independent agency, is not subject to these guidelines.

The U.S. Environmental Protection Agency (EPA), U.S Department of Transportation (DOT), and U.S. Department of Health and Human Services (HHS) each have formal guidelines for the use of VSL within their agency. EPA derives its estimates from 26 studies, of which 21 are wage-risk studies (EPA 2010). DOT primarily addresses injury-related risks; it derives its VSL estimate exclusively from wage-risk studies, which also address injury-related risks (DOT 2021). HHS bases its VSL estimates on six wage-risk studies and one meta-analysis of these studies, as well as three stated preference studies (HHS 2016). Table 2 displays the values of all three agencies' VSL, adjusted to 2021 dollars and income levels for comparison.

[14] https://www.federalregister.gov/documents/2022/09/21/2022-20200/safety-standard-for-magnets
[15] https://www.federalregister.gov/documents/2022/11/28/2022-25041/safety-standard-for-operating-cords-on-custom-window-coverings
[16] https://www.federalregister.gov/documents/2022/11/25/2022-24587/safety-standard-for-clothing-storage-units
[17] CPSC also issues regulations for durable infant and toddler products under section 104 of the Consumer Product Safety Improvement Act of 2008 (CPSIA), however these regulations are not subject to a regulatory analysis.

**Table 2: U.S Federal Agency Central VSL Estimates (2021 dollars and income levels)**

| EPA | DOT | HHS |
|---|---|---|
| $11.3 million | $11.8 million | $11.6 million |

These estimates are very similar, even though the three agencies each reviewed the literature at different times using different criteria, and hence included different studies in developing their estimates. These estimates are also very similar to the publication of a bias-adjusted estimate recommended by Viscusi (2018) when adjusted to the same year.

CPSC has routinely used EPA's VSL estimate in the benefits assessment of its regulatory analyses. Specifically, CPSC adjusts EPA's base VSL for inflation to the year of the analysis using the Bureau of Labor Statistics' (BLS) Consumer Price Index (CPI). Then, the inflation adjusted VSL is multiplied by the number of estimated deaths. This generates a monetized value of benefits from the fatality risk reduction associated with the proposed rule. When the analysis projects the regulation's impact into the future, CPSC discounts all monetized future costs and benefits, including the value of prevented deaths, to account for the time value of money.

### II.C. Reason for Establishing VSL Guidelines

CPSC regularly assesses the costs and benefits of proposed regulations that address child safety. By developing and publishing guidelines for using VSL in regulatory analysis, CPSC accomplishes the following: 1) that its regulatory analyses appropriately measure the benefits from reduced fatality risk, especially children's mortality, 2) makes certain there is consistency between regulatory analyses on the valuation of benefits for reducing fatality risk, and 3) ensures transparency by sharing these guidelines with the public and gathering comments on the guidelines.

These guidelines will establish the source, base value, and method of application for VSL. The guidelines will also establish a ratio of child VSL to adult VSL for CPSC to use in valuing reduced children's fatality risk for its formal regulatory analysis, as opposed to limiting it to use in a sensitivity analysis. This action will ensure that CPSC regulations aimed at child safety better account for society's prioritization of children's safety among the public and no longer undervalues regulations aimed at protecting children.

Establishing VSL guidelines will also ensure CPSC's methodology for VSL is consistent across regulatory analyses. These guidelines will ensure there is no ambiguity on which value to use, how to adjust for inflation and changes in real income, and whether to discount benefits using VSL. CPSC establishes these guidelines for the purpose of streamlining the process to be as simple as possible, which will make consistent application easier.

Finally, CPSC is publishing its agency's VSL guidelines in an NOA in the FR so that the public may comment on these guidelines.

## III. SUMMARY OF VSL GUIDELINES

CPSC seeks public comment on its VSL guidelines, especially the establishment of child VSL. The guidelines (fully described in Appendix I) state that:

1. CPSC will use HHS's VSL estimates for adults.
2. CPSC will double the adult VSL to establish the child VSL.
3. When adjusting the VSL, CPSC will account for both the change in the general price index (inflation) and in real income using the method in HHS's G*uidelines for Regulatory Impact Analysis*.
4. CPSC will include a sensitivity analysis in its regulatory analyses that use both high and low estimates for adult and child VSLs.
5. When estimating VSL for future years, CPSC will discount the resulting benefit values to reflect the time value of money, consistent with its approach for all cost and benefits estimates.

These guidelines and their sources are summarized in Table 3.

**Table 3: Summary of CPSC VSL Guidelines**

| Variable | Guideline |
|---|---|
| Adult VSL | **$11.6 million** in 2021 dollars as of January 1, 2023, Based on HHS's VSL guidance. |
| Child VSL | **$23.2 million** in 2021 dollars as of January 1, 2023. Double the adult VSL. Doubling the VSL is based on findings from IEc's "Valuing Reductions in Fatal Risks to Children" and Robinson et al. (2019). |
| Inflation | Inflate to year where full annual data is available for changes in prices (inflation) and real income. Use data and formula in HHS VSL guidance. |
| Discount | Apply discount rate to all monetized values that accrue in future years. |
| Real income | Use Current Population Survey (CPS) Median Weekly Earnings for initial adjustment to year of analysis. For future years, use real earnings per worker growth rate from the Congressional Budget Office's Long-Term Budget Outlook. |
| Income elasticity | Using value from HHS VSL guidance. |

Note: The HHS guidance is provided in the U.S. Department of Health and Human Services. G*uidelines for Regulatory Impact Analysis, "*Appendix D: Updating Value per Statistical Life (VSL) Estimates for Inflation and Changes in Real Income," 2021.

By publishing its VSL guidelines in an NOA, CPSC can gather public comments and refine the methodology based on any substantive comments or new information. CPSC seeks public comment on the proposed VSL Guidelines, including in particular the following:

- The criteria and studies included in the IEc and Robinson et al. reviews, as well as any new studies;
- Alternative approaches for adjusting for age;
- The estimation of VSL in these guidelines, especially child VSL;
- Any other adjustments to VSL that CPSC should address in its draft guidance; and
- Any other general comments on child VSL and CPSC's proposed draft guidance.

## Appendix I: VSL Guidelines

This appendix describes CPSC's VSL guidelines. First, the guidelines will specify how to determine the VSL for both adults and children. Next, the guidelines will describe how to make adjustments to the VSL and how to determine when they are needed. Then, the guidelines will suggest values for adult and child VSL to use in sensitivity analysis. Finally, this appendix will provide an example scenario that will illustrate how to apply these guidelines.

### A. Adult VSL

CPSC staff should use the most recent VSL from HHS to value expected fatality risk reductions for individuals that are 18 years or older. For 2021, HHS recommends a VSL of $11.6 million in 2021 dollars at 2021 income levels. As explained in greater detail further into these guidelines, CPSC staff should update that value as needed, following the HHS guidance.[18]

CPSC will switch from applying EPA's VSL estimates because they are based on research conducted over 30 years ago. The HHS value is based on a more recent review of the literature, that applies more extensive selection and evaluation criteria reflecting the evolution of best practices. It also includes newer studies which are more likely to reflect the preferences of the current U.S. population. For these reasons, CPSC aligns its VSL estimate with HHS.

### B. Children VSL

These guidelines recommend doubling the value CPSC uses for adult VSL to represent child VSL. CPSC staff should apply this child VSL to mortality risk reductions likely to accrue to any individual younger than 18 years old uniformly and not modify this value for any other characteristics. This valuation aligns with the findings from recent reviews, that child VSL has been valued between 1.2 to 2.9 times more than adult VSL (Table 1) in peer-reviewed literature.[19] The approximate midpoint of this range is the source for doubling the adult VSL to represent child VSL.

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[18] U.S. Health and Human Services, "Appendix D: Updating Value per Statistical Life (VSL) Estimates for Inflation and Changes in Real Income", Table D.1., April 2021, https://aspe.hhs.gov/sites/default/files/2021-07/hhs-guidelines-appendix-d-vsl-update.pdf

[19] Industrial Economics, Inc. "Valuing Reductions in Fatal Risks to Children", January 3, 2018, https://www.cpsc.gov/content/Valuing-Reductions-in-Fatal-Risks-to-Children; Robinson, L., Raich, W., Hammitt, J., & O'Keeffe, L. (2019). Valuing Children's Fatality Risk Reductions. Journal of Benefit-Cost Analysis, 10(2), 156-177. doi:10.1017/bca.2019.10

There are other estimations of VSL that could potentially be used to derive a child VSL, such as value per statistical life year (VSLY) estimates or an "inverse U" that peaks in middle age such as that reported in Aldy and Viscusi (2008). However, there are potential issues with the application of these approaches with the data constraints that CPSC regularly encounters (e.g., not having enough data on the age distribution between the ages of children). Therefore, CPSC aligns its child estimates with those ratios in the IEc study and Robinson et al. (2019).

### C. Adjustments

When applying VSL in regulatory analysis, the values must be adjusted for inflation, changes in real income, and the time value of money (discounting). This subsection describes the approach CPSC staff should take for each. This subsection also provides an example to illustrate these methods.

Adjusting for Inflation and Changes in Real Income

VSL should be adjusted to the most recent calendar year that has full inflation and real income data available, using the approach described in HHS (2021) and the accompanying Excel workbook.[20] This method accounts for both the change in prices and real income and is summarized below.

$$VSL_{(year\ y)} = VSL_{(year\ x)} \times (P_{(year\ y)} \div P_{(year\ x)}) \times (I_{(year\ y)} \div I_{(year\ x)})^{e}$$

where

year y = specified dollar year of the analysis (year to which VSL is being inflated)
year x = year that is the basis for the initial VSL
P = price index for year x or y using the Consumer Price Index[21]
I = real income in year x or y using BLS Weekly Earnings[22]
e = income elasticity[23] of VSL, assumed to be 1.0[24]

When using this formula, CPSC should use the 'annual average' of the most recently completed year (for $P_{(year\ y)}$ and $I_{(year\ y)}$). Finally, the adjusted VSL should be rounded to the nearest tenth of a million dollars ($100,000) for presentation purposes.

It is important to note that CPSC should adjust to the most recent 'annual average' of reported indices – and not inflate to a partial year – for both the price and real income indices. For example, as of the drafting of this guidance document in January 2023, 2021 is the most recent year that has all 12 months' CPI indices reported, while 2022 only has 10 months of the year

[20] U.S. Health and Human Services, "Appendix D: Updating Value per Statistical Life (VSL) Estimates for Inflation and Changes in Real Income", Figure D.1., April 2021, https://aspe.hhs.gov/sites/default/files/2021-07/hhs-guidelines-appendix-d-vsl-update.pdf

[21] Use BLS Series CUUR0000SA0: https://data.bls.gov/timeseries/CUUR0000SA0

[22] From U.S. Census Current Population Survey (CPS) Weekly Earnings: https://www.bls.gov/cps/earnings.htm

[23] Income elasticity measures how much VSL changes with a respective change in income; and elasticity of 1.0 assumes the change is proportional. Both theory and research suggest that as income increases, individuals are willing to increase the amount they are willing to pay for a small change in their own mortality risks.

[24] U.S. Health and Human Services, "Guidelines for Regulatory Impact Analysis", pg. 16, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//171981/HHS_RIAGuidance.pdf

reported. Because 2022 CPI reporting is not complete, the most recent year to which CPSC can inflate the VSL is 2021. This condition is mutually inclusive so that the target year (year y) is set to the most recent annual average available for both price and real income indices. The VSL should not be inflated for different years between the price index and real income index, even in instances where full year data is available for different years between the indices. For example, if the full year data for 2022 is available for the price index, but the most current full-year real income data is for 2021, then the VSL should be inflated to 2021 for both the price and real income indices. In all cases, the analysis should prominently indicate the actual year dollars in which the VSL is expressed.

Over time, VSL estimates should be adjusted to account for changes to real income in the future. Best practice throughout the Federal government is to calculate future costs and benefits in constant real dollars for a specific year (year y), then not project inflation in future years. CPSC should follow the HHS Guidance from HHS for this adjustment. This method is summarized below.

$$VSL_{(year\ z)} = VSL_{(year\ y)} \times (1 + g)^{E \times (year\ z - year\ y)}$$

where

year z = a specific year in the period of analysis
year y = specified dollar year of the analysis
g = real income growth rate using the Congressional Budget Office's long-term growth forecast[25]
E = income elasticity of VSL, which currently uses the value of 1.0[26]

For real income growth rate, HHS relies on the estimate that the Congressional Budget Office (CBO) uses in its most recent *Long-Term Budget Outlook*. As of the time of this draft guidance document, the most recent published outlook is from 2022, and it reports an annual growth in real earnings per worker of 0.8 percent from 2022 to 2052. CPSC should use this estimate as its real income growth (g) in its prospective regulatory analyses until CBO updates the value in a future *Long-Term Budget Outlook*, at which case CPSC should use the updated real income growth rate estimate. If CPSC has a prospective regulatory analysis that goes beyond the projection window from CBO (e.g., 2052 for the *2022 Long-Term Budget Outlook*), CPSC should still use the real income growth rate from CBO for those years beyond CBO's projection window.

Sensitivity Analysis

Many regulatory analyses include a sensitivity analysis as a supplement to the primary cost-benefit analysis. Often, these sensitivity analyses will alter the value of one or more of the variables in the primary analysis and describe the impact that change has to the estimated total benefits or total costs. CPSC should include a sensitivity analysis that adjusts adult and child VSL using lower and higher estimates than the recommended estimate for the primary analysis.

[25] Congressional Budget Office, "The 2022 Long-Term Budget Outlook", *Real Earnings per Worker (2022-2052)* in Table B-1, 2022, https://www.cbo.gov/publication/57971

[26] U.S. Health and Human Services, "Guidelines for Regulatory Impact Analysis", pg. 16, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//171981/HHS_RIAGuidance.pdf

For adult VSL, the most recent HHS low and high adult VSL estimates in 2021 dollars are $5.4 million and $17.7 million, respectively.

For child VSL, CPSC should double the low and high adult VSL estimates. This results in low and high child VSL estimates in 2021 dollars of $10.8 million and $35.4 million, respectively.

Discounting

CPSC regularly performs prospective regulatory analyses that project a proposed or final regulation's impact into the future. In its prospective analyses, CPSC considers the time value of money by applying an annual discount rate to all monetized costs and benefits.

An argument can be made that discounting prevented deaths may be inappropriate because unlike money, a life saved today does not have an opportunity cost to be invested for more lives saved in the future, therefore a life saved today should be worth as much as a life saved 10 years into the future. However, CPSC agrees with OMB Circular A-4[27] on this matter[28]:

> "…the resources that would have been used to save those lives can be invested to earn a higher payoff in future lives saved. People have been observed to prefer health gains that occur immediately to identical health gains that occur in the future. Also, if future health gains are not discounted while future costs are, then the following perverse result occurs: an attractive investment today in future health improvement can always be made more attractive by delaying the investment. For such reasons, there is a professional consensus that future health effects, including both benefits and costs, should be discounted at the same rate."

For these reasons, CPSC should apply discount factors to monetized benefits using VSL in its prospective regulatory analyses.

Example

This section provides an example to illustrate the guideline's application of child VSL, adjustments for inflation and changes in real income, a sensitivity analysis, and discounting. This example adjusts HHS's 2020 VSL value into 2021 dollars, doubles the adjusted VSL to get the child VSL, and then accounts for changes in real income for a prospective 10 years.

First, the 2020 VSL value of $11.4 million must be inflated to 2021 dollars. The average annual consumer price index[29] for the base year of 2020 is 258.811, and for the target year of 2021 is 270.970. The average annual real income index[30] for the base year of 2020 is 380, and for the target year of 2021 is 369. Last, the income elasticity of VSL according to HHS is 1.0.[31] These data points are used below to show the calculation to adjust VSL from 2020 dollars to 2021 dollars.

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[27] https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A4/a-4.pdf

[28] As an independent Federal agency, CPSC is not obligated to follow the guidelines from OMB Circular A-4.

[29] Use BLS Series CUUR0000SA0: https://data.bls.gov/timeseries/CUUR0000SA0

[30] From U.S. Census Current Population Survey (CPS) Weekly Earnings: https://www.bls.gov/cps/earnings.htm

[31] U.S. Health and Human Services, "Guidelines for Regulatory Impact Analysis", pg. 16, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//171981/HHS_RIAGuidance.pdf

$$\$11.6 \text{ million} = \$11.4 \text{ million} \times (270.970 \div 258.811) \times (369 \div 380)^{1.0}$$

The adjusted VSL is rounded to the nearest tenth of a million, or $11.6 million. This is the value that would be used in a regulatory analysis based in 2021 dollars. If the analysis is measuring prevented deaths among children, the analysis would use double this value, $23.2 million in 2021 dollars, to estimate benefits from a reduction in fatality risk for children. The same method is done for the low and high estimates of adult VSL which generate estimates of $5.4 million and $17.7 million, respectively. For child VSL, the low and the high in 2021 dollars would be $10.8 million and $35.4 million, respectively.

For a prospective analysis, the VSL should increase throughout the years at the rate of real annual growth of earnings per worker. CBO estimates this real annual growth rate to be 0.8 percent from 2022 to 2052. Table 4 shows the adjusted VSL for adults over a 10-year prospective analysis.

**Table 4: Adult VSL Estimates from 2021-2030**

| Year of Analysis | Low Adult VSL Estimate | Central Adult VSL Estimate | High Adult VSL Estimate |
|---|---|---|---|
| 2021 | $5.4 million | $11.6 million | $17.7 million |
| 2022 | $5.4 million | $11.7 million | $17.8 million |
| 2023 | $5.5 million | $11.8 million | $18.0 million |
| 2024 | $5.5 million | $11.9 million | $18.1 million |
| 2025 | $5.6 million | $12.0 million | $18.3 million |
| 2026 | $5.6 million | $12.1 million | $18.4 million |
| 2027 | $5.7 million | $12.2 million | $18.6 million |
| 2028 | $5.7 million | $12.3 million | $18.7 million |
| 2029 | $5.7 million | $12.4 million | $18.9 million |
| 2030 | $5.8 million | $12.5 million | $19.0 million |

Table 5 shows the adjusted VSL for children over a 10-year prospective analysis.

**Table 5: Child VSL Estimates from 2021-2030**

| Year of Analysis | Low Child VSL Estimate | Central Child VSL Estimate | High Child VSL Estimate |
|---|---|---|---|
| 2021 | $10.8 million | $23.2 million | $35.4 million |
| 2022 | $10.8 million | $23.4 million | $35.6 million |
| 2023 | $11.0 million | $23.6 million | $36.0 million |
| 2024 | $11.0 million | $23.8 million | $36.2 million |
| 2025 | $11.2 million | $24.0 million | $36.6 million |
| 2026 | $11.2 million | $24.2 million | $36.8 million |
| 2027 | $11.4 million | $24.4 million | $37.2 million |
| 2028 | $11.4 million | $24.6 million | $37.4 million |
| 2029 | $11.4 million | $24.8 million | $37.8 million |
| 2030 | $11.6 million | $25.0 million | $38.0 million |

These VSL values would be multiplied by the estimated number of reduced or increased deaths due to the rule to generate monetized estimates from a reduction in fatality risk. The monetized estimates would then have a discount rate applied to them for each year to account for the time value of money.

## Appendix II: References


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