



## CONSUMER PRODUCT SAFETY COMMISSION

[Docket No. CPSC-2023-0013]

### Notice of Availability of Final Guidance for Estimating Value per Statistical Life

**AGENCY:** U.S. Consumer Product Safety Commission.

**ACTION:** Notice of availability.

**SUMMARY:** The Consumer Product Safety Commission (Commission or CPSC) is announcing the issuance of final guidance for CPSC’s application of the Value per Statistical Life in the agency’s analyses of benefits and costs and, in particular, for its regulatory analysis.

**ADDRESSES:** *Docket:* For access to the docket to read background documents or comments received, go to [www.regulations.gov](http://www.regulations.gov), and insert the docket number, CPSC-2023-0013, into the “Search” box, and follow the prompts.

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### SUPPLEMENTARY INFORMATION:

#### I. Introduction

The Value per Statistical Life (VSL) is a widely used parameter in benefit-cost 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 for purposes of benefit-cost analysis; it is not an attempt to place a value on any individual life. In regulatory analysis, government economists typically apply VSL as a standardized and transparent measure of the welfare impact from policies that reduce or increase fatalities.

CPSC’s Directorate for Economic Analysis (EC) is responsible for conducting all economic analyses for the agency, which includes regulatory analyses. A regulatory analysis

may include an analysis of benefits and costs of a proposed regulation. EC regularly uses VSL in its regulatory analyses of CPSC regulations. While the U.S. Office of Management and Budget (OMB) and other executive branch agencies and departments have published guidelines on the application of VSL,<sup>1</sup> CPSC, as an independent agency, is not subject to these guidelines.

On March 24, 2023, CPSC published a Notice of Availability (NOA) in the **Federal Register** that presented its Proposed Draft Guidance for Estimating the Value per Statistical Life (88 FR 17826). The NOA provided a 60-day comment period. CPSC received eight comments, and based on these comments, CPSC made the following changes to its VSL guidance:

- Removed the recommendation that high and low values should be used for child VSL in sensitivity analyses. Instead, the Final VSL Guidance recommends that the decision for what variables to test in a sensitivity analysis be done on a case-by-case basis, as is currently practiced in CPSC.
- Added further discussion on the normative frameworks used for the rationale of recommending a separate VSL for children.
- Added further discussion on alternative methods for estimating VSL and provided the reasons why CPSC did not recommend them.

This document establishes and describes the final guidelines on the application of VSL in CPSC's analysis of benefits and costs and regulatory analysis. Specifically, this final guidance establishes a standard method for estimating VSL as well as guidelines for adjusting VSL for inflation, changes in real income (i.e., controlling for inflation), and discounting.<sup>2</sup>

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<sup>1</sup> 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. OMB provides general best practice guidance (OMB Circular A-4) to Federal executive branch agencies on regulatory analysis, including discussion of issues related to estimating and using VSL in regulatory analyses.

<sup>2</sup> On March 29, 2024, the Commission voted (3-2) to approve publication of this notice. Commissioner Trumka issued a statement in connection with his vote, available at <https://cpsc.gov/About-CPSC/Commissioner/Richard-Trumka/Statement/New-CPSC-Guidance-Will-Double-the-Value-We-Place-on-Saving-Children%E2%80%99s-Lives-I-Expect-This-to-Lead-to-More-Protective-Rulemaking-Both-at-CPSC-and-Across-the-Rest-of-Government>. Commissioners Feldman and Dziak issued a joint statement in connection with their vote, available at <https://cpsc.gov/About-CPSC/Commissioner/Peter-A-Feldman/Statement/Joint-Statement-of-Commissioners-Peter-A-Feldman-and-Douglas-Dziak-on-%E2%80%9CValue-of-Statistical-Life%E2%80%9D-Double-Counting>.

This final guidance prescribes a VSL estimate specifically for children, which differs from other established VSL guidance. Other government economists have applied a uniform VSL to all fatalities that fall within the scope of the regulation being assessed.<sup>3</sup> This approach has the advantage of simplicity. However, it systematically underestimates benefits for regulations that reduce fatality risks to children.<sup>4</sup>

New research shows a higher willingness to pay for risk reduction in children's fatality risk than adults.<sup>5</sup> CPSC recommends a specific VSL for children based on this research. In addition to this research, there are anecdotal observations that strongly suggest 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 in the baby proofing industry,<sup>6</sup> safety caps on over-the-counter medicines,<sup>7</sup> and additional certifications and licensing for child safety put upon daycares and schools. Congress has also given CPSC special statutory mandates to protect children from the risk of death or injury associated with the use of consumer products.<sup>8</sup> Research on individuals' willingness to exchange money to reduce fatality risks to children largely align with these societal preferences. This final guidance recommends a higher VSL for children to more accurately assess the benefits of regulations that protect children from deadly outcomes.

## **II. Discussion**

The purpose of this final guidance is to: (1) provide background on relevant work CPSC

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<sup>3</sup> However, recent OMB guidance indicates agencies should consider valuing fatal risk reductions using estimates of the VSL and the value per statistical life-years (VSLY) extended. The VSLY approach emphasizes that the value of a statistical life is not a single number relevant for all situations; instead, it varies with the remaining life expectancy of the population affected. The remaining life expectancy is usually higher for children than for other populations, which implies a higher VSL for children. OMB also recommends the use of health-related monetary values for children that are at least as large as the values used for adults.

<sup>4</sup> 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 these Final Guidelines.

<sup>5</sup> Studies are summarized in IEC (2018) and Robinson et al. (2019).

<sup>6</sup> The global baby safety devices market has been estimated to be a \$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>

<sup>7</sup> Poison Prevention Packaging Act of 1970, Pub. L. 91-601 84 Stat. 1670.

<sup>8</sup> See, for example, 15 U.S.C. 2056a.

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; and (4) publish CPSC guidelines for VSL. Additional details were provided in the NOA that presented CPSC's Proposed Draft Guidance for Estimating the Value per Statistical Life (88 FR 17826) and the accompanying staff briefing package.<sup>9</sup>

This final guidance does 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.<sup>10</sup> This guidance document does not change CPSC's injury cost estimation approach for non-fatal outcomes.

#### *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 mortality risk, or they examine real world behavior that reflects this trade-off, such as the change in income associated with a change in job-related risk. The framework of such studies 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. Individual willingness to pay estimates from these studies are then converted to a VSL estimate by dividing by the risk change. 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<sup>11</sup> to reduce the risk of one additional fatality in that year.

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<sup>9</sup> Briefing Package can be found here: <https://www.cpsc.gov/s3fs-public/DraftFederalRegisterNoticeNoticeofAvailabilityProposedGuidanceforUsingValueofStatisticalLife.pdf?VersionId=QiWpCy7L9AvI17U.Mo3s.CyRkUdM2INf>

<sup>10</sup> For information on how CPSC estimates the cost of injuries, see: <https://www.cpsc.gov/s3fs-public/ICM-2018-Documentation.pdf>

<sup>11</sup>  $\$900 \div 0.01\% = \$900 \div 0.0001 = \$9 \text{ million}$  per expected death averted. In practice, WTP varies across individuals. In this example, \$900 could also represent the average WTP across the population.

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 characteristics of the risk. A majority of the studies other agencies have used to estimate VSL are wage-risk studies examining labor market data for working age adults. This approach is not transferable to children, who are not part of the labor market, do not control financial resources, and may not understand or be able to express their willingness to pay for such reductions. As such, the revealed preference literature is limited to a few, lower-quality averting behavior studies for valuation of mortality risks to children.<sup>12</sup> The stated preference literature is more prevalent for children VSL, and stated preference studies have been employed in many instances by Federal agencies in mortality valuation.<sup>13</sup> As articulated in *Pricing Lives: A Guidepost for a Safer Society*,<sup>14</sup> “[d]espite the challenges of undertaking credible stated-preference studies, it may nevertheless be the case that this approach yields more reliable estimates of VSL in situations in which either the fatality rate data or the employment data are deficient, making it infeasible to obtain stable VSL estimates using market data.” The scenario described by Viscusi very much describes the current dilemma for child VSL.

Assigning the same VSL for adults and children ignores evidence that society values the safety of children more than adults. 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,<sup>15</sup> runs the risk of undervaluing the perceived benefits of regulations that protect children. Therefore, applying a uniform VSL likely

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<sup>12</sup> We also highlight that averting behavior studies for children's mortality risks are limited by a drawback comparable to stated preference literature in this area of study: these studies examine parents' expenditures for products or actions that reduce risks to their children (i.e., rather than children's WTP for their own reductions in risk).

<sup>13</sup> The review studies cited by CPSC in crafting its recommendations—IEc (2018) and Robinson et al. (2019)—take care to address potential limitations of the stated preference literature.

<sup>14</sup> Viscusi, W. Kip. 2018. “Pricing Lives: Guideposts for Safer Society”. Princeton University Press.

<sup>15</sup> 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>.

disadvantages regulations meant to protect the lives of those whose safety society values most.

Inasmuch as CPSC is 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.<sup>16</sup> Furthermore, CPSC's statutory authorities (such as sections 104 and 106 of Consumer Product Safety Improvement Act of 2008, 15 U.S.C. 2056a and 2056b) 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 estimating the VSL for children to ensure a more precise and 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. 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.” In 2019, a group of co-authors that included a subset of the authors of the IEc report published an update of this criteria-driven literature review in a peer-reviewed journal with some modifications from the 2018 report.<sup>17</sup> For convenience, we refer to these two documents as the “literature reviews.”

The literature reviews applied two sets of criteria.<sup>18</sup> 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

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<sup>16</sup> 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).

<sup>17</sup> 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

<sup>18</sup> 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.

criteria to assess the quality and applicability of studies. These criteria required detailed review of each study, and some involved substantial professional judgment. The authors used these evaluation criteria to investigate the relative strengths of each study and the implications of including or omitting them.

The selection criteria<sup>19</sup> are:

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); and
6. Estimates willingness to pay (not willingness to accept compensation).

The evaluation criteria<sup>20</sup> are:

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); and
5. Provides evidence of validity.

The literature reviews found five publications that satisfied many of the evaluation criteria. These studies suggest the VSL for children exceeds the VSL for adults by a factor of 1.2 to 2.9, with a midpoint of roughly 2. The five studies and their estimates of children's VSL as a ratio to adult VSL are listed in table 1.

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<sup>19</sup> Robinson et al., 2019, tables 1 and 2.

<sup>20</sup> *Id.*

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

STUDY	RATIO
<u>Alberini and Scasny (2011)<sup>21,22</sup></u>	1.2
Dickie and Gerking (2006) <sup>23</sup>	2.3
Gerking, Dickie, and Vernosi (2014) <sup>24</sup>	1.6, 2.9
Hammitt and Haninger (2010) <sup>25</sup>	2
Hammitt and Herrera (2017) <sup>26</sup>	2.8

Since the completion of these studies, CPSC has published three regulations in the **Federal Register** aimed at children’s safety that include benefit-cost analysis: Safety Standards for Magnets (87 FR 57756),<sup>27</sup> Safety Standards for Operating Cords on Custom Window Coverings (87 FR 73144),<sup>28</sup> and Safety Standards for Clothing Storage Units (87 FR 72598).<sup>29 30</sup> 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 a uniform VSL. However, in the benefit-cost 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.

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<sup>21</sup> Results summarized from Alberini and Scasny (2011) represent their estimates from a survey conducted in Milan, Italy, which indicated the VSL for children was not statistically different from the VSL for adults (i.e., from a ratio of 1.0). The authors present additional estimates from a survey in the Czech Republic, which—despite producing statistically significant evidence of a modest premium for the children’s VSL—was not considered in the literature review because Czech Republic did not qualify as a high-income country at the time of the review.

<sup>22</sup> Alberini, A, Scasny, Milan. (2011). Context and the VSL: Evidence from a Stated Preference Study in Italy and the Czech Republic. *Environmental and Resource Economics*, 49(4), 511-538. <https://doi.org/10.1007/s10640-010-9444-8>.

<sup>23</sup> Dickie, M., & Gerking, S. D. (2006). Valuing children's health: Parental perspectives. In P. Scapecchi (Ed.), *Economic valuation of environmental health risks to children* (pp. 121-158). Organisation for Economic Co-operation and Development (OECD).

<sup>24</sup> Gerking, S., Dickie, M., and Veronesi, M. (2014). Valuation of Human Health: An Integrated Model of Willingness to Pay for Mortality and Morbidity Risk Reductions. *Journal of Environmental Economics and Management*, 68(1): 20-45.

<sup>25</sup> Hammitt, J.K., & Haninger, K. (2010). Valuing fatal risks to children and adults: Effects of disease, latency, and risk aversion. *Journal of Risk and Uncertainty*, 40, 57-83. DOI: 10.1007/S11166-009-9086-9.

<sup>26</sup> Hammitt, J.K., & Herrera-Araujo, D. (2017). Peeling back the onion. DOI: 10.1016/j.jeem.2017.06.006.

<sup>27</sup> <https://www.federalregister.gov/documents/2022/09/21/2022-20200/safety-standard-for-magnets>

<sup>28</sup> <https://www.federalregister.gov/documents/2022/11/28/2022-25041/safety-standard-for-operating-cords-on-custom-window-coverings>

<sup>29</sup> <https://www.federalregister.gov/documents/2022/11/25/2022-24587/safety-standard-for-clothing-storage-units>

<sup>30</sup> CPSC also issues regulations for children’s products under other statutes, including for durable infant and toddler products under section 104 of the Consumer Product Safety Improvement Act of 2008 (CPSIA). These regulations, however, do not require a full regulatory analysis.



### *B. Current Federal Agency Practice*

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.<sup>31</sup> DOT primarily addresses injury-related risks; it derives its VSL estimate exclusively from wage-risk studies, which also address injury-related risks.<sup>32</sup> HHS bases its VSL estimates on six wage-risk studies and one meta-analysis of these studies, as well as three stated preference studies.<sup>33</sup> Table 2 displays the values of all three agencies' VSL, adjusted to 2022 dollars and income levels for comparison.

Table 2: U.S Federal Departments' VSLs (2022 dollars)

<b>EPA</b>	<b>DOT</b>	<b>HHS</b>
\$11.0 million	\$12.5 million	\$12.3 million

These estimates are 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<sup>34</sup> recommended by Viscusi when adjusted to the same year.

### **III. Summary of the Final VSL Guidelines**

CPSC's VSL guidelines (stated in section VI) 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. CPSC will account for both the change in the general price index (inflation) and in real

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<sup>31</sup> U.S. EPA. 2010. "Guidelines for Preparing Economic Analyses." <https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses>.

<sup>32</sup> U.S. Department of Transportation (DOT). 2021. "Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses". <https://www.transportation.gov/sites/dot.gov/files/2021-03/DOT%20VSL%20Guidance%20-%202021%20Update.pdf>

<sup>33</sup> U.S. Department of Health and Human Services (HHS). 2016. "Guidelines for Regulatory Impact Analysis". <https://aspe.hhs.gov/reports/guidelines-regulatory-impact-analysis>.

<sup>34</sup> Viscusi, W. Kip. 2018. "Best Estimate Selection Bias in the Value of a Statistical Life." *Journal of Benefit-Cost Analysis*, 9(2): 205–246.

income using the method in HHS’s *Guidelines for Regulatory Impact Analysis*.

4. When estimating VSL for future years, CPSC will increase the VSL by the expected growth in real earnings and 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

<b>Variable</b>	<b>Guideline</b>
Adult VSL	\$13.0 million in 2023 dollars and 2023 real income level as of March 1, 2024. Based on HHS's VSL Guidance.
Child VSL	\$26.0 million in 2023 dollars and 2023 real income level as of March 1, 2024. 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). 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.

#### **IV. Reasons for Establishing VSL Guidelines**

CPSC staff developed these VSL guidelines, including the recommendation of a separate VSL for children, along two normative frameworks. The Commission then published the draft VSL guidelines for public comment. Staff analyzed these comments to develop the Commission’s final VSL guidelines as presented here.

The first normative framework applied by staff is CPSC’s established approach to valuing premature deaths: CPSC employs estimates of individuals’ willingness to pay for their own reductions in mortality risk (i.e., the VSL). While willingness to pay estimates for children are derived from a parental perspective (i.e., reflecting how parents value children’s mortality

risk reductions higher than their own), the research and data of IEC (2018) and Robinson et al. (2019) provide persuasive evidence that values are higher for children's risks. Regulatory analysis frequently demands judgment calls in areas of limited data and research. CPSC assesses that its current approach to VSL—valuing mortality risk changes equally for adults and children—significantly underestimates benefits accruing to children through lower mortality risks associated with consumer products. Although it may be difficult to precisely measure child VSL, CPSC's final VSL guidance is supported by the literature and available evidence and is more accurate than equating child and adult VSLs. Adopting a child VSL that doubles adults' VSL aligns CPSC's regulatory analyses more closely with societal preferences in the U.S.

The second framework applied by staff is CPSC's mission to protect the public against the unreasonable risks of injuries and deaths associated with consumer products. Rulemaking is one tool CPSC uses to carry out its mission. The rulemaking process entails CPSC staff assembling a technical briefing package for the Commission's consideration, which may encompass a regulatory analysis. The Commission makes its determinations based on its governing statutes, such as section 9 of the CPSA which requires that "the benefits expected from the rule bear a reasonable relationship to its costs." 15 U.S.C. 2058(f)(3)(E). In adopting this Final Guidance to guide staff and CPSC's future regulatory analyses, the Commission facilitates efficient rulemaking to further its safety mission and specific statutory responsibilities.

CPSC developed this Final Guidance for VSL considering both of these frameworks and comments received on the Draft Guidance for VSL. CPSC also publishes this Final Guidance as a form of standardizing best practices for components of its regulatory analysis.

By developing and publishing guidelines for using VSL in regulatory analysis, CPSC provides for regulatory analyses that appropriately and consistently measure the benefits from reduced fatality risk, including when children's mortality is considered and ensures transparency by sharing these guidelines with the public. CPSC establishes these guidelines with the objective of streamlining the estimation process and making its application consistent and clear across

regulations and time periods.

These guidelines thus establish the source, base value, and method of CPSC's application of VSL in regulatory analyses. The guidelines also establish a ratio of child VSL to adult VSL for CPSC to use in valuing reduced children's fatality risk in formal regulatory analysis, as opposed to limiting its use to sections of the sensitivity analysis as the Commission has done in the past. These guidelines will ensure there is no ambiguity on which value to use in regulatory analysis, nor in how to adjust for inflation and changes in real income, or whether to discount VSL-related benefits.

## **V. Response to Public Comments**

Following publication in the **Federal Register** on March 24, 2023, CPSC received eight public comments on the Draft Guidance. This section summarizes those comments and provides the Commission's responses.

Overall, five commenters support approaches that value fatal risk reductions for children differently from adults, and three commenters do not support such approaches. Of those who support a different VSL for children and adults, three approve of CPSC's specific proposal to adjust the VSL by approximately a factor of two. The two commenters supporting a different VSL for children do not specify a recommended multiplier. The remaining three commenters, who oppose applying a different VSL for children, prefer the application of a uniform VSL for individuals of all ages. The remainder of this section addresses the specific issues raised by the commenters.

### *A. Comments Supporting a Higher VSL for Children*

*Comments:* As noted above, three commenters voiced support for CPSC's recommended approach of employing a multiplier of two for VSL when assessing risks to children. Dr. Glenn Blomquist of the University of Kentucky (emeritus) noted that this adjustment is consistent with his assessments of a premium for children's risk valuation. An anonymous commenter provided support for the proposed multiplier but recommended relying solely on the Hammitt and

Haninger (2010) study, which is one of the mortality valuation studies informing CPSC's understanding of children's risk valuation. The commenter states that this approach would be simpler because it is the most applicable study for U.S. regulatory analysis. The preferred estimate from this study is identical to the multiplier (2.0) recommended by CPSC. A third group of commenters who submitted joint comments (Consumer Federation of America, Consumer Reports, Kids in Danger, U.S. Public Interest Research Group) provide additional support for the multiplier of 2.0, highlighting that this finding is aligned with broader societal priorities for the protection of children.

Two commenters voiced support for alternative adjustments to mortality valuation estimates for children. First, Dr. Adam Finkel of the University of Michigan lauded CPSC's efforts to offer a separate mortality valuation estimate for children. The commenter asserted that improvements could be made to the methods employed to estimate willingness to pay for mortality risk reductions; however, he did not recommend a specific alternate estimate of mortality risk values for children. Second, Lisa Robinson of the Harvard T.H. Chan School of Public Health provided comments supporting mortality risk valuation that specifically addresses how values may vary for children but noted such estimates should be conducted (1) "at least in sensitivity analysis" (i.e., in sensitivity analysis and, if supported by sufficient evidence, in CPSC's primary estimates) and (2) following investigation of other approaches. These alternatives, as presented by the commenter, include a value per statistical life year (VSLY), value per quality-adjusted life year (vQALY), or an inverse "U" function highlighting the link between age and mortality risk values. These approaches result in age-specific values for changes in mortality risk, including a more gradual transition in values from younger children to older children and adults.

*Response:* We thank these commenters for their input. CPSC's Final Guidance maintains the recommendation for doubling the VSL for children in the primary estimate of benefits. With regard to the alternative formulations of age-specific valuations for mortality risk, CPSC has

evaluated these other options and concludes that applying a multiplier has the advantage of relying entirely on willingness to pay (WTP) values. Both the base VSL estimate and the adjustment factor for children rely on primary research studies intended to estimate WTP for small risk reductions. This consistency between methods and elicited values is a significant strength.

CPSC acknowledges two limitations of its chosen approach. The first relates to the framework for valuing mortality risks to children. The studies used to derive the multiplier evaluate parents' WTP to reduce risk for their own children. This framing differs from the standard welfare economic framing, where individuals are assumed to be the best judge of their own well-being. As discussed in Robinson et al. (2019), eliciting a child's WTP for their own risk reduction is problematic.<sup>35</sup> Thus, a parental perspective offers the next best solution. The second limitation is the small number of available, high-quality studies estimating multipliers.

Like the use of WTP, the alternatives for valuing avoided child fatalities suggested by Ms. Robinson also have strengths and limitations. Standard derivation of VSLY (or vQALY) divides an estimate of VSL by the discounted number of remaining life years (or QALYs), accounting for age-specific survival probabilities, for the mean age of sampled individuals in the stated and revealed preference studies informing an agency's preferred VSL estimate. Analysts then multiply estimates of the VSLY or vQALY by the life years or QALYs lost from premature fatality. More life years are lost due to a child fatality than an adult fatality, resulting in different values for avoiding each type of death. While computationally straightforward to apply, this approach requires several strong assumptions.

First, in the case of vQALYs, the construction of QALYs "assumes that how individuals value health states (measured as changes in health-related quality of life, or HRQL) is independent of the duration of the state, the age at which they are experienced, and the

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<sup>35</sup> Robinson, L.A., W.J. Raich, J.K. Hammitt, and L. O'Keefe. 2019. "Valuing Children's Fatality Risk Reductions." *Journal of Benefit-Cost Analysis*. 10(2):156-177.

individual's remaining life expectancy" (Robinson and Hammitt 2013).<sup>36</sup> In practice, these assumptions are unlikely to hold in all cases.

Second, this approach assumes that the VSLY (or vQALY) is constant through time (i.e., no matter one's age, the value the individual places on living an additional year does not change). According to Robinson and Hammitt (2013), "the assumption of a constant value per QALY implies that VSL is proportional to future QALYs, which is not consistent with empirical estimates of how VSL varies with age." The inverse "U" function is typically discussed in the context of mortality risk valuation for working age adults. Aldy and Viscusi (2008),<sup>37</sup> for example, provide evidence from labor market data that VSL peaks at age 39, with diminished values at younger and older ages. These results, however, are not available for children or for adults over 62 years of age. It is unclear whether the inverse "U" pattern would extend to other ages.

We note that application of a VSLY or vQALY could result in results comparable to the simpler doubling of values for children, depending largely on the age of the affected population, the selected approach (i.e., VSLY or vQALY), and the discount rate. United States life tables illustrate that (undiscounted) life expectancy for infants is around 78.7 years.<sup>38</sup> In contrast, life expectancy for a 48-year-old (the mean age of a U.S. adult) is 33.5 years.<sup>39</sup> In discounted terms, the gap is narrowed: at a 2 percent discount rate, the present value of remaining life years is approximately 39.7 for infants and 24.2 for the average U.S. resident. In applying a VSLY to monetize avoided premature deaths at these ages, the value of preventing one infant death would be 1.6 times greater than the value of preventing one death of an average age adult. This ratio is

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<sup>36</sup> Robinson, L.A., and J.K. Hammitt. 2013. "Skills of the Trade: Valuing Health Risk Reductions in Benefit-Cost Analysis." *Journal of Benefit-Cost Analysis*. 4(1): 107-130.

<sup>37</sup> Aldy, J. E., & Viscusi, W. K. 2008. "Adjusting the value of a statistical life for age and cohort effects". *Review of Economics and Statistics*, 90(3), 573–581

<sup>38</sup> Life expectancy estimates are derived from Centers for Disease Control (CDC) estimates included in the Excel workbook accompanying HHS's Guidelines for Regulatory Impact Analysis Appendix D: Updating Value per Statistical Life (VSL) Estimates for Inflation and Changes in Real Income. See <https://aspe.hhs.gov/reports/updating-vsl-estimates>, as viewed on November 10, 2023.

<sup>39</sup> Mean age of U.S. adults (ages 18+) derived from 2020 Decennial Census table PCT12 ("Sex by single-year age"). <https://data.census.gov/table/DECENNIALDHC2020.PCT12?q=PCT12:+SEX+BY+SINGLE-YEAR+AGE>

higher when using remaining expected QALYs (instead of remaining life years) due to diminishing health-related quality of life at older ages.<sup>40</sup> Practically, this approach results in a premium that declines as children approach adulthood. In contrast, CPSC’s VSL guidance results in a sharply delineated difference in mortality risk reductions for older children and adults.

We are not aware of any regulatory agency currently using VSLYs or vQALYs in primary estimates of benefits or costs. One department, U.S. Department of Health and Human Services (HHS), uses the VSLY to estimate the value of mortality risk reductions in sensitivity analysis. But like other agencies, HHS uses a uniform VSL in its primary estimate. *See, e.g.,* HHS (2022) Tobacco Product Standard for Characterizing Flavors in Cigars, available at <https://www.regulations.gov/document/FDA-2021-N-1309-0001>.

Finally, while measurements like VSLY or inverse “U” make it possible to generate estimates for each age of childhood, CPSC would then need to project the number of deaths at each age for the prospective study period. While CPSC staff is confident this could be done for two subpopulations – adults and children – staff are less confident that there will be enough data to consistently forecast incidents for every individual age of childhood. Accordingly, if these alternate approaches were used, the Commission might have to base some of its rules on projections supported by only a handful of historical death records.

Weighing the strengths and limitations of the available options for differentiating the value of risk reductions for children and adults, CPSC concludes that the application of a multiplier derived from available WTP literature is preferable to valuing lost life years for affected individuals using a VSLY or vQALY. The advantages of relying solely on WTP studies, despite the small number of high-quality studies, and the resulting sharply delineated difference in the value of mortality risk reductions for adults and children, outweighs the advantages of an

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<sup>40</sup> Estimation of expected lifetime QALYs is challenging for children—particularly younger children—due to the difficulties in eliciting health status from children and valuing those health states to construct measures of health-related quality of life (see Section 7.10.3 and Online Appendix 7.7 of *Cost-Effectiveness in Health and Medicine*, Second Edition, 2017).



approach that results in more gradual declines in value as children age but requires several strong assumptions to construct a VSLY or vQALY and potentially unavailable data on the age distribution of children affected by proposed regulations.

*B. Comments Opposing a Higher VSL for Children*

*Comment:* Three commenters oppose CPSC’s proposed multiplier of two for children’s mortality risks. The Toy Association characterized children as an “arbitrary section of the population” for the purposes of mortality risk valuation. It asserts that the VSL should be applied uniformly across the entire population and labels the multiplier as an “exaggeration” of the VSL. Dr. W. Kip Viscusi of Vanderbilt University Law School and Dr. Thomas Kneisner of Claremont Graduate University also voiced opposition to the adjustment. Dr. Viscusi asserted that the evidence provided by CPSC does not warrant a different VSL for children. Dr. Kneisner voiced support for equality in children’s and adults’ VSLs in CPSC regulatory analyses.

*Response:* The Proposed Draft and Final Guidance defines the age threshold for the guidance as individuals younger than 18 years old. CPSC does not view individuals younger than 18 as an “arbitrary section of the population” given that age 18 is a common cutoff employed in studies of adult and children’s VSL. Eighteen years old also aligns with society’s commonly accepted threshold for adulthood which are supported by the governmental obligations and rights afforded to an individual the moment they turn 18, such as military service and the right to vote. As explained below, this application of a higher VSL for children also falls within current guidance from the OMB’s Circular A-4<sup>41</sup> that such values should be at least as high as comparable values for adults.

*C. OMB Guidance on VSL Adjustments*

*Comments:* Four commenters discuss CPSC’s proposed VSL adjustments in the context of Federal guidance for benefit-cost analysis. Specifically, these commenters reference OMB Circular A-4 and its discussion on the topic of age adjustments for VSL. Three commenters—

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<sup>41</sup> Pg. 51, <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf>

The Toy Association, Dr. Viscusi, and Dr. Kneisner—all state that OMB cautions against the use of age adjustment factors and notes that other agencies follow this approach. One commenter, Dr. Finkel, addresses these comments preemptively by noting that the 2003 version of the OMB guidance is 20 years old and was crafted in a context in which OMB was admonished for the use of lower VSL estimates for elderly populations. Dr. Finkel comments that an upwards adjustment on the children’s VSL is distinct from the “much-derided ‘senior-death-discount.’” Finally, The Toy Association claims that CPSC has not provided evidence that new research that is materially different or additional to the research considered in Circular A-4. The Toy Association characterizes as “disingenuous” assertions that the Circular is 20 years old, and that new research is available.

*Response:* As an independent Federal agency, CPSC is not subject to OMB review as part of its rulemaking process. While CPSC regulatory analyses follow many of the recommended practices in Circular A-4, CPSC can consider newer evidence and best practices not reflected in the 2003 document.

Furthermore, since the filing of comments on the Draft Guidance, OMB has updated its guidance for benefit-cost analysis.<sup>42</sup> The revised OMB guidance now states:

The valuation of health outcomes for children and infants poses special challenges. It is rarely feasible to measure a child’s willingness to pay for health improvement, and adults’ concern for their own health is not necessarily relevant to valuation of child health. For example, the wage premiums demanded by workers to accept hazardous jobs are not necessarily appropriate to use for regulations that accomplish health gains for children. Some studies suggest that parents may value children’s health more strongly than their own health. Although this parental perspective has been a promising research strategy, it may need to be expanded to include a societal interest in child health and safety.

Where the primary objective of a regulation is to reduce the risk of injury, disease or mortality among children, [agencies] may develop a benefit-cost analysis to the extent that valid monetary values can be assigned to the primary expected health outcomes. For regulations where health gains are expected among both children and adults and [the agency] decide[s] to perform a benefit-cost analysis, the monetary values for children should be at least as large as the values for adults (for the same probabilities and outcomes) unless there is specific and compelling evidence to suggest otherwise.

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<sup>42</sup> U.S. Office of Management and Budget. 2023. Circular No. A-4. Available at <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf>

CPSC's new guidelines are consistent with OMB's current recommendation that monetary values for children deserve "special" attention and should be no lower than that of adults.

*D. Framework for CPSC's Policy Decision*

*Comment:* Lisa Robinson called for CPSC to clarify whether it is applying the conventional benefit-cost analysis framework in which individuals' preferences (i.e., willingness to exchange money for effects they themselves experience) are the basis for valuing outcomes, the framework for government policy decisions in which CPSC must interpret and act upon societal influences, including significant investments in child safety and Congressional mandates, or another framework. Ms. Robinson notes that policymakers may decide to pursue policies that differ from the results of benefit-cost analysis; however, she notes that most guidance documents are clear that benefit-cost analysis is intended as a tool to inform, but not determine, the decision.

Related to Ms. Robinson's comment, one anonymous commenter recommended that CPSC justify its statement "that society prioritizes the safety of children over the adult population and invests significantly in child safety" by citing IEC (2018) or Robinson et al. (2019). The commenter believes these sources provide greater support than the market size of the child safety industry.

*Response:* We thank Ms. Robinson for clearly distinguishing between the two frameworks that may serve as rationales for a higher VSL for children. The Final Guidance now includes an explanation of the two normative frameworks guiding the incorporation of child VSL into CPSC's regulatory analysis.

The first normative framework presented by Ms. Robinson describes CPSC's typical approach to valuing premature deaths: CPSC employs estimates of individuals' willingness to pay for their own reductions in morality risk (i.e., the VSL). While willingness to pay estimates for children are derived from a parental perspective (i.e., reflecting how parents value children's mortality risk reductions higher than their own), CPSC concludes that the research and data of

IEc (2018) and Robinson et al. (2019) represent sufficient evidence that values are higher for children's risks. Regulatory analysis frequently demands judgment calls in areas of limited data and research. CPSC assesses that valuing mortality risk changes equally for adults and children underestimates the benefits accruing to children through lower mortality risks associated with consumer products. Although the conventional framework of relying on individuals to value risks to themselves is often infeasible in the context of children valuing their own risk reductions such that novel methodologies are required, adopting a child VSL double that of adults, as a policy decision, best aligns CPSC's regulatory analyses with societal preferences in the U.S.

The second framework presented by Ms. Robinson is relevant in this context as well. CPSC is guided by its mission "to protect the public against unreasonable risks of injury associated with consumer products." 15 U.S.C. 2051(b)(1). Rulemaking is one tool CPSC uses to carry out its mission. Neither agency mandates nor statutory obligations compel the Commission to endorse or reject proposed rules solely on benefit-cost analysis outcomes. At very most, CPSA is required to find in some rulemakings that "the benefits expected from the rule bear a reasonable relationship to its costs," where "benefits or costs that cannot be quantified in monetary terms" are considered. 15 U.S.C. 2058(c)(1), (f)(3)(E). Therefore, policymakers also may consider effects not captured in economic analysis.

#### *E. Availability of Studies Estimating a Multiplier*

*Comment:* Three commenters suggest that available literature is too limited to support an adjustment of the VSL (or, more specifically, an adjustment of 2.0). First, Drs. Kneisner and Viscusi note that there is limited literature on VSL for children versus adults. In particular, they state that this literature is sparse relative to the large literature on VSL more generally. These commenters also assert that the evidence is particularly slim to serve as the empirical foundation for a "major shift in benefit assessment practice." Finally, two commenters (The Toy Association and Dr. Kneisner) claim that the literature does not support the conclusion that VSL for children is roughly double that of adults. Dr. Kneisner asserts, without any supporting citation, that more

accurate revealed preference estimates suggest the two VSLs are close.

*Response:* The literature studying mortality valuation for children is indeed more limited than the literature on broader mortality valuation topics. This is expected because children do not participate broadly in the labor market and are not included in wage-risk studies. Similarly, children are not typically sampled for stated preference research estimating willingness to pay for mortality risk reductions.

Regulatory analysts frequently operate in data-limited environments and must assess the quality and applicability of a limited number of studies or data sources. Given the importance of accurately characterizing mortality valuation for children, CPSC explored the available literature for children's VSL to assess the weight of evidence on this topic. CPSC concludes that the existing literature, including the literature cited in the NOA seeking comment on the Draft Guidance as well as in this Notice, provides sufficient evidence for an adjustment to the VSL for children that is consistent with societal preferences for protection of children's health.

#### *F. Application of Existing Literature to CPSC's Regulations*

*Comment:* Four commenters address the types of risks and the geographic coverage of the studies considered by CPSC. One anonymous commenter requests that CPSC better describe the context of the risks managed by CPSC in order to support transfer of these estimates. Three commenters (The Toy Association, Dr. Kneisner, and Dr. Viscusi) state that the types of risks considered in these studies are different from those regulated by CPSC, thus limiting the applicability of these studies for use in CPSC regulatory analysis. These three commenters further expressed concern about the study populations informing CPSC's proposed adjustment. The Toy Association notes that the studies rely on samples from Milan, Italy; parents in Orlando, Florida; and a non-representative sample of parents across the United States. Drs. Kneisner and Viscusi note that assessments of VSL vary greatly by country, limiting the applicability of non-U.S. studies for use by CPSC.

*Response:* As a U.S. regulatory agency, CPSC aims to rely on nationally representative

U.S. studies if available data allow. Given the smaller set of studies on this topic (relative to broader VSL research), tradeoffs may be necessary, including consideration of studies conducted in other high-income countries or using spatially constrained and/or non-representative samples within the United States. Both IEc (2018) and Robinson et al. (2019) found such studies met enough of the remaining evaluation criteria to include in their estimate for child to adult VSL ratio.

Importantly, while VSL estimates may differ across countries, there is not strong evidence that the relationship between children and adult VSLs similarly differ. The literature reviews by IEc and Robinson et al. focused on high income countries to minimize economic factors that would strongly influence the valuation of mortality risks. We note that if the two studies conducted abroad (in France and Italy) were excluded from the reviews, the result would be a range of ratios from 1.6 to 2.9 and a *higher* midpoint (2.25) than recommended by CPSC. And reliance on the lone study conducted across the entire United States (Hammit and Haninger 2010) would result in the same ratio (2.0) as the broader set informing CPSC's approach. Accordingly, relying on a larger set of studies that includes the foreign studies is both more defensible and more conservative (i.e., resulting in a lower or the same VSL for children than what each of the commenters proposed).

Finally, risks managed by CPSC include both acute and chronic injury-based values that can lead to a fatality. CPSC does manage risk for traumatic injuries and death, such as strangulation from window covering cords and tip overs from clothing storage units. But CPSC has a broad mandate to prevent death and injuries from all types of hazard scenarios associated with consumer products. For instance, the Commission has a rule (codified at 16 CFR part 1307) that prohibits the use in children's toys of certain types of phthalates that can cause adverse effects on male reproductive development. CPSC likewise sets regulations on the amount of lead in children's toys to address long-term and recurring health complications from lead poisoning. We encourage researchers to conduct U.S.-based studies estimating willingness to pay

for risk reductions in the context of all types of injuries resulting from consumer products.

*G. Concerns with Stated Preference Literature*

*Comment:* Drs. Kneisner and Viscusi express concerns with the use of stated preference literature as the basis for CPSC’s proposed VSL adjustment. These commenters suggest that responses to hypothetical survey questions are not a useful guide for policy because they are subject to “rampant potential biases.”

*Response:* Wage-risk studies, a type of revealed preference research underlying many VSL estimates employed by Federal agencies, rely on labor market data for working age adults and therefore do not address risks to children. As such, the revealed preference literature is limited to averting behavior studies for valuation of mortality risks to children. As articulated in *Pricing Lives: A Guidepost for a Safer Society*<sup>43</sup>, “[d]espite the challenges of undertaking credible stated-preference studies, it may nevertheless be the case that this approach yields more reliable estimates of VSL in situations in which either the fatality rate data or the employment data are deficient, making it infeasible to obtain stable VSL estimates using market data.” Viscusi’s assessment very much describes the current circumstances for child VSL.

The stated preference literature is more prevalent in this study area and stated preference studies have been employed in many instances by Federal agencies in mortality valuation. The review studies cited by CPSC in crafting its recommendations—IEc (2018) and Robinson et al. (2019)—take care to address potential limitations of the stated preference literature. IEc (2018) highlighted the scope tests performed in each study examining WTP sensitivity to magnitude changes in risk, specifically, whether results were consistent with WTP increasing with larger risk reductions and if the increase was proportional. For example, if a study found a group of individuals willing to pay \$900 to reduce their risk of death by 0.01 percent, then a proportional response would be the same group willing to paying \$1,800 to reduce their risk of death by 0.02 percent. Two of the five available studies passed its scope test. The other three studies exhibited

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<sup>43</sup> Viscusi, W. Kip. 2018. “Pricing Lives: Guideposts for Safer Society”. Princeton University Press.

sensitivity but either lacked proportionality or did not report a ratio. However, the other relative strengths of these three studies (explained in full detail in Section 4.1.2. in IEC (2018)) merits their inclusion. We note that insensitivity to scope would not necessarily result in biased estimates of the ratio between VSL for children and adults. Overall, the literature provides evidence of elevated willingness to pay for risk reductions to children.

#### *H. Statistical Significance*

*Comment:* Two commenters call for additional information on the statistical significance of the ratios (children's VSL to adult VSL) presented by CPSC. The Toy Association highlights that the IEC (2018) authors noted some ratios are not statistically significant and asserts that the value of VSL for children is not statistically different from the VSL for adults. An anonymous commenter recommended CPSC include the statistical significance of these ratios in its documentation.

*Response:* We have expanded table 1 of the Final Guidance to address these comments. The comment from The Toy Association, however, lacks context. While IEC (2018) notes that multiple studies present results that are not statistically different than the adult VSL (a ratio of 1.0), this finding includes studies on fatal and nonfatal risks. Only one ratio of mortality risk values (1.2, Alberini and Ščasný 2011) was not statistically different than the adult VSL (a ratio of 1.0) – the remaining three studies presented values that were statistically different from 1.

#### *I. Consideration of Use in Primary Estimates or Sensitivity Analysis*

*Comment:* Three commenters consider the use of alternative VSL estimates in primary CPSC estimates or in sensitivity results. All three suggest that CPSC should present a range of values (i.e., using both the standard VSL and adjusted VSL for children) in its analyses. Lisa Robinson calls for CPSC to clarify why it believes the literature justifies an adjustment in its main estimates, rather than only in sensitivity analysis. Ms. Robinson notes that IEC (2018) and Robinson et al. (2019) both highlight uncertainty in the relationship between the VSL for adults and children. She quotes recommendations in the latter paper that agencies adjust the VSL in



sensitivity analyses until more research is published supporting an adjustment (Robinson et al. 2019, p. 173).

Two other commenters, Drs. Blomquist and Finkel, also support the use of sensitivity analyses reflecting both sets of VSL estimates; however, these commenters do not comment on whether the primary estimates should reflect the conventional VSL or the adjusted VSL for children.

*Response:* CPSC’s primary estimates of benefits and costs reflect the agency’s best characterization of the anticipated effects of a rule. CPSC’s primary assessments are modeled using the agency’s best estimates of any uncertain inputs. Given available evidence on the valuation of children’s risk changes—as summarized in IEC (2018) and Robinson et al. (2019)—CPSC concludes that doubling the adult VSL for children is more accurate than equating child and adult VSLs. Further, as the midpoint of the range of values for this multiplier, doubling would be the appropriate single point estimate for all non-symmetric distributions.

#### *J. Age Threshold for Children*

*Comments:* Three commenters discuss the pattern of VSL by age that results from two VSL estimates: one for adults, and one for children. The resulting pattern, characterized as a “cliff” by Lisa Robinson, has a uniform, elevated VSL for ages 0 to 17 that drops to a uniform, standard VSL for ages 18 and up. Ms. Robinson notes that it seems unrealistic for values to drop suddenly, rather than changing as a child progresses to adulthood. Similarly, Dr. Glenn Blomquist comments that limited evidence suggests VSL is greatest for young children and is closer to that of adults for older teens. The Toy Association states that the CPSC proposal ignores the inconsistency of applying a single adjustment to all adolescent age groups (infant, toddler, pre-teen, or teenager). The Toy Association states that CPSC does not define the age differentiating children from adults.

*Response:* Contrary to the Toy Association’s comment, the Draft Guidance defined the age threshold, stating “CPSC staff should apply this child VSL to mortality risk reductions likely

to accrue to any individual younger than 18 years old . . . .”

CPSC acknowledges that a stepwise adjustment to the child VSL results in a pattern in which risks for 17 and 18 year olds are valued using estimates that differ considerably. While the strength of available research supports an adjustment for children, there is a weaker literature base to support adjustments for more refined age bins (or single-year ages). In Section 4.2.2 of IEc (2018), the authors discuss variation in values by age of the child. Most studies on children’s risks considered broad age ranges approximating those recommended by CPSC for adjustments (i.e., newborns to 17 year olds). IEc (2018) note at page 33:

[Only] some of these studies provide evidence that WTP may vary by the age of the child. For fatal risk reductions, two surveys suggest that estimated WTP declines with the age of the child (Gerking, Dickie, and Veronesi 2014, skin cancer survey; Hammitt and Haninger 2010); but two surveys find no significant impact (Alberini and Ščasný 2011; Gerking, Dickie, and Veronesi 2014, leukemia survey). Hammitt and Herrera (2017) do not report whether WTP differs by children’s age.

As researchers publish on this topic in future years, CPSC will consider whether available research supports more granular adjustments by the age of the child. Current research supports an adjustment for a broad definition of children, consistent with the recommendations in CPSC’s Final Guidance.

*K. Use of HHS Guidance for Base VSL*

*Comment:* Two commenters provided input on CPSC’s proposal to rely on the HHS VSL as the base VSL (i.e., for adults) in regulatory analysis. While one anonymous commenter requested that CPSC provide additional justification for using the HHS estimate, Lisa Robinson commented that the proposal seems reasonable given that many of the studies underlying the HHS estimates address injury-related deaths.

*Response:* CPSC has added to the Final Guidance a more comprehensive rationale for adopting HHS’s VSL estimate and methodology. This rationale reemphasizes HHS’s inclusion of more recent studies in the development of its VSL estimate. Contemporary studies are

preferable because revealed preference literature has progressed significantly<sup>44</sup> in recent years and newer studies better reflect current societal preferences. Moreover, the studies considered by HHS encompass fatalities stemming from both traumatic injuries and illnesses, aligning with the spectrum of potential death causes from consumer products that CPSC is responsible for mitigating.

*L. Equity Concerns*

*Comment:* Dr. Kneisner commented that, “equity grounds are also the basis for an equal VSL, as has been the case in other applications that come under mandatory OIRA review where age adjustments have been prohibited in VSL.”

*Response:* As noted above, CPSC is not subject to OMB review of its regulatory analyses. Further, age adjustments are no longer prohibited for the VSL under OMB’s final revised Circular A-4. OMB notes that values for children should be at least as high as those for adults.

*M. Legal Analogies*

*Comment:* Dr. Kneisner contends that an equal VSL for children and adults mirrors how possible demographic differences are treated legally in other situations. He notes that unequal annual pension payments by gender are no longer legal because no individual woman is necessarily going to live longer than a man. Similarly, no individual child is necessarily going to live longer than an adult.

*Response:* CPSC’s application of the VSL is not used to value any individual life. Rather, the concept of a “statistical life” represents the aggregation of many individuals benefiting from small reductions in their risk of death. In this context, the population average life expectancy for children is longer than the analogous life expectancy for adults. While this may be part of the higher valuation of risk reductions to children, we do not know the list of factors—or their

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<sup>44</sup> Cropper, Joiner, and Krupnick, “Revisiting the Environmental Protection Agency’s Value of Statistical Life”, Resources for the Future, pg.15; Section 2.3.6., July 2023, [https://media.rff.org/documents/WP\\_23-30.pdf](https://media.rff.org/documents/WP_23-30.pdf)

relative importance—being considered by respondents of stated preference questionnaires.

Further, values frequently differ across ages in benefit-cost analysis. For example, cost of illness estimates may reflect higher treatment expenditures for children than adults for a particular illness or injury. These averages represent our best assessment of the value of these outcomes, even if expenditures for one child may be lower than expenditures for one adult.

#### *N. Discount Rate*

*Comment:* Dr. Adam Finkel recommended that CPSC include language about the discount rate. Dr. Finkel encouraged CPSC to follow recent OMB guidance (i.e., the draft revisions to Circular A-4) of adopting a discount rate of 1.7 percent.

*Response:* CPSC staff is reviewing the recently published final revisions to Circular A-4 and considering an update with respect to the revised discount rate cited by Dr. Finkel; however, this rate was updated from 1.7 percent to 2 percent in the final revisions. This issue, however, is outside the scope of this guidance on valuing premature deaths.

## **VI. VSL Guidelines**

In this section we state CPSC's final VSL guidelines, as determined by the Commission following consideration of the public comments described above. CPSC made the following changes to its VSL guidance from its Draft Guidance published in March 2023:

- Removed the recommendation that high and low values should be used for child VSL in sensitivity analyses. Instead, the Final VSL Guidance recommends the decision for what variables to test in a sensitivity analysis to be done on a case-by-case basis, as is currently practiced in CPSC.
- Added further discussion on the normative frameworks used for the rationale of recommending a separate VSL for children. And,
- Added further discussion on alternative methods for estimating VSL and provided the reasons why CPSC did not recommend them.

Aside from these changes, the guidelines did not substantively change from the Draft

Guidance.

First, the Final VSL Guidance specifies how to determine the VSL for both adults and children. Next, it describes how to determine when adjustments to the VSL are needed and how to make them. Finally, this guidance provides an example scenario that illustrates how to apply the guidelines.

#### *A. Adult VSL*

CPSC should use the most recent VSL from HHS to value expected fatality risk reductions for individuals that are 18 years or older. As of this document, HHS recommends a central VSL estimate of \$13.0 million in 2023 dollars at 2023 income levels. As explained in greater detail further into these guidelines, CPSC should update that value as needed, following the HHS guidance.

CPSC recommends HHS's estimate because its value is based on a more recent review of the literature that applies extensive selection and evaluation criteria that reflects the evolution of best practices. It includes newer studies that better reflect current societal preferences, as revealed preference literature has progressed significantly in recent years. Moreover, the studies considered by HHS encompass fatalities stemming from both traumatic injuries and illnesses, aligning with the spectrum of potential death causes from consumer products that CPSC is responsible for mitigating. For these reasons, CPSC aligns its VSL estimate with HHS. If the HHS estimate or methodology significantly changes in the future, CPSC will evaluate changes to the estimate and the basis for any changes.

#### *B. Child VSL*

These guidelines recommend doubling the value CPSC uses for adult VSL to represent child VSL. CPSC 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.

The approximate midpoint of this range is the source for doubling the adult VSL to represent child VSL.

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). These alternatives for valuing avoided child fatalities have strengths and limitations.

Standard derivation of VSLY (or vQALY) divides an estimate of VSL by the discounted number of remaining life years (or QALYs), accounting for age-specific survival probabilities, for the mean age of sampled individuals in the stated and revealed preference studies informing an agency’s preferred VSL estimate. Analysts then multiply estimates of the VSLY or vQALY by the life years or QALYs lost from premature fatality. More life years are lost due to a child fatality than an adult fatality, resulting in different values for avoiding each type of death. While computationally straightforward to apply, this approach requires several strong assumptions.

First, in the case of vQALYs, the construction of QALYs “assumes that how individuals value health states (measured as changes in health-related quality of life, or HRQL) is independent of the duration of the state, the age at which they are experienced, and the individual’s remaining life expectancy” (Robinson and Hammitt 2013). In practice, these assumptions are unlikely to hold in all cases.

Second, this approach assumes that the VSLY (or vQALY) is constant through time (i.e., no matter one’s age, the value the individual places on living an additional year does not change). According to Robinson and Hammitt (2013), “the assumption of a constant value per QALY implies that VSL is proportional to future QALYs, which is not consistent with empirical estimates of how VSL varies with age.” The inverse “U” function is typically discussed in the context of mortality risk valuation for working age adults. Aldy and Viscusi (2008), for example, provide evidence from labor market data that VSL peaks at age 39, with diminished values at younger and older ages. These results, however, are not available for children or for adults over

62 years of age. It is unclear whether the inverse “U” pattern would extend to other ages.

We note that application of a VSLY or vQALY could result in comparable results as a doubling of values for children, depending largely on the age of the affected population, the selected approach (i.e., VSLY or vQALY), and the discount rate. United States life tables illustrate that (undiscounted) life expectancy for infants is around 78.7 years. In contrast, remaining life expectancy for a 48-year-old (the mean age of a U.S. adult) is 33.5 years. In discounted terms, the gap is narrowed: at a 2 percent discount rate, the present value of remaining life years is approximately 39.7 for infants and 24.2 for the average U.S. resident. In applying a VSLY to monetize avoided premature deaths at these ages, the value of preventing one infant death would be 1.6 times greater than the value of preventing one death of an average age adult. This ratio is higher when using remaining expected QALYs (instead of remaining life years) due to diminishing health-related quality of life at older ages. Practically, this approach results in a premium that declines as children approach adulthood. In contrast, this VSL guidance results in a sharply delineated difference in mortality risk reductions for older children and adults.

We are not aware of any regulatory agency currently using VSLYs or vQALYs in primary estimates of benefits or costs. HHS uses the VSLY to estimate the value of mortality risk reductions in sensitivity analysis. A uniform VSL is used in its primary estimate. See, for example, HHS (2022) Tobacco Product Standard for Characterizing Flavors in Cigars, available at <https://www.regulations.gov/document/FDA-2021-N-1309-0001>.

Finally, while measurements like VSLY or inverse “U” make it possible to generate estimates for each age of childhood, CPSC would then need to project the number of deaths at each age for the prospective study period. While CPSC is confident it can do this for two subpopulations – adults and children – we are less confident that there will be enough data to consistently forecast incidents for every individual age of childhood. Some CPSC safety rules

may rely on projections derived from only a handful of historical death records.

Weighing the strengths and limitations of the available options for differentiating the value of risk reductions for children and adults, CPSC concludes that the application of a multiplier derived from available WTP literature is preferable to valuing lost life years for affected individuals based using a VS LY or vQALY. The advantages of relying solely on WTP studies, despite the small number of high-quality studies, and the resulting sharply delineated difference in the value of mortality risk reductions for adults and children, outweighs the advantages of an approach that results in more gradual declines in value as children age, but requires several strong assumptions and potentially unavailable data on the age distribution of children affected by proposed regulations.

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 should take for each. This subsection also provides an example to illustrate these methods.

#### 1. 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. This method accounts for both the change in prices and real income and is



summarized below.

$$\text{VSL}(\text{year } y) = \text{VSL}(\text{year } x) \times (\text{P}(\text{year } y) \div \text{P}(\text{year } x)) \times (\text{I}(\text{year } y) \div \text{I}(\text{year } x))^e$$

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

I = real income in year x or y using BLS Weekly Earnings

e = income elasticity of VSL, assumed to be 1.0

When using this formula, CPSC uses the ‘annual average’ of the most recently completed year for the Consumer Price Index and the Weekly Earnings (P and I).

CPSC updates VSL estimates using the most recent ‘annual average’ of reported indices – and not inflate to a partial year – for both prices and real incomes. For example, as of the drafting of this guidance document in March 2024, 2023 is the most recent year that has all 12 months’ CPI indices reported.

CPSC regularly performs prospective regulatory analyses that project a proposed or final regulation’s impact into the future. Throughout the study period of a prospective regulatory analysis, VSL estimates should be adjusted to account for expected changes in real income. Regarding inflation, best practice throughout the Federal Government is to calculate future costs and benefits in constant real dollars for a specific dollar year, and not project inflation in future years. CPSC will follow the HHS Guidance from HHS for this adjustment. This method is summarized below.

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

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

$E$  = income elasticity of VSL, which currently uses the value of 1.0

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 2023, and it reports an annual growth in real earnings per worker of 1.0 percent from 2023 to 2053. 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 that time, CPSC would 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., 2053 for the 2023 Long-Term Budget Outlook), CPSC should still use the real income growth rate from CBO for those years beyond CBO's projection window.

## 2. Sensitivity Analysis

Many regulatory analyses include a sensitivity analysis as a supplement to the primary benefit-cost 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 in the estimated total benefits or total costs. CPSC should continue its practice of including a sensitivity analysis that adjusts input variable estimates that have a significant impact on the outputs of the analysis or have a great deal of uncertainty associated with them, on a case-by-case basis for each regulatory analysis. The sensitivity analysis could include adjusting adult and child VSL.

## 3. 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, the same resources that would have been used to save those lives could have been invested to earn a higher payoff in future lives saved from an alternative policy. In addition, 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.

#### 4. Example

This section provides an example to illustrate the guideline's application of child VSL, adjustments for inflation and changes in real income, and discounting. This example adjusts HHS's 2013 VSL value into 2023 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 2013 VSL value of \$9.0 million must be inflated to 2023 dollars. The average annual consumer price index for the base year of 2013 is 232.957, and for the target year of 2023 is 304.702. The average annual real income index for the base year of 2013 is 333, and for the target year of 2023 is 367. Last, the income elasticity of VSL according to HHS is 1.0. These data points are used below to show the calculation to adjust VSL from 2013 dollars to 2023 dollars.

$$\$13.0 \text{ million} = \$9.0 \text{ million} \times (304.702 \div 232.957) \times (367 \div 333)^{1.0}$$

The adjusted VSL is \$13.0 million. This is the value that would be used in a regulatory analysis based in the year 2023 and in 2023 dollars. If the analysis is measuring prevented deaths among children, the analysis would use double this value, \$26.0 million in 2023 dollars, to estimate benefits from a reduction in fatality risk for children.

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 1.0 percent from 2023 to 2053. Table 3 shows the adjusted VSL for adults over a 10-year

prospective analysis.

Table 4: Adult VSL Estimates from 2023-2032

Year of Analysis	Adult VSL Estimate
2023	\$13.0 million
2024	\$13.1 million
2025	\$13.2 million
2026	\$13.4 million
2027	\$13.5 million
2028	\$13.6 million
2029	\$13.8 million
2030	\$13.9 million
2031	\$14.0 million
2032	\$14.2 million

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

Table 5: Child VSL Estimates from 2023-2032

Year of Analysis	Child VSL Estimate
2023	\$26.0 million
2024	\$26.2 million
2025	\$26.4 million
2026	\$26.8 million
2027	\$27.0 million
2028	\$27.2 million
2029	\$27.6 million
2030	\$27.8 million
2031	\$28.0 million
2032	\$28.4 million

These VSL values would be multiplied by the estimated number of reduced 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.

**Alberta E. Mills,**  
*Secretary,*  
*Consumer Product Safety Commission.*