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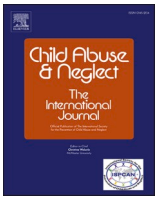

Estimating and monetizing the causal effect of severe interpersonal violence against children in sports on subjective well-being

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ABSTRACT

Background: Interpersonal Violence (IV) against children in sports is a prevalent problem and has a major impact on their well-being. However, the causal relationship and the costs for society remain unclear.
Objective: The aim of this study is to estimate the causal effect of severe IV in sports on Subjective Well-Being (SWB) and to monetize the collective loss for society.
Participants and setting: The study used survey data from 4003 respondents in the Netherlands and Flanders (Belgium). The questionnaire included current SWB as well as 41 items to assess experiences with psychological, physical and sexual IV in sports before the age of 18. Severity was quantified by experts and reported frequency.
Methods: By using the number of sports that someone participated in during their youth as an instrumental variable to control for confounding, the study estimates the causal effect of severe IV on SWB. The Three-Stage Well-Being Valuation Approach was used to monetize the loss in SWB in terms of income compensation.
Results: The results show that experiencing severe IV in sports results in significant lower SWB levels ($b = -0.45$, $p < .01$). The lower SWB is comparable to an annual loss of income of 9672 euro per person.
Conclusions: We have found evidence for a causal effect of severe IV in childhood on the SWB later in life. The results highlight the long-term, extensive impact of experiencing severe IV in sports that exceeds direct physical and psychological health outcomes.

1. Introduction

The disclosure of several high-profile cases of child sexual abuse in sports around the world, has drawn renewed public attention to the sports setting as a conducive context for Interpersonal Violence (IV) against children (Mountjoy, 2019). The climate of competitive sports performances can put athletes at risk because of the hierarchical structure, bodily contact, male-dominated cultures, norms and values, authoritarian leadership, and existing reward structures (Kirby et al., 2000). Severe IV in childhood has been associated with psychological distress and reduced quality of life in adulthood (Vertommen et al., 2018). However, most studies about IV in sports are

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cross-sectional and unable to determine causality between IV and risk factors or effects like mental health issues or quality of life measures (Parent & Vaillancourt-Morel, 2021; Vertommen et al., 2018). While regression analysis can control for observable variables, unobservables can significantly distort results. This underscores the need to examine the extent of unobservable variables influencing the causal effect of IV in sport.

Additionally, Corso and Lutzker (2006) have pointed out that the economic evaluation literature is extremely scarce concerning child maltreatment. What does IV against children in sports cost society? The absence of this information presents two issues. First, there are no established criteria for assessing the amount of suffering, stress, and loss of well-being endured by victims, leading to over- or underestimation of impacts. For example, in the Netherlands, victims of IV in gymnastics received a financial contribution of €5000 euro per person (NL Times, 2021). This was not a compensation for the damage that was done, but a symbolic acknowledgment conjoined with a formal apology. The amount of this contribution was derived from previous settlements in similar cases of IV outside sport, but multiple gymnasts stated that the contribution was considered insufficient for even the recognition of the suffering. By contrast, in the United States, Michigan State University (MSU) agreed in 2018 to a settlement of $500 million for 332 women and girls who were sexually abused by USA Gymnastics team doctor Larry Nassar (Rentner & Young, 2019). This equates to an average of more than 1.5 million dollars per person. Improving the understanding of the impact of severe IV on individuals' lives can help facilitate fair and appropriate compensation and recognition for the damage and suffering endured. Second, the lack of economic evaluation also makes it difficult to compare the cost-effectiveness of different prevention and intervention strategies. While it is important to consider the moral and ethical dimensions of child maltreatment prevention and intervention, policymakers must also consider the financial costs of various approaches (Suh & Holmes, 2022). With a clear understanding of the economic impact of child maltreatment, policymakers and funders may fully appreciate the scale of the problem or the potential benefits of investing in solutions. Cohen (2005) has written that the intangible victim costs of pain, suffering, and reduced quality of life are inevitably the largest component of victim costs. As noted by Corso and Lutzker (2006), economic analysis should play a crucial role in policymaking, funding decisions, and national recommendations for child maltreatment prevention research. By conducting economic evaluations of IV prevention efforts, the social benefits of these interventions can be accounted for and weighed against their costs. Ultimately, incorporating economic evaluation into the decision-making process for child maltreatment prevention efforts can lead to more informed decisions that optimize the use of resources and maximize the benefits to society.

To estimate the costs and benefits of policies, events, and experiences, including IV in sport, the Compensating Variation Approach (CVA) utilizes a well-being scale to determine the appropriate compensation required. The CVA has been applied to positive experiences, such as participating in sports and visiting museums, as well as negative events, such as unemployment and air traffic noise, as shown in previous studies (Fujiwara, 2019a, 2019b; Lawton & Fujiwara, 2016; Fujiwara, 2013).

This study has two objectives. The first aim is to estimate the causal effect of severe IV in sports on Subjective Well-Being (SWB). The second aim is to convert the causal effect into monetary units to express the collective loss for society. In the following sections, we first elaborate on SWB and previous studies on IV in sport. We then explain how we use an instrumental variable to establish a causal relationship between severe IV and SWB while controlling for confounding variables and selection bias. Next, we apply the Three-Stage Well-Being Valuation Approach to translate the causal effect coefficient of severe IV on SWB into the equivalent amount of lost income that results in the same drop in SWB levels. We propose a framework for applying this approach to future studies. Finally, we reflect on the implications of our results for society.

2. Literature

Subjective well-being (SWB) is defined as the sum of feelings and mental states that individuals experience subjectively, including broader judgments about their lives and specific domains, such as social relationships, health, and work (Diener, 2000). SWB is a democratic outcome variable as it allows people to assess their own lives (Diener & Oishi, 2000). However, due to its broad definition, there is debate about the optimal measurement of SWB. Common single-item scales include happiness and life satisfaction (Downward & Rasciute, 2011). The former measures people's affective state at the moment of the survey and is vulnerable to the respondent's state of mind, while the latter is an evaluative judgment of overall life enjoyment (Layard, 2005). Veenhoven (2004) describes life satisfaction as the ‘overall enjoyment of your life as a whole’. This is a more rational evaluation of one's life as a whole.

The Personal Well-Being Index (PWI) is an instrument for measuring Subjective Well-Being (SWB) and encompasses a range of life domains, such as standard of living, health, achievements, relationships, safety, community connectedness, and future security. This instrument quantifies subjective well-being in these domains, offering a comprehensive view of an individual's overall life satisfaction (International Wellbeing Group, 2006). Incorporating the PWI into research on SWB allows for a nuanced understanding of how factors like poverty and socio-economic status impact individuals' perceptions of well-being. For instance, Main (2014) highlights the significant influence of poverty on various aspects of subjective well-being, suggesting that tools like the PWI could be invaluable in quantifying these effects across different life domains, including interpersonal relationships and personal autonomy.

A limited number of studies have directly engaged with children to explore their perspectives on well-being, emphasizing the need for a qualitative and socio-anthropological approach. Such an approach is crucial for capturing the diverse and culturally specific understandings of well-being from the viewpoint of children, an aspect that has often been overlooked or assumed in previous research (Stoecklin, 2021). This is further complicated by intergenerational inequalities, where factors such as family structure, education, and income play a significant role in determining children's opportunities and aspirations (Jonsson, 2010). Such inequalities can lead to disparities in how children experience and process major life events, subsequently impacting their SWB.

The validity of self-reporting instruments is a major concern in the field of SWB. Merely stating that one is happy may not necessarily reflect a genuine feeling of happiness (Diener et al., 2002). Furthermore, cultural differences exist in what happiness

entails. For example, achievement-oriented individuals may evaluate their happiness based on their success or failure in work or other domains (Oishi et al., 1999). Nevertheless, SWB measures remain valuable as they provide insight into how individuals construct evaluations of their lives and make decisions (Diener et al., 2002).

Previous research has demonstrated that major life events can have significant impacts on SWB, both in the short- and long-term. However, the effects of specific life events can vary greatly. A meta-analysis by Luhmann et al. (2012) has found that events such as marriage, divorce, bereavement, unemployment, and relocation have diverse effects on SWB. Interestingly, in the long run, SWB declines after positive events but increases after negative ones. Additionally, the effects of childhood abuse, especially neglect, on adult SWB indicators are complex and indirect, potentially involving anxiety and mood swings (Kanai et al., 2016).

A recent multi-national study conducted in Europe on interpersonal violence against children in sports has found that a significant proportion of respondents experienced at least one type of interpersonal violence before the age of 18, with up to 75 % reporting such experiences (Hartill et al., 2023). Similarly, studies conducted outside Europe using the same low threshold measure have also reported similar findings, with both Pankowiak et al. (2023) and Willson et al. (2021) reporting high levels of interpersonal violence against children in sport. In the Netherlands and Belgium, a large-scale study examining the prevalence of IV in youth sports has found that a substantial proportion of child athletes experienced psychological, sexual, or physical violence; with 38 %, 14 %, and 11 % respectively reporting such experiences (Vertommen et al., 2016). The researchers also have developed a severity classification based on expert-rated incident severeness and respondent self-reported frequency; which revealed that 9 % experienced severe psychological violence, 8 % severe physical violence, and 6 % severe sexual violence in various organized sports settings (Vertommen et al., 2016).

A recent study by Parent and Vaillancourt-Morel (2021) has found that IV can lead to lower self-esteem, higher psychological distress, and symptoms of Post-Traumatic Stress Disorder (PTSD). While these physical and psychological effects are well-established, the impact of IV on quality of life is less researched. An auto-ethnographic study by Stevens (2023) exemplifies the profound and lasting impact of IV in sport. Twenty years after the experience, severe IV continued to affect daily life as memories are reactivated with the slightest hints leading to overwhelming feelings of powerlessness and stress. A study by Vertommen et al. (2018) demonstrated a significant reduction in quality-of-life measures (QOL), with an effect-size that was comparable to the impact of having close relatives with psychological problems. As far as we know, no quantitative research exists on the association, let alone causal effects, between IV and SWB outcomes.

3. Method

3.1. Data collection

This study is a follow-up analysis from data received in a longitudinal study on the prevalence of IV in sport, which was sampled by the market research company GfK (www.gfk.com) in the Netherlands and Flanders (the Dutch-speaking region of Belgium). The participants in the study were adults aged between 18 and 50 years who had participated in organized sports before the age of 18. Prior to conducting the pilot study, approval for the research protocol was obtained from the Antwerp University Hospital ethics committee (file code 13/44/430). Panel members who met the inclusion criteria (18–50 years and active in organized sport before the age of 18) were invited to participate in the study, and a total of 4003 respondents completed the survey within three weeks. The sample size was deemed sufficient to achieve a maximum precision of 3 % at a significance level of 0.01 for random samples from the target population, as reported by Vertommen et al. (2016).

3.2. Measurements

The IV against Children in Sport (IViS) questionnaire contained 41 items with all the relevant components of sport-related childhood experiences of psychological, physical, and sexual violence. The researchers used 28 independent experts to assess the severity for each item from 1 to 3 (low, medium, high). Combining the expert-rated seriousness of each experience with the respondents' self-reported frequency, allowed for the calculation of a severity classification. Four items (teasing, shouting, negative critique on performance, and personal space invasions) were classified as ‘mild’. When at least one of these items was experienced regularly or often, the respondent's experiences were categorized as ‘moderate’. Twenty-two items (e.g., bullying, humiliation, name-calling, threatening, being forced to continue practice while injured or exhausted, sexist jokes or remarks, uncomfortable physical contact, messages with sexual connotation) were ranked as ‘moderate’, but if any of these items were experienced regularly/often, the experience was categorized as ‘severe’. The remaining 15 items (e.g., slapping, knocking down, beating, choking, sexual assault, rape) were considered ‘severe’, regardless of the reported frequency (Vertommen et al., 2016). The current study only compared severe IV versus all other categories, including no IV. The hypothesis is that severe IV has a major impact on SWB levels and therefore can be distinctly detected from the data.

The study has used the WHO-QOL-Bref questionnaire to measure subjective well-being (SWB). This tool assesses an individual's perception of their quality of life based on cultural and value systems, personal goals and expectations, standards, and concerns (De Vries & van Heck, 1996). The questionnaire comprises 11 satisfaction items covering health, sleep, daily living activities, work capacity, self-esteem, personal relationships, sex life, support from friends, living conditions, access to health services, and transport. Respondents have been asked to rate each item on a 5-point scale (1 = very poor; 5 = very good), based on their experiences over the past two weeks. The 11 items have been aggregated to create a single-item SWB outcome variable, which was transformed to a 7-point scale to match the Compensating Variation Approach. This reflects the structure of the Personal Wellbeing Index, aggregating diverse dimensions of subjective experience into a composite measure of well-being. Yet it does not encompass all aspects as PWI also looks at

safety, achievements in life, community connectedness and spirituality (International Wellbeing Group, 2006). To minimize the impact of negative childhood experiences on SWB ratings, the well-being questionnaires were administrated before asking about participants' negative experiences in sport. To assess its robustness, Cronbach's alphas have been calculated for each item. The resulting Cronbach's alpha for the SWB scale with 11 items (LS11) was 0.87 (Table 1).

3.3. Analysis

First, descriptive statics are presented. Subsequently, SWB levels have been plotted by age and compared to identify the differences between those who have experienced severe IV and the remaining individuals in the dataset. By doing this, the length of the impact of severe IV across a lifetime have been evaluated. Next, an initial step involved conducting a simple regression analysis to examine the association between severe IV and SWB. This has been done to assess the strength and direction of the relationship, providing preliminary insights into the potential association. However, recognizing the potential for endogeneity and the need to establish a causal relationship, an instrumental variable approach has been subsequently employed. By employing instrumental variables, we aim to mitigate potential biases arising from endogeneity and obtain more reliable causal estimates, thereby enhancing the robustness and validity of our findings. In this approach a certain variable, known as the instrument, have been included in the analysis to induce changes in the explanatory variable while having no independent effect on the dependent variable. The instrument has served as a source of randomness in the chance of experiencing IV, allowing for unbiased estimation of the causal effect of the explanatory variable on the dependent variable, while accounting for potential confounding and selection bias (Mehta, 2001).

The number of sports in which the respondents participated in their youth was chosen as the instrument to correct for the selection effect. All respondents participated in at least one sport and a maximum of five sports. There is no previous study that used number of sports as an instrument for this purpose but there was confidence it would serve as a source of randomness in the chance of experiencing severe IV. This variable is associated with more experiences of severe IV in sports ($r = 0.188$, $p < .01$), but it does not have a direct link with SWB levels ($r = -0.19$, $p = .237$). Instead, it only affects the selection into the treatment condition (severe IV) and not SWB. The rationale behind this is that engaging in a greater number of sports increases exposure to different sports contexts, thereby raising the likelihood of encountering a harmful environment. The instrument was highly significant, as evidenced in an OLS regression, where the f-test statistic was 61.9 and the t-statistic for the instrument was 7.87. According to the rule of thumb, the f-statistics should be above 10 and the t-statistics higher than 3.16 (Staiger & Stock, 1997), indicating that the number of sports can be used as a valid instrument in our analysis.

The instrumental variable approach was adopted, utilizing a probit regression as outlined in Formula 1, in accordance with the methodology proposed by Orlowski and Wicker (2018). In this model, the incidence of severe injuries in sports (m) was treated as the binary dependent variable, with the number of sports (Z) serving as the explanatory variable, and additional control variables (X) included in the analysis. The results of this first stage can be found in table S1. The predicted values (ϵ) of this stage were used to estimate a linear regression model of the dependent variable SWB (Formula 2).

$$\beta m = c + \beta Z + \beta X + \epsilon \tag{1}$$

$$\text{SWB} = c + \beta m + \beta X + \beta \epsilon + \nu \tag{2}$$

Assuming cardinality of SWB in the OLS regression is standard in much of the literature (Fujiwara, 2013). Ferrer-i-Carbonell and Frijters (2004) showed that using ordinality makes little difference in the models. To control for observable heterogeneity the following control variables were derived from earlier study by Vertommen et al. (2018) and included in the first and second stage regressions; Country (Netherlands/Belgium), demographics (male, age, marital status), education (low, moderate, high), Dutch/Belgian origin (yes/no), participating in sports for people with a disability (yes/no), LGBT sexual orientation (yes/no), recent life events (yes/no) and relatives' psychological problems (yes/no).

Table 1
Items statistics satisfaction life domains items.

Item statistics	Mean	Std. D.	Cronbach's alpha*
Health	3.80	0.93	0.86
Sleep	3.40	1.03	0.87
Daily living activities	3.71	0.86	0.85
Capacity for work	3.70	0.90	0.85
Oneself	3.71	0.81	0.85
Personal relationships	3.82	0.85	0.86
Sex life	3.44	1.06	0.87
Support friends	3.75	0.81	0.86
Living conditions	3.86	0.78	0.85
Access health services	3.96	0.72	0.86
Transport	3.99	0.78	0.87
Cronbach's alpha			**0.87**

* If item dropped.

3.4. Monetizing the effect of IV on SWB

Examining an individual's feelings and perceptions of life, provides a direct account of the effects that certain experiences have on peoples' well-being and may therefore be a good start to acquire more knowledge about the effects of IV in sports and the associating costs for society (Kahneman et al., 2000). To estimate the monetary value of the causal effect of severe IV on SWB, we utilized the Three-Stage Well-being Valuation Approach developed by Fujiwara (2013). This approach compares the effect of severe IV to the effect of income on SWB, resulting in the marginal rate of substitution (MRS). The MRS represents the monetary compensation required for an individual who experienced severe IV to attain the same level of SWB as an identical individual who did not experience severe IV. In its most basic form and when assuming linear functions, this so-called Marginal Rate of Substitution (MRS) is the ratio of the effect of severe IV on SWB (βq) and the effect of income on SWB (βm) (Dolan & Fujiwara, 2016).

The CVA is a more sophisticated way to value the costs of IV in sports than deriving the value from hypothetical situations or market transactions in proxy markets (Fujiwara, 2019b). The technique does not rely on any forecasting or evaluation, as individuals are not asked to express the costs directly and therefore do not evoke strategic or desirable answers (Kahneman et al., 2000; Testoni et al., 2018).

Since income data was not available in the dataset, we have adopted the Three-stage Well-Being Valuation Approach that applies existing outcomes from previous studies. Specifically, the estimate for the causal effect of income on SWB was derived from Fujiwara's (2013). We believe the outcomes can be used here, because the study has applied the same SWB scale, the English population has a high resemblance with Flanders and the Netherlands, and it has been applied in other CVA studies (Schoemaker, 2023). Furthermore, the author of the study has proposed that the income coefficient can be utilized as an estimate of the income model in other studies (Fujiwara, 2013, p. 14). To estimate the causal effect of income, lottery wins were used as an instrumental variable because they provide an exogenous change in income. Fujiwara's study estimated the effect of log of income on life satisfaction to be 1.1 (βq). This means that a 1 % increase in income leads to a 0.011-point improvement in life satisfaction (scale 1–7). In the second stage, the established causal effect of severe IV in sports to SWB (βm) as found in our study have been used. The last step in the Three-Stage Well-being Valuation is to calculate the Marginal Rate of Substitution (MRS), as follows:

$$\mathrm{MRS} = M - \mathrm{e}\left(\frac{-\beta\mathrm{q}}{\beta\mathrm{m}} + ln(M)\right) \tag{3}$$

The formula (3) has been adapted from Fujiwara (2013) to calculate the equivalent surplus for avoiding any negative changes in SWB. It uses the log of income to account for the diminishing marginal utility of income. The formula includes the average income of the population, denoted as M. For this study, the average net income of €28,800 in the Netherlands and Flanders was used (Statistiek Vlaanderen, 2023; CBS, 2019).

4. Results

Table 2 presents a descriptive analysis of the sample, which appears to be a representative cross-section of the general population involved in youth sports. SWB stood at 5.23 with a standard deviation of 0.81, indicating a generally positive level of well-being among the participants. Demographically, the sample was almost evenly split by country, with 49 % of respondents being from the Netherlands. Gender distribution was slightly skewed towards males, who constituted 55 % of the sample. The age groups represented varied, with the largest groups being those aged 25–34 and 35–44 years, each making up about 30 % of the sample, followed by the 45–50 age group at 21 %, and the 18–24 age group at 18 %. Educational background showed a balanced distribution among the

Table 2
Descriptive analysis.

Measure	Variable	Obs	Mean	Std. dev.	Min	Max
Subjective well-being	LS11	4003	5.23	0.81	1.00	7.00
Severe IV in sport	Any severe IV	4003	0.17	0.37	0.00	1.00
Instrument	Number of sports	4003	2.50	1.37	1.00	5.00
Country	Netherlands	4003	0.49	0.50	0.00	1.00
Gender	Male	4003	0.55	0.50	0.00	1.00
Age	Age 18–24	4003	0.18	0.38	0.00	1.00
	Age 25–34	4003	0.30	0.46	0.00	1.00
	Age 35–44	4003	0.31	0.46	0.00	1.00
	Age 45–50	4003	0.21	0.41	0.00	1.00
Education	Low level education	4003	0.16	0.37	0.00	1.00
	Moderate level education	4003	0.42	0.49	0.00	1.00
	High level education	4003	0.42	0.49	0.00	1.00
Marital status	Married	4003	0.61	0.49	0.00	1.00
Origin	Dutch/Belgian origin	4003	0.08	0.28	0.00	1.00
Disabled sports	Disabled	4003	0.05	0.21	0.00	1.00
Sexual orientation	LGBT oriëntation	4003	0.08	0.27	0.00	1.00
Recent life events	Life events	4003	0.33	0.47	0.00	1.00
Relatives' psychological problems	Relatives' psychological problems	4003	0.21	0.41	0.00	1.00

respondents, with those having a moderate and high level of education each accounting for 42 % of the sample, while 16 % had a low level of education. Marital status revealed that a majority, 61 %, were married. Regarding Dutch/Belgian origin, 8 % of the sample identified with an ethnicity other than the majority, and a small proportion. The same percentage (8 %) identified as LGBT, indicating diversity in sexual orientation within the sample. A small fraction (5 %) reported being disabled in their youth. Recent life events affecting subjective well-being were reported by 33 % of the participants, and 21 % noted having relatives with psychological problems, which could influence individual well-being perceptions.

Fig. 1 displays the mean of the constructed SWB measure (LS11) on a 7-point scale for different age groups, and illustrates the difference between those who experienced severe IV and those who did not. The results show that severe IV has a negative association with SWB that increases with age.

Table 3 presents regression results for the effect of severe IV on the LS11 SWB scale without (model 1) and with the use of an instrumental variable (Model 2). The most notable variance pertains to the coefficient associated with severe IV. In Model 1, this coefficient is -0.29 ($p < .00$), indicating a significant negative effect. Model 2, however, exhibits a more pronounced negative effect with a coefficient of -0.45 ($p < .00$), suggesting an augmented adverse impact of severe IV on well-being. Also, the instrument's residual seems to capture unobserved variables correlating with well-being. Other variables across both models show consistent coefficients, standard errors, and significance levels, highlighting stability in their estimated effects. The results from a sensitivity check using life satisfaction from six WHO-QOL-Bref items were also consistent (Table S2).

4.1. Framework for converting effect of severe IV into the collective loss for society

The Three-Stage Well-Being Valuation Approach by Fujiwara (2013) has been used in the proposed framework to convert the causal effect of severe interpersonal violence (IV) on subjective well-being (SWB) into monetary units (see Formula 3). As a result, the subjective costs per incident of severe IV have been estimated at 9672 euros per year (refer to Table 4). The use of the logarithm of income in Formula 3 accounts for the diminishing marginal utility of income, yielding a non-linear estimate. These figures represent the amount of money individuals would theoretically be willing to pay to avoid the negative effects of experiencing severe IV. Therefore, they represent the compensated sum required for an individual to maintain the same level of SWB as if they had not experienced severe IV.

5. Discussion

This study provides evidence that severe interpersonal violence (IV) in sports has a considerable negative impact on individuals' subjective well-being. Prior studies also indicate that negative life events are significantly associated with decreased life satisfaction and increased psychological distress (Marum et al., 2014; Vertommen et al., 2018). Previous research by Vertommen et al. (2018) have demonstrated a significant correlation between IV in sports and poor mental health, including symptoms of somatization, depression, anxiety, and reduced quality of life. In addition, this study is the first to estimate the causal effect of severe IV in sports by utilizing an instrumental variable. The instrument's residual seems to capture unobserved variables correlating with severe IV and well-being. This can be economic factors, such as differential access to resources or employment, which were not directly measured, or personal traits, which are inherently difficult to quantify. These unobserved elements, absorbed in the residual, might elucidate the intricate relationship between severe IV and subjective well-being.

Experiencing IV in youth sports is linked to a significant decrease in SWB levels, equivalent to an estimated average annual income loss of 9672 euro per person. The results suggest that an individual who experienced severe interpersonal violence (IV) in their youth may incur a loss in subjective well-being over the course of a lifetime, equivalent to hundreds of thousands of euros. Indeed, longitudinal research indicates that people do not easily adapt to drastic changes in life circumstances and that these life events matter to one's SWB (Diener et al., 2002). In line with this, we have observed a pronounced effect among older individuals who experienced IV in

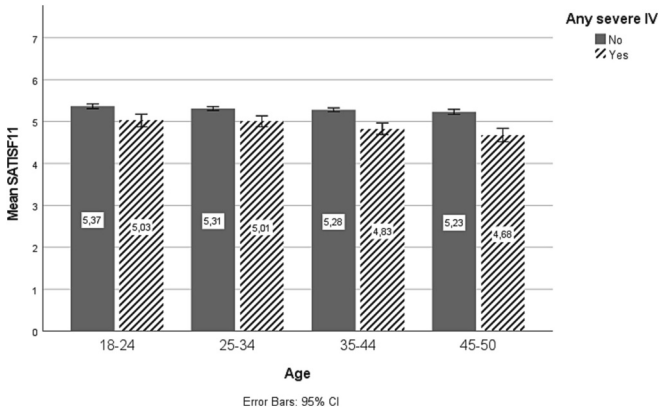

Fig. 1. Clustered bar mean of LS11, by Age by Severe IV.

Table 3
Regression dependent variable: Life Satisfaction based on 11 life domains items (LS11).

	1			2		
	B	SE	Sig.	B	SE	Sig.
Constant	5.30	0.05	0.00	5.26	0.05	0.00
Any Severe IV	−0.29	0.03	0.00	−0.45	0.10	0.00
Netherlands	0.17	0.03	0.00	0.17	0.02	0.00
Male	−0.04	0.03	0.07	−0.04	0.02	0.09
Age (reference = 18–24 years)						
Age 25–34	−0.21	0.04	0.00	−0.21	0.04	0.00
Age 35–44	−0.23	0.04	0.00	−0.23	0.04	0.00
Age 45–50	−0.28	0.04	0.00	−0.29	0.04	0.00
Education (reference = low level education)						
Moderate level education	0.08	0.04	0.02	0.08	0.04	0.02
High level education	0.28	0.04	0.00	0.28	0.04	0.00
Married	0.25	0.03	0.00	0.25	0.03	0.00
Ethnicity	−0.15	0.05	0.00	−0.15	0.04	0.00
Dutch/Belgian origin	−0.17	0.06	0.01	−0.18	0.06	0.00
Disabled	−0.07	0.05	0.12	−0.08	0.05	0.10
LGBT oriëntation	−0.34	0.03	0.00	−0.35	0.03	0.00
Life events	−0.18	0.03	0.00	−0.19	0.03	0.00
Residue first stage				0.26	0.15	0.08

Table 4
Three-stage Well-Being Valuation Approach framework.

	Average income of the population	€ 28,800
Stage 1	Causal effect of income on SWB (βq)*	1.1
Stage 2	Causal effect of severe IV in sports on SWB (βm)	−0.45
Stage 3	Marginal Rate of Substitution (MRS)	€9672

* This estimate was derived from the study of Fujiwara (2013).

their youth. From this study, it is unclear if this is an age effect, a reflection of differences between generations or other possible explanations. Older individuals may appraise the event differently than younger individuals, based on their life experiences, expectations, and coping strategies (Aldwin, 1991; Lazarus & DeLongis, 1983).

The effect size of severe IV in sports is much larger than found in a study of airport noise (with a beta of −0.147) on local residents, and more comparable to the negative impact of being unemployed (with a beta of −0.785) or smoking (with a beta of −0.345) (Lawton & Fujiwara, 2016). It is important noting that these conditions or choices can be changed or improved to some extent. However, experiencing severe IV in sports is irreversible, forced upon, and victims suffer from it for the rest of their lives.

In a study that uses the same Three-stage Well-being Valuation Approach framework, participation in sports was estimated to contribute to SWB with a monetary value of 4738 euro per year (HACT & Fujiwara, 2018). Severe IV in sports negates these positive effects and has alarming implications for the well-being of children in sports. It urges us to devote time and resources in future research, policies, and practice. Providing a solution for IV in sports is not simple and does not come at small costs (Gelles & Perlman, 2012). However, our study demonstrates that preventing even a small number of cases can have large benefits over the long run.

Our study focuses on the costs of losses in an individual's subjective well-being associated with severe interpersonal violence against children in sport. However, this is just one type of all cost's society experiences with IV. Zielinski (2009) showed that for child maltreatment in general the high long-term costs are a major economic challenge as it involves various areas such as health care, mental health services, child welfare, education, socioeconomic productivity, and justice. These costs fall outside the scope of this study. Our results quantify the well-being losses in terms of income equivalents, yet do not encompass a detailed cost-benefit analysis of psychosocial aspects. Our research contributes to the call by Suh and Holmes (2022) for a holistic, multi-agency perspective in studying costs, with the consideration to social or economic costs related to well-being of children and families. To avoid misunderstanding, it is important to state that the income compensating approach does not imply that victims can be compensated with this amount of money and life can go as if the experience, in this case: severe IV, has not happened (Fujiwara, 2019b). Experiencing severe IV in sports has an impact on many levels as it violates the core of a person's integrity and comparing it with the loss of income is one-dimensional and limited in many regards. However, this approach and the outcomes can contribute to a better understanding of the impact of IV, underlining the importance of appropriate policy actions, including prevention, recourse, and remedy.

5.1. Strengths and limitations

This study's strength lies in the use of an instrumental variable approach to investigate the causal effect of IV in sports on SWB, a first-time accomplishment. Therefore, the study adds to the literature of both well-being and interpersonal violence. The study relies on the random variance of an instrument, the number of sports, and demonstrated that the causal effect is comparable to the estimation in

simple linear regression. This approach provides a basis for the causal interpretations although we acknowledge that absolute certainty in causal relationships is challenging in any non-experimental setting. While the number of sports is a seemingly valid instrument, in theory it is possible that the number of sports has an indirect relationship with SWB other than through IV in sport. Practicing more types of sports is likely correlated with the number of hours spent training. Additional hours of sports practice could influence SWB through health, as more exercise can lead to a healthier and happier life (Frey & Gullo, 2021). But there was no direct relation observed between the number of sports and SWB ($r = -0.19$, $p = .237$), also after including all the control variables in a regression.

The dataset did not include information on respondents' income and used the income effect found in England through lottery wins (Fujiwara, 2013). However, income effects could differ across countries, potentially impacting the calculated costs. The study used national average income to substitute for personal income, which also impacts the outcomes. The income coefficient used in this study led to lower subjective costs and conservative estimations compared to other studies (Schoemaker, 2023; Thomson et al., 2022). Using an income estimate from a different study also made it impossible to analyse different outcome for different socio-economic groups.

Moreover, the inclusion criteria of our study, which focus on individuals who participated in sports before the age of 18, might impact the observed effect size regarding subjective well-being (SWB). However, it's important to note that in regions like Flanders and the Netherlands, a significant majority of children engage in sports at some point in their lives (De Knop & De Martelaer, 2001; Scheerder et al., 2011). This widespread involvement in sports suggests that the sample may not be as skewed. Nonetheless, the potential influence of this selection criterion on our findings should be acknowledged.

Finally, this study developed a SWB indicator using 11 items that measured satisfaction in various life domains. Using this method to predict life satisfaction based on domain aggregates aligns with overall life satisfaction trajectories (Rojas, 2006; McAdams et al., 2012; International Wellbeing Group, 2006). It would be of great interest to utilize commonly used single item scales, where individuals evaluate their happiness or life satisfaction in general, to see if this leads to different results.

5.2. Future studies

To enhance comparability with other harmful practices in society, future studies on the prevalence of interpersonal violence (IV) in sports should incorporate single-item subjective well-being (SWB) scales. Additionally, the societal costs of mild or moderate IV experiences warrant investigation, given their impact on a broad segment of sports participants. To refine the estimation of the causal impact of IV in sports on SWB, it is imperative for researchers to consider diverse causal inference models, such as longitudinal studies, to verify whether unobserved variables linked to economic factors or stigmas are influencing this relationship. Furthermore, the findings prompt an in-depth exploration of SWB discrepancies across generations, alongside other socio-economic factors, various forms and severities of IV, and different types of sports.

6. Conclusion

This study has found evidence for a causal effect of severe IV in childhood on well-being later in life. The findings emphasize the far-reaching impact of severe IV in sports that extends beyond physical and psychological health outcomes, with a significant reduction in SWB levels (-0.45, $p < .01$) equivalent to an annual loss of income of 9672 euro per person.

CRediT authorship contribution statement

Jelle Schoemaker: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Tine Vertommen:** Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Resources. **Vidar Stevens:** Conceptualization, Investigation, Validation, Writing – original draft. **Willem de Boer:** Data curation, Formal analysis, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

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Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chiabu.2024.106719.

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