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## Echoes of Aggression. The Gendered Impact of School Bullying on the Well-Being of Victims and Witnesses

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# Echoes of Aggression. The Gendered Impact of School Bullying on the Well-Being of Victims and Witnesses

Till Stefes<sup>1</sup>

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## Abstract

This study examines the impact of bullying victimization and witnessing classroom bullying on adolescents' subjective well-being (SWB) and whether these effects are independent of each other. Effects of bullying on uninvolved bystanders are yet to be explained in sociology. The article presents evidence and explanation of this effect for different forms of bullying, introducing echo-effects of aggressive behaviour. Using multilevel regression analysis on data from 121 classrooms, the findings show that both victimization and witnessing bullying significantly harm SWB, with girls being more affected than boys. The study employs a robust, multi-dimensional index to measure SWB, collected among secondary schools in Germany. Results indicate that bullying experiences vary by gender, with boys facing more physical violence and girls more often targeted indirectly or online, aligning with prior research on the matter. While patterns vary, effects seem to be similar. Significantly negative impact on SWB underscores the need for effective interventions at the classroom level to support both victims and witnesses, highlighting the importance of addressing the complex dynamics within school environments and considering the distinct experiences of different gender groups.

**Keywords** Bullying · Victimization · Subjective well-being · Peer relations · Violence · School

## 1 Introduction

Peer relationships are a central piece in adolescent life, profoundly influencing their social integration, development, and subjective well-being. An expanding body of research on peer relationships indicates that as adolescents grow, their focus shifts increasingly toward interactions outside the family, with friendships and peer dynamics becoming more significant and intricate (Larson & Richards, 1991; Allison et al., 1999; Flynn et al., 2017; Melton

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et al., 2021). Engaging with peers is of great importance for identity formation (Eder, 1985; Larson & Richards, 1991; Swanson et al., 1998; Ragelienė, 2016) and overall well-being (Brown & Larson, 2009; Guhn et al., 2013; Cuadros & Berger, 2016; Appau et al., 2019). Studies have highlighted the combined and interrelated effects of relationships with both peers and adults on various well-being and developmental outcomes, such as mental health, resilience, and life satisfaction (Guhn et al., 2013; Oberle, 2018). This interconnectedness underscores the importance of understanding peer relationships' multifaceted role in adolescent development and well-being. Since much adolescent social life takes place in school, the school climate plays a pivotal role in students' psychological well-being, both positively and negatively (Katsantonis et al., 2024; Stefes, 2024a).

Bullying is a detrimental aspect of peer relations and school life, which can severely undermine well-being. It is distinct from typical peer conflicts due to its persistent nature and the imbalance of power between the bully and the victim (Espelage et al., 2013). Unsurprisingly, it can have profound and lasting detrimental effects on all adolescents involved, highlighting the urgent need for effective interventions and support systems. While the direct impact of bullying victimization on an individual's well-being is well-documented (Cook et al., 2010; Moore et al., 2017; Katsantonis et al., 2024), the adverse effects on bystanders who witness bullying are also significant. Sociological research on bullying mainly focuses on the victims and perpetrators (e.g. Stubbs-Richardson, 2020), but psychological literature has understood the importance of considering the bystanders already (Midgett & Dumas, 2019). The perspectives on the subject differ between the two disciplines. Psychology mainly focuses on individual and developmental factors. Some authors offer evolutionary explanations, proposing bullying as an adaptive strategy for achieving dominance and improving social/reproductive prospects (Volk et al., 2016). Sociology, on the other hand, tries to understand structural and institutional factors. It moves beyond individualistic approaches - bullying is seen as a product of social forces rather than solely individual behaviours (Donoghue, 2022; Donoghue & Pascoe, 2023). For instance, power disadvantages (e.g., younger, female, low socioeconomic status) align with being more likely to be victimized. Hence, power dynamics on a higher level seem to also trickle down to smaller environments, such as the classroom. Espelage and De La Rue (2012) bridge sociological and psychological perspectives. They employ sociological and social-learning frameworks to consider the interaction of individual characteristics with family, peer, and school environments. Both individual and systemic factors play important roles. This perspective guides the following research, which examines how bullying affects the subjective well-being of students who are not directly targeted. This study investigates the gendered impact of school bullying on the well-being of both victims and witnesses, conceptualized as the 'echoes of aggression'. The aim is to enrich the sociological literature with quantitative evidence on this effect.

Throughout this article, I introduce and use the term "echo effect" of bullying. It is a conceptual metaphor developed for this study to capture the idea that the impact of bullying reverberates beyond victims to affect bystanders. An echo is a phenomenon in which sound waves are reflected off a surface, such as a wall or mountain, and return to the listener, creating a repetition of the original sound. In complex structures, sound is retracted in all possible directions that the original source might not have intended initially. In a broader sense, an echo can also symbolise the lingering effects or reverberations of an event, emotion, or action, much like its sound counterpart persists beyond the initial occurrence. In this article, echo describes how the harm caused by bullying extends beyond immediate victims,

resonating through social dynamics and affecting witnesses or the classroom environment as a whole.

While psychological literature has recognised the harmful impact of witnessing bullying on students' mental health, sociological research has largely overlooked this form of indirect exposure. Most sociological studies on school bullying continue to focus primarily on the direct interaction between victims and perpetrators, leaving bystanders and witnesses analytically underdeveloped. This gap is especially pressing because indirect exposure to aggression can shape perceptions of safety, belonging, and power dynamics in the classroom—key sociological constructs—and may affect students differently depending on gender and social identity. Moreover, existing research often relies on self-identification as a bystander, which introduces recall bias and limits comparability across contexts. This study addresses these shortcomings by using a novel methodological approach: defining witnesses at the classroom level based on reported incidents rather than individual self-identification. It further contributes by integrating a sociological gender perspective to explore how indirect exposure may have different well-being effects on boys, girls, and gender-diverse students. Drawing on Bronfenbrenner's ecological systems theory (1979), particularly the mesosystem where peer and classroom interactions occur, this study provides robust evidence for what is conceptualised here as the *echo effect*—the structural and emotional implications of indirect aggression in peer cultures. In short: “Is there an echo of aggressive behaviour on those not involved? Does witnessing bullying in the classroom affect the subjective well-being of adolescents?”

Analyses build on a classroom-based, standardised survey study which took place in Germany in 2021 (Stefes et al., 2023; Stefes, 2024b). A major strength of this data source is the use of a multi-dimensional index to measure subjective well-being, which aligns with established practices in child and adolescent well-being research (Pollock et al., 2018; Moore, 2020). This index encompasses six dimensions: self-esteem, optimism, absence of sadness, absence of worries, body image, and life satisfaction. Each dimension is assessed through three statements. In contrast, bullying victimization research, whether focusing on victims or bystanders, often relies on single-item analyses (Sandvik et al., 2009; Katsantonis et al., 2024), which can be susceptible to random errors. Demonstrating significant effects of witnessing bullying on a robust, multi-dimensional index of subjective well-being would provide compelling evidence of the harm caused to those indirectly involved.

This article aims to replicate and extend previous findings by testing four hypotheses, approaching the issue from a sociological perspective and addressing research gaps that remain unexplored in predominantly psychological studies. Following this paragraph, the theoretical grounds and hypotheses are presented, before in the next chapter, methods and data are discussed. The sample and prevalence of bullying, differences between boys and girls, as well as correlations between types of bullying are shown. These figures are complemented by a multilevel regression analysis of subjective well-being (SWB) in the subsequent chapter. The influence of social resources and bullying on both class and individual levels is tested, and whether their effects differ between genders.

## 2 Theory & Literature Review

### 2.1 Theoretical Framework: The Echo Effect of Bullying

The echo can be understood from an ecological perspective – rooted in the famous ecology of human development (Bronfenbrenner, 1979). Bronfenbrenner argues that the social environment surrounding individuals affects their well-being and development (ibid.). He describes the environment as a concentric system consisting of interconnected sub-systems with direct and indirect effects on the individual in the centre. The first layer, the microsystem, has an immediate impact on the individual. It consists of the peer group, family, school and community. Interactions and relationships between actors across the microsystem, typically among the parents or between parents and teachers, form the mesosystem. The broader social settings and institutions that indirectly influence the individual, such as parental workplaces, community policies, or media, form the exosystem. The macrosystem entails overarching cultural values, norms, laws, and societal structures that shape the other systems and influence development. Consequently, how society, institutions and actors involved in childcare deal with the phenomenon of bullying matters for adolescent well-being, which has been shown in recent research (Katsantonis et al., 2024). On the other hand, dysfunctional relationships in the peer group, and thus in the mesosystem, can lead to severe damage (Espelage, 2014).

Bronfenbrenner's theory emphasises that these environmental systems are not isolated; rather, they interact in complex ways that shape individual development over time. The mesosystem—where classroom peer cultures are situated—serves as a critical arena in which experiences of inclusion, exclusion, and conflict are negotiated. Importantly, the macrosystem's cultural norms and institutional structures not only shape broad societal responses to bullying but also influence how bullying is defined, tolerated, or challenged within schools. The “echo” of aggression thus reflects how the stress of bullying is socially transmitted within the mesosystem, while being reinforced or mitigated by exosystem and macrosystem forces. In this way, the ecological model provides a multi-level explanation for how indirect exposure to bullying can harm adolescent well-being, even among those not directly targeted. This multi-level dynamic suggests that classrooms where bullying occurs may foster climates of normalised aggression, resulting in negative consequences for the well-being of all students.

**Hypothesis 1** The average SWB is decreased across students in classrooms where bullying is prevalent.

### 2.2 Previous Research on Bystanders & Witnesses

The impact of bullying extends beyond immediate harm, leading to long-term physical and psychological issues (Vanderbilt & Augustyn, 2010; Wolke & Lereya, 2015; Moore et al., 2017; Bradshaw et al., 2017). Among them, research found poor social adjustment and psychosomatic symptoms of victimized students (Rigby, 2003; Wolke & Lereya, 2015), as well as associations with symptoms of affective disorder, anxiety and depression (Romano et al., 2020). Additionally, bullying can entrench a cycle of violence, with victims becoming perpetrators and vice versa (Walters, 2021; Falla et al., 2022; Espino et al., 2023). Certain find-

ings reveal particularly alarming consequences. Kelly et al. (2015) and Galindo-Domínguez and Losado Iglesias (2023) found that bullying victimization significantly increases suicidal tendencies among young people.

**Hypothesis 2** Individual experiences of victimization are linked to reduced personal SWB.

This hypothesis is grounded in the well-established literature demonstrating that students who experience bullying often report lower levels of well-being (Wolke & Lereya, 2015; Bradshaw et al., 2017). The aim here is to confirm that individual victimization correlates with decreased SWB, reinforcing the known psychological toll of being bullied (Rivers & Noret, 2010, 2013).

With over two-thirds of students reporting that they have witnessed bullying at school in previous studies (Bradshaw et al., 2007; Rivers et al., 2009), understanding this phenomenon is imperative. Students, who may intervene, encourage, or passively observe bullying (Cowie, 2000; Smith et al., 1999), often face significant impacts on their well-being. Research shows that students who observe bullying often experience internalising symptoms such as anxiety, depression, and even suicidal ideation (Rivers et al., 2009; Werth et al., 2015). Studies conducted in Canada and Taiwan indicate that bystanders, particularly those who intervene, report higher levels of depression and anxiety (Lambe et al., 2017; Wu et al., 2016). In the UK, findings reveal that witnessing bullying is linked to mental health risks independent of being a target or perpetrator, with bystanders reporting lower levels of suicidal ideation than targets but higher than perpetrators and uninvolved students (Rivers & Noret, 2010, 2013). These studies highlight the considerable impact of witnessing bullying on students' overall well-being, emphasising the need for further research and intervention. While some research suggests that the negative impacts of witnessing bullying are independent of being a target or perpetrator (Rivers & Noret, 2010, 2013), more studies are needed to confirm these findings in different (cultural) contexts, as the phenomenon and its implications can differ substantially between classrooms, schools and even countries (Katsantonis, 2021; Cosma et al., 2022; Katsantonis et al., 2024).

**Hypothesis 3** The occurrence of bullying in the classroom negatively affects individual SWB, regardless of personal victimization.

This hypothesis addresses whether simply being in an environment where bullying occurs can harm a student's well-being, independent of whether they are a direct victim. It tests the theory that the psychological effects of bullying extend beyond those immediately involved, potentially affecting all students exposed to such a hostile environment (Rivers et al., 2009; Midgett & Doumas, 2019). The latent prevalence of aggressive behaviour is hypothesised to create an echo, affecting those who do not report being victimized themselves.

### 2.3 Gender Differences in Bullying Involvement and Effects

The subjective well-being of adolescents varies notably between genders, with girls often reporting lower levels of well-being compared to boys (González-Carrasco et al., 2017; Knüttel et al., 2021; Stefes, 2024a; Katsantonis et al., 2024). Likewise, the experience of bullying differs between genders, likely caused by gender roles and expectations emerging

during adolescence (Hellström & Beckmann 2020). Male targets of bullying have been found to be less likely to report bullying victimization (Rivers & Smith, 1994; Cowie, 2000). Quality of bullying victimization and perpetration has also been found to differ between boys and girls, with boys being more likely to suffer from and commit physical violence (Scheithauer et al., 2006; Iossi Silva et al., 2013; Cosma et al., 2022) and girls being more often targeted indirectly (Rivers & Smith, 1994) or online (Smith et al., 2019). Additionally, girls are affected much stronger by sexual dimensions of cyberbullying (Rivers & Duncan, 2013; Copp et al., 2021), although Brody and Vangelisti (2017) found that male victims of sexualized bullying experience targeting based on their sexual orientation more often. The realisation that queer adolescents are attacked because of their identity is not new (Espelage et al., 2008). Plus, according to recent research (Gower et al., 2022; Sares-Jäske et al., 2023; Watson et al., 2024), adolescents outside of the binary gender spectrum, such as transfeminine or transmasculine youth, are even more likely to be victimized by peers. Thus, research dealing with bullying in adolescence must acknowledge and factor in gender and identity in its analyses (Espelage et al. 2014).

These patterns reflect not only behavioural differences but deeper gendered social structures, as explained by sociological gender theory. Connell's concept of "hegemonic masculinity" (2005) could explain why boys may be more likely to underreport experiences of victimization. Hegemonic masculinity refers to the dominant cultural ideal of manhood, which values strength, control, and emotional restraint while marginalising traits perceived as weak or vulnerable. In classroom settings, bullying behaviour can serve to reinforce these norms, positioning toughness and emotional detachment as markers of acceptable masculinity (Hellström & Beckmann, 2020; Rivers & Smith, 1994). This could also help explain why boys are less likely to report experiences of social or verbal victimization: the cultural ideal of masculinity may lead them either to avoid disclosing such incidents, or to interpret them—consciously or unconsciously—as harmless banter rather than bullying.

Meanwhile, "doing gender" (West & Zimmerman, 1987) highlights how girls may be more frequently involved in or affected by relational and reputational aggression, as their social roles are often tied to maintaining likeability and appearance within peer hierarchies (Eder, 1985; Espelage et al. 2014). Studies have also shown that girls may be more willing to report such experiences, while boys may suppress disclosure because admitting victimization can conflict with masculine ideals and risk stigmatisation (Cowie, 2000). These dynamics underscore that bullying is not merely individual deviance, but a gendered process embedded in classroom status systems and normative scripts (Copp et al., 2021).

This study therefore views bullying and its echo effects not just as developmental stressors but as expressions of structural inequalities related to gender, power, and social capital. It extends existing frameworks by empirically testing how these dynamics reverberate through the mesosystem, shaping adolescent well-being even among those not directly victimized.

**Hypothesis 4** The impact of bullying victimization and classroom bullying on SWB varies by gender, with girls experiencing a stronger negative effect.

This hypothesis explores gender differences in response to bullying, building on evidence that girls often report lower SWB and are differently affected by various forms of bullying (González-Carrasco et al., 2017; Knüttel et al., 2021; Stefes, 2024a). The hypothesis posits

that both direct victimization and the general presence of bullying within a classroom are likely to have more severe negative effects on girls' well-being compared to boys, reflecting the gendered nature of bullying experiences (Hellström & Beckmann 2020; Copp et al., 2021).

### 3 Data and Methods

#### 3.1 Data Source and Variables

The UWE survey instrument, developed by the Ruhr-Universität Bochum's Zentrum für interdisziplinäre Regionalforschung (ZEFIR), focuses on measuring the subjective well-being (SWB) of children and adolescents within local communities and school contexts. UWE stands for "Umwelt, Wohlbefinden und Entwicklung" (= „Environment, Well-being and Development”).

Its approach is largely inspired by the ecology of human development by Bronfenbrenner (1979). The study aims at modelling this ecology to understand adolescent life and deliver data that aids communities and schools to facilitate the healthy upbringing of youth. It evaluates factors enhancing and protecting SWB, aiming to provide representative data at both institutional (schools) and small-area (statistical districts) levels. By emphasising subjective experiences and local variations, the UWE survey serves as a comprehensive tool for municipalities and schools to tailor interventions that promote favourable environments for children and adolescents.

In its 2021 wave, all students in 7th and 9th grades (~12-17-year-olds) in two medium-sized German cities were asked to take part in the study, attempting a full survey in this demographic. The survey targeted 6,024 adolescents, with 1,770 responding—resulting in an overall turnout of 29.4% (Stefes et al., 2023). Both cities are mostly urban environments with high rates of child poverty (see Knüttel et al., 2021). Given the high response rate and broad school-type coverage, the sample is reasonably representative of this urban adolescent population in terms of age, school type, and regional context. However, as is common in voluntary school surveys, female respondents are slightly overrepresented.

The first city enabled cooperation with schools directly; questionnaires were administered digitally or on paper to groups of up to 15 students at a time, either in the classroom or at home in a distance-learning setting during school hours. The sample includes all students in the target group whose parents consented to their child's participation prior to the study. Schools in the second city were not cooperating in this way, partly because of the COVID-19 pandemic and its contact limitations. Hence, all residents of the town in that age group were asked to take part in an online survey, where they also provided data on their school and classroom affiliation. The invitation to the survey was delivered by mail up to three times over a period of four weeks. Contact information was obtained by the municipal residents' registration office. From the total number of respondents, 1168 cases could be used for the analyses in this article. Stefes et al. (2023) provide a detailed report on the surveys' conduct in 2021 (open access, in German). The data is available for replication from Stefes (2023).

The questionnaire takes around 45 min to answer, and the resulting dataset contains more than 200 items and variables. During these 45 min, a supervisor introduces the project

and its questionnaire before respondents ask a few questions. The questionnaire length and resulting time necessary raises concerns about the cognitive capacity to answer all questions reliably especially among the younger respondents. To ensure comprehensibility and age-appropriateness, the questionnaire was pretested in a two-step process in 2019. First, focus groups were conducted with students in grade 6 and grade 8 at a secondary school. These grades were selected to be just below the actual target grades (7 and 9) in order to avoid any prior exposure to the questionnaire among later participants. Students were asked to review each question and indicate whether they understood it, felt unsure, or could not or did not want to answer. Items flagged by several students were discussed in detail and revised for clarity and accessibility. A subsequent pretest in parallel classes tested the full questionnaire for remaining comprehension issues, timing, and implementation. The average completion time during pretesting matched the planned 45-minute school period, and no major difficulties remained.

The dependent variable in all models conducted below is subjective well-being, which is a multidimensional concept that is assessed by statements in the six dimensions:

*Optimism.*

- I feel better more often than I feel bad.
- I think I will experience more good things than bad.
- In the morning I usually think it's going to be a good day.

*Self-esteem.*

- Most of the time, I like the way I am.
- I have a lot to be proud of.
- Many things about me are good.

*Life satisfaction.*

- Most of the time, my life is the way I want it to be.
- Everything is really good in my life.
- I am happy with my life.

*Worries (Recoded to reflect absence of worries).*

- I'm worried about being teased or annoyed.
- I worry a lot that other people might not like me.
- I worry about what other children might say about me.

*Body image.*

- I usually like the way I look.
- Most of the time I am happy with my weight.
- I feel good in my body.

*Sadness (Recoded to reflect absence of sadness).*

- I often feel unhappy.
- I am often sad.
- Most of the time I feel alone.

These statements are answered on a five point scale assessing agreement and the average of these responses serves as a scale, given that at least two questions were answered. Possible answers to the statements were ranging from “I don’t agree at all.” (1) to “I fully agree” (5). All six scales are then combined in the same manner to produce the “subjective well-being index”. In the datasets used for this study, both the individual scales and the overall index exhibit satisfactory psychometric properties.

The survey collects data on social resources accordingly. Social resources refer to the tangible and intangible support individuals receive from their social networks, such as emotional care, material assistance, and a supportive home environment. The survey provides information on social resources in the family (relationships to parents, subjective wealth), school (relationships to staff, climate, feelings of belonging, feelings of joy, subjective success) and peer group (feelings of belonging and close friendships). An overview of Cronbach’s Alpha values and the results of an exploratory factor analysis can be found in the Appendix (Table A.1), the statements in an English translation are available by Stefes (2024a).

Part of the standardized questionnaire is an item battery dealing with bullying victimization. In cases of conflicts, insults, or physical altercations alone, one cannot yet speak of bullying. Bullying occurs repeatedly and is based on unequal power dynamics, with the intention to harm the person or persons in a subordinate position. Bullying is a diverse group phenomenon and can take various forms, which the questionnaire inquires about accordingly:

- *Physical Bullying:* Someone has hit me, pushed me, kicked me, spat on me, or beaten me up more than once.
- *Verbal Bullying:* Someone has insulted me, offended me, picked on me, or embarrassed me more than once.
- *Social Bullying:* Someone has excluded me, made fun of me, spread rumours about me, or made me look stupid more than once.
- *Cyberbullying:* Someone has used the internet via computer or phone to make fun of me, exclude me, threaten me, or hurt my feelings more than once.”

These statements represent the original phrasing in the questionnaire which is translated into English from the German original survey. Another item in the survey covers bullying perpetration, asking whether one has done at least one of those things in the past weeks. Unsurprisingly, the numbers do not quite add up, as not all classrooms where bullying was reported have confessed perpetrators.

### 3.2 Analytical Strategy

Figure 1 presents a simplified model of the analysis. Bullying victimization is measured on the individual level. Students were asked how often they experienced each kind of bullying, daily, weekly, monthly or never. For the analysis, two new variables were created for each of the four kinds of bullying. The first one distinguishes whether or not the individual respondent has ever been victimized. The second captures whether there is at least one respondent in the classroom who is being victimized. This is represented by the first dashed upward arrow in Fig. 1. Two straight sideways arrows represent the suspected relationships between bullying victimization and SWB on each level (Hypotheses 1 & 2). On the macro-level (classroom) I suspect a negative influence of cases of bullying on the average subjective well-being in the classroom, which is aggregated from the individual responses (dashed upwards arrow) (Hypothesis 1). The third straight arrow, directing from the classroom-level bullying to the individual SWB, denotes the echo-effect of bullying – the Echo of Aggression (Hypothesis 3). All modelled relationships are assumed to be negative; hence, symbols indicating direction are omitted for clarity. Based on the findings of research presented above, it is suspected that both levels of bullying have a different effect on SWB depending on the gender of the respondents, namely a stronger negative effect on girls (Hypothesis 4). The grey area covers all variables and effects that are hypothetically gender-specific: The individual experience of bullying, its effect on SWB, SWB regardless of bullying, and the echo-effect of bullying on individual SWB.

### 3.3 Sample

Table 1 provides an impression of the sample. Female respondents are slightly overrepresented (54%). Unfortunately, due to a lack of observations, this study can only analyse gendered differences from a binary perspective. The bullying victimization variables present the share of respondents who have reported being victimized at least every month. On the class-level, we can see the share of students who attend a classroom with at least one reported victim of each type. Here it becomes evident that although not every student experiences bullying victimization themselves, almost everyone in the sample is in a classroom with at least one report of social or verbal bullying, and more than half could potentially witness physical and/or cyberbullying in their classroom.

A more detailed view of bullying victimization experiences and how they might differ between genders can be seen in Fig. 2 in the results section. It shows the share of students

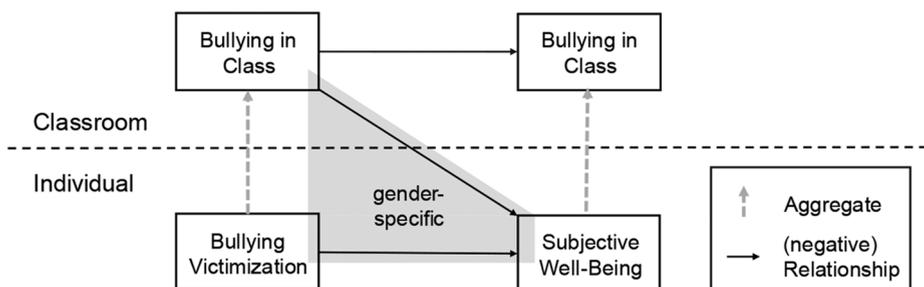


Fig. 1 Analytical setting of this study

who have reported to experience different types of bullying either never, monthly, or even weekly or daily. The vast majority of students do not personally experience victimisation at all, according to their accounts. While around 90% never experience cyberbullying or physical violence, and more than 70% are free from verbal and social bullying. It must be noted, however, that there likely are cases of victimization that have not been reported by victimized students in the sample. Reporting victimization can be perceived as shameful and may collide with gender role expectations (Hellström & Beckmann 2020).

The sample is slightly skewed towards younger students. To evaluate item performance across age groups in the study sample, indicators such as item non-response and straightlining patterns in item batteries are reported in the appendix (Table A2). Straightlining is measured as the number of times a respondent gave identical answers across all items in a battery. While not necessarily invalid in every case, frequent straightlining may signal low engagement or response bias, especially if concentrated within subgroups. While 13-year-olds appeared somewhat more hesitant to answer all questions, and a small number of students showed unusually high item non-response, overall data quality remains high and does not show systematic age-related bias. All modes of survey research inhabit a risk of response bias, especially those which involve sensitive questions. However, anonymous and

**Table 1** Descriptive statistics

Variable	Mean	SD	Min	Max	<i>n</i>
<i>Dependent Variable</i>					
Subjective Well-Being	3.565	0.819	1.0	5.0	1168
<i>Independent Variables</i>					
Physical Victimization	0.077		0.0	1.0	1168
Verbal Victimization	0.277		0.0	1.0	1168
Social Victimization	0.258		0.0	1.0	1168
Cyberbullying	0.080		0.0	1.0	1168
Bullying Perpetration	0.112		0.0	1.0	1168
Physical Victimization (class level)	0.641		0.0	1.0	1168
Verbal Victimization (class level)	0.944		0.0	1.0	1168
Social Victimization (class level)	0.938		0.0	1.0	1168
Cyberbullying (class level)	0.672		0.0	1.0	1168
<i>Control Variables</i>					
Subjective Wealth	0.790	0.143	0.2	1.0	1168
Sleep and nutrition	3.745	0.683	1.6	5.0	1168
Relationships: Peers	4.034	0.892	1.0	5.0	1168
Relationships: Friends	4.314	0.975	1.0	5.0	1168
Relationships: Adults at home	4.517	0.727	1.0	5.0	1168
Relationships: Adults at school	3.226	0.952	1.0	5.0	1168
School: Subjective success	4.033	0.892	1.0	5.0	1168
School: Belonging	3.435	0.977	1.0	5.0	1168
School: Climate	3.285	0.901	1.0	5.0	1168
School: Feeling of Joy	3.302	0.945	1.0	5.0	1168
Gender: Female	0.537		0.0	1.0	1168
Age	13.789	1.148	12.0	17.0	1168
Family: Number of adults at home	0.918	0.510	0.0	2.0	1168

self-administered questionnaires are considered least prone to response bias (Felderer et al., 2019). More details about the reliability of the approaches used for this study are discussed by Stefes (2024b). He argues that the different modes of supervision which have been used in the field were adequate, even considering the sensitive questions discussed here. All were anonymous and self-administered.

### 3.4 Multilevel Regression

The analysis in this work examines the relationship between individual SWB and bullying on the individual and classroom level. Multiple levels of analysis demand for certain methodology of inferential statistics, and classrooms are a classic example of the need for multilevel regression analysis (DiPrete & Forristal, 1994; Snijders & Bosker, 2012). Multilevel regression analysis is particularly suitable for classroom-based student surveys because it accounts for the hierarchical data structure, where individual students (level 1) are nested within classrooms (level 2), which are nested in schools (level 3). This approach recognises the intraclass correlation, acknowledging that students surveyed within the same classroom share similarities not present in students from different classrooms, such as shared environments, teaching methods, peer influences, and nuances in how interviews are conducted within the classroom setting. The latter is especially relevant for this study (Stefes, 2024b): Not only is there reason to assume that classmates share similarities in terms of their reported experiences, but they were also (in part) interviewed at the same time in the same room. By partitioning the variance in subjective well-being (SWB) into within-classroom and between-classroom components, multilevel models clarify how much of the variation is due to individual differences versus classroom differences. This method also addresses heteroskedasticity, where the variability of SWB might differ across classrooms, potentially leading to biased estimates if unaddressed. Heteroskedasticity refers to the condition where the variance of errors in a regression model is not constant across observations, posing a problem because it can lead to inefficient estimates and biased standard errors, thereby invalidating hypothesis tests and confidence intervals. Employing mixed models with both random and fixed effects enables a more nuanced analysis by allowing random effects to model complex variations across classrooms (e.g., different impacts of bullying or different baseline well-being in classrooms), while fixed effects control for specific observed characteristics (e.g., gender, age). Different baseline SWB in classrooms can be accounted for by using random intercepts, and different effects of bullying on SWB in each classroom can be accounted for by allowing random slopes of the bullying variables. This could make sense if we suspect that the intensity of bullying differs but is not captured in the variable itself. The analysis in this study will allow for random intercepts, because there is reason to assume varying levels of average SWB in different classrooms. Random slopes are not allowed in the models to avoid overfitting and convergence issues.

The analysis follows the approach outlined by Snijders and Bosker (2012). First, a null model (random intercept only) is estimated to partition the variance of subjective well-being (SWB) into individual and class levels, establishing the baseline intra-class correlation coefficient (ICC). The ICC for SWB in this sample is 0.025, meaning that approximately 2.5% of the total variance in SWB can be attributed to differences between classrooms. This indicates that most of the variance in SWB (97.2%) is due to individual differences within classrooms rather than differences between classrooms. While some argue that ICC values

below 5% may not require multilevel modelling, research with hierarchical data and theoretical interest in group-level effects (e.g., classroom climate) still benefits from multilevel modelling, especially when the model includes group-level predictors (Snijders & Bosker, 2012). Thus, the modelling choice is justified by both data structure and theoretical considerations, as outlined above.

Next, demographic control variables and the independent variables representing social resources are included to assess their impact on SWB. All scales have been standardised. Z-standardisation is a process of transforming data so that it has a mean of zero and a standard deviation of one. This is achieved by subtracting the mean of the variable and then dividing by the standard deviation. By standardising all scales, the variables are brought to a common metric. This allows for a direct comparison of coefficients, as they all reflect the impact of a one standard deviation change in the predictor variable on the dependent variable (SWB).

No weights were applied to the regression models. While girls are slightly overrepresented (54%), the deviation from the expected gender distribution is moderate, and the sample's breadth across schools and classrooms provides a solid basis for inference. Furthermore, as discussed in Winship and Radbill (1994), applying weights in regression models can sometimes increase variance or bias if not carefully justified, particularly when the analytic goal is estimation rather than population description.

Sensitive questions can be subject to social desirability bias. The data presented above was collected during the second lockdown phase of the COVID-19 pandemic in Germany, resulting in a variety of survey modes used during field work and consequently. The second lockdown phase in German schools was marked by high volatility, as the collaborating municipalities had to balance infection prevention and contact restrictions with the need to maintain educational and childcare infrastructure. As a result, during the six weeks of data collection, the target population was either attending school in smaller groups or participating in distance learning at home—depending on weekly assessments of local COVID-19 incidence rates. Consequently, some students completed the survey at home, others in classrooms; some were supervised externally, while others were accompanied only by teachers. Since the survey mode was chosen based on external factors alone (incidence rates), this factor is more or less random. All modes have been shown to yield satisfactory data quality (Stefes, 2024b).

This can be used as an advantage. There is evidence that social desirability bias is more likely when teachers are present (Rasberry et al., 2018; March et al., 2022) or the survey was taken at home (Cops et al., 2016). External supervision can reduce response bias (Bidonde et al., 2023). The following figures and results were all subjected to robustness checks involving characteristics of the interview situation. Results do not differ when dummy variables were included that indicated whether there was (1) a teacher present, (2) an external supervisor by the research institute was conducting the survey, or (3) the survey took place at home in distance learning sessions. In all cases, the survey was self-administered on paper or a mobile device. In the following figures, these robustness checks are not included for better clarity.

### 4 Results

Reports of bullying correlate highly, as students either experience no bullying at all or more than one kind (Fig. 3). The number of those who experience no bullying at all is lower in Fig. 3 than might be the impression given by Fig. 2, where numbers ranged between 70% and 94% of non-targeted students. 21% of all respondents are bullied in at least two forms, and almost 2% experience bullying in all four ways. Social and verbal victimization are the most common types, and their correlation is very strong, as shown in Table 2. Verbal and physical bullying also correlate strongly, implying that those being bullied physically are often humiliated verbally as well (Turner et al., 2015). Among boys, all correlations involving physical bullying are stronger than among girls. In contrast, the remaining correlations (between social, verbal, and cyberbullying) are stronger among girls than among boys. These patterns suggest that boys who experience one form of bullying (especially physical) are likely to face multiple forms simultaneously. Whereas for girls, bullying tends to manifest in more relational and verbal ways that often occur together, reflecting different gendered dynamics in how bullying is experienced and enacted. These correlations highlight that bullying rarely occurs in isolation. Physical bullying, in particular, is strongly associated with other forms, especially verbal bullying among boys. This descriptive pattern underscores the complexity of bullying experiences in this sample.

Figure 4 provides an overview of the share of students in each classroom that has experienced each kind of bullying. Included in the sample are only classrooms that have at least five complete questionnaires. The higher on the y-axis the marker is, the higher the average SWB is reported in the classroom. Every point represents one classroom; the shape and colour of the marker indicate the school type. The further to the right, the higher is the share of students with personal experience.

Three kinds of school tracks are present here: (1) The cross represents the “Higher Secondary Track”, or “Gymnasium”, which enables further academic degrees. (2) The small

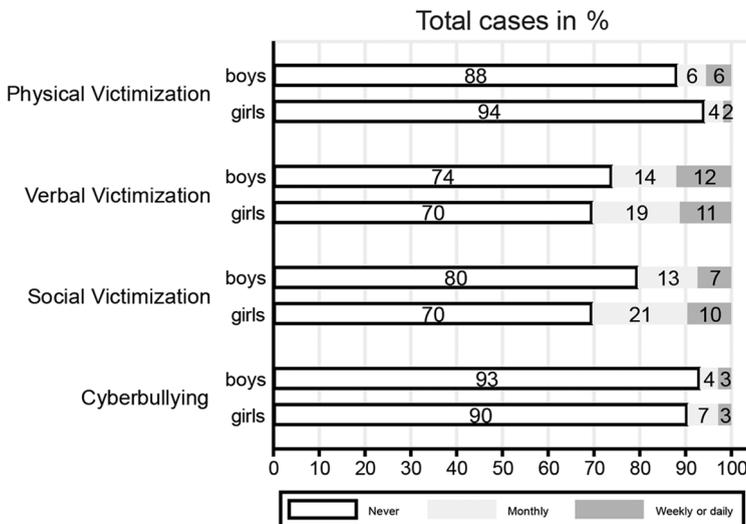
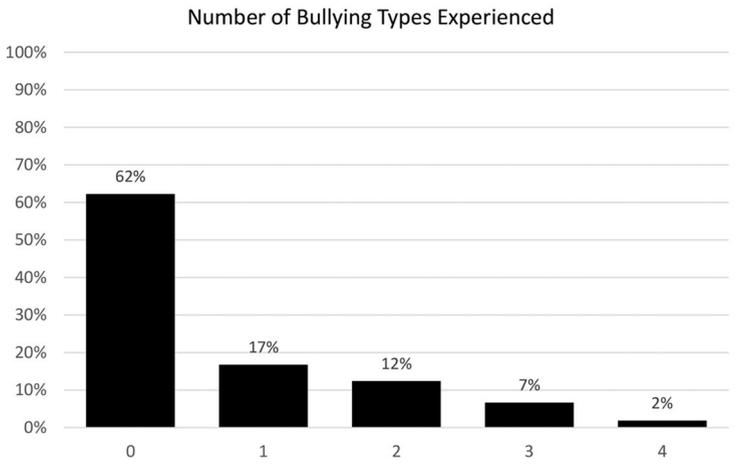


Fig. 2 Distribution of Students by Bullying Types Experienced, sorted by Gender (Data: UWE Survey 2021; n=1364 students)



**Fig. 3** Distribution of Students by Number of Bullying Types Experienced at least monthly

**Table 2** Correlation between individual-level forms of bullying victimization

	Physical		Verbal		Social		Cyber	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Physical	1.00	1.00						
p-value	0.0000	0.0000						
Verbal	0.50	0.33	1.00	1.00				
p-value	0.0000	0.0000	0.0000	0.0000				
Social	0.35	0.24	0.49	0.50	1.00	1.00		
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Cyber	0.26	0.15	0.30	0.38	0.33	0.37	1.00	1.00
p-value	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

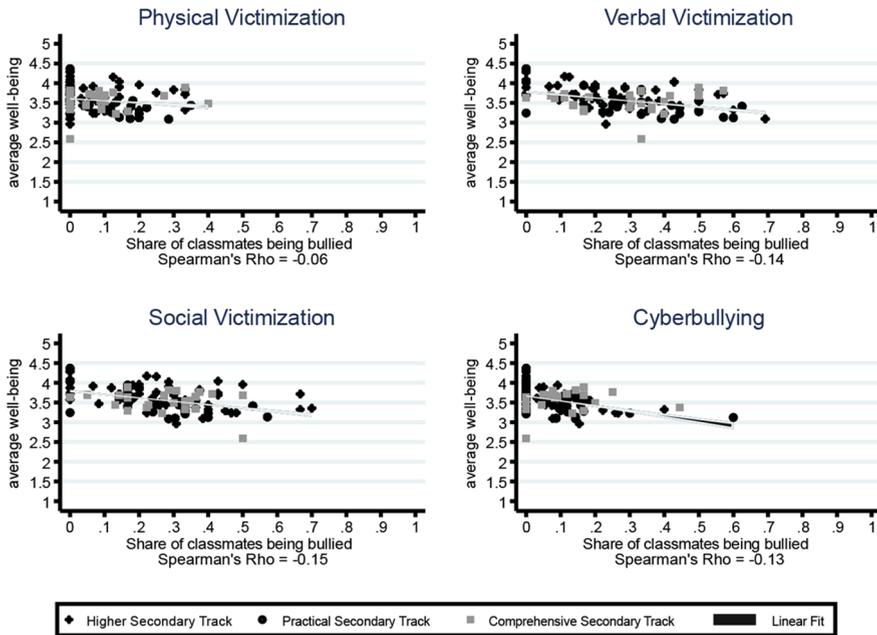
circles represent the “Practical Secondary Track” which typically ends after the 10th grade and prepares its students for manual labour or further vocational training, the track consists of “Hauptschule” and “Realschule”. These two have been found to be challenged with bullying more than other tracks (Fischer et al., 2020). (3) The grey square represents the “Comprehensive Secondary Track” which has a holistic approach. It allows students to leave after grade 10 and pursue vocational training or stay for the “Abitur” to earn access to tertiary education. In this sample, schools were called either “Gesamtschule” or “Sekundarschule”.

The distribution of victimization across classrooms shows considerable variation, with some classrooms reporting very low levels and others where bullying is more pervasive. Notably, classrooms with higher shares of victimized students tend to report lower average subjective well-being, consistent with Hypothesis 1. However, as indicated by Spearman’s Rho, these differences are not significant.

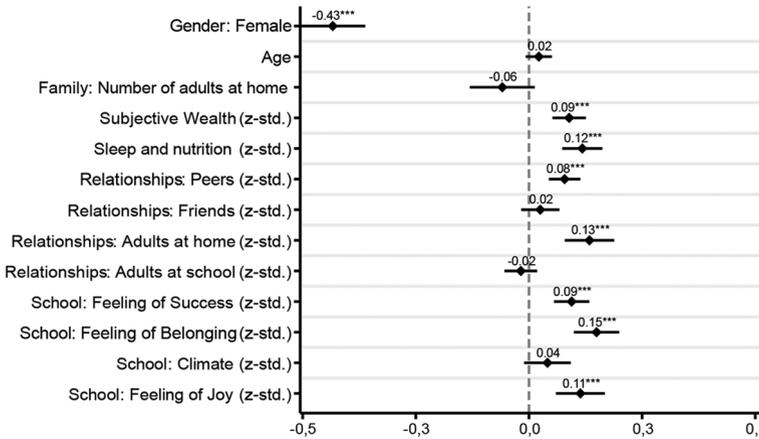
The figures displayed above might give the impression that most students are not affected by bullying victimization, although at least 37.8% of the students in the sample experience at least one form of bullying themselves (Fig. 3).

The regression model without any account for bullying is shown in Fig. 5. The coefficient plot displays the effect of all independent variables used to explain SWB in the sample. Gender is the strongest predictor, with girls reporting much lower values on average. The coefficient indicates an average difference of 0.43 points between boys and girls on a scale of 1–5. The significance level is indicated by three stars. Subjective wealth, indicating a sense of relative poverty by those with lower values, creates a significant gap in SWB between those who perceive themselves as relatively poor or wealthy. SWB is supported by good sleep and nutrition, positive relationships with peers and adults at home, while close friends and adults in school do not have a statistically significant effect. Close friends are less important for SWB, when there are general feelings of belonging to the peer group, and youths are part of a group of friends. The school climate itself is not as impactful as feelings of success, belonging and joy – the perception of one’s own role in school life matters more than the institution in general (Stefes, 2024a).

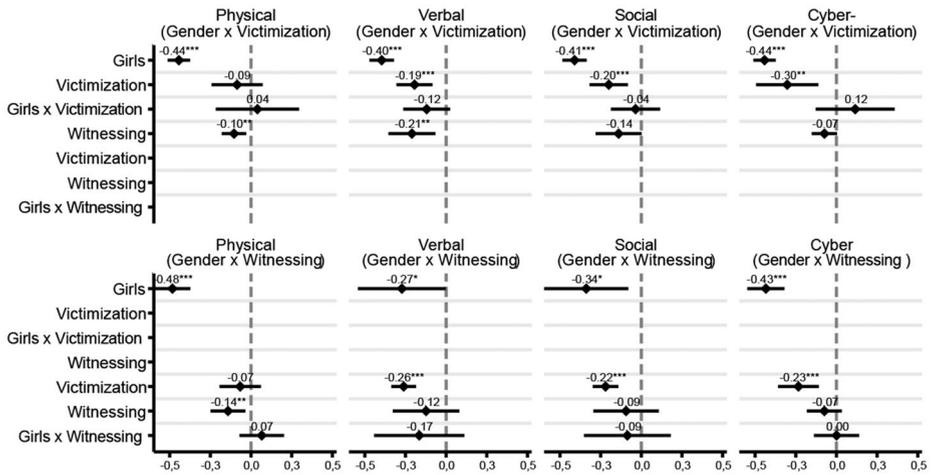
Following this, interaction terms between bullying (both individual and class level) and gender are incorporated to explore whether there is an effect of witnessing bullying and if the effect of bullying on SWB differs by gender. Eight models are presented in Fig. 6. Bullying is a binary variable in the models, indicating that respondents reported at least a monthly experience of the bullying type in question. Each model includes either individual or class-level bullying interacted with gender, while the other form is not interacted with, and the remaining types of bullying are excluded. The coefficient plot only shows the effects of gender, bullying and the interaction term. All controls presented in Fig. 5 are included in



**Fig. 4** Share of victimized students in each classroom and average subjective well-being by school type and form of bullying (Data: UWE Survey 2021;  $n = 119$  classrooms)



**Fig. 5** Predictors of Subjective Well-Being (Data: UWE survey 2021;  $n = 1168$  students). (Significance: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ )



**Fig. 6** Interaction effects of gender with bullying victimization and witnessing bullying on SWB (Data: UWE Survey 2021;  $n = 1168$  students). (Significance: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ )

the calculation behind Fig. 6 but not shown here for better visibility. All hidden effects are robust and do not change significantly between models.

Gender remains the strongest predictor, regardless of which form of bullying is added to the model. Most forms of bullying cause a significant drop in SWB when students are targeted, supporting Hypothesis 2. Physical bullying is an interesting exception, as it appears to mainly cause indirect harm – witnessing is a significantly negative influence, while the victimization variable is insignificant. Witnessing physical and verbal bullying significantly decreases SWB, supporting Hypothesis 3. The latter effect disappears when the interaction of witnessing/gender is added, which reduces the effect of gender as well. This is an indication that girls in this sample suffer more from verbal bullying in the classroom than

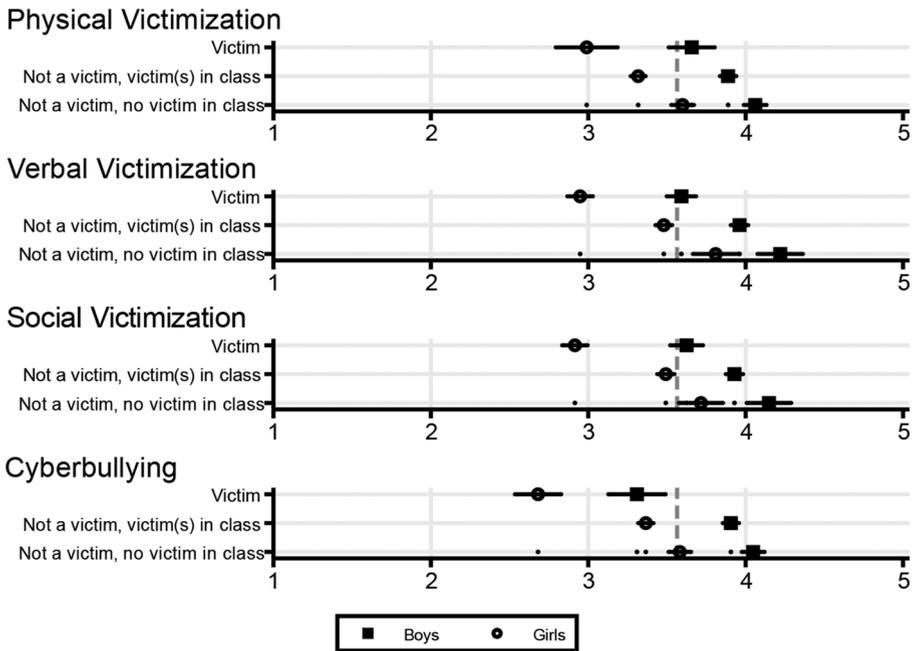
their male counterparts. None of the interaction terms is significant, limiting the evidence for Hypothesis 4. The regression results indicate that both direct and indirect exposure to certain forms of bullying are significantly associated with lower subjective well-being. The effect of witnessing physical and verbal bullying is particularly pronounced, lending support to Hypothesis 3. In contrast, cyberbullying shows a stronger association with direct victimization than with indirect exposure.

Based on the models in the first row, featuring the interaction term of bullying victimization and gender, Fig. 7 shows the predicted SWB for six groups: victimized students, non-victimized students who might witness bullying in class, and students without any reported exposure, with each group further sorted by gender. The dashed line in each plot marks the overall average SWB. In every model and every group, girls still report a lower SWB than boys. However, the difference decreases in classrooms without reports of verbal and social bullying. Girls report significantly lower SWB when being victimized or witnessing bullying, for male respondents, it is not that strong and not significant for every form. Although the average SWB differs between the three groups, the effect of witnessing is not significant for social- and cyberbullying. This might be partly caused by boys not reporting bullying in the survey (Rivers & Smith, 1994; Cowie, 2000). Cyberbullying has the strongest effect, showing a difference of more than 20% between victimized girls and boys without any exposure. These predicted values illustrate the cumulative negative effects of bullying exposure, whether direct or indirect. The consistent gender gap in subjective well-being persists across groups, though it narrows somewhat in classrooms with lower bullying prevalence.

## 5 Discussion

The study investigated the impact of witnessing school bullying on the subjective well-being (SWB) of adolescents who are not direct targets. Using a classroom-based survey from Germany, the research analyses physical, verbal, social, and cyberbullying. Results show that occurrences of bullying negatively affect SWB across classrooms, with differences noted between genders. The study highlights the broader, often overlooked, impact of bullying on bystanders and underscores the importance of gender-sensitive approaches in addressing bullying's repercussions. The findings emphasise the need for comprehensive interventions to support all students, not just direct victims. Coming back to the initial research question of whether witnessing school bullying had a significant negative impact on the subjective well-being of adolescents who are not direct targets, this effect is evident across different types of bullying and varies between genders, indicating a need for comprehensive, gender-sensitive bullying interventions. Ultimately, there is strong evidence for the Echo of Aggression.

Four hypotheses were tested. The first one is based on the macro-level: "The average SWB is decreased across students in classrooms where bullying is prevalent." The descriptive statistics and inferential analysis provide mixed evidence regarding this hypothesis. Figure 4 provides three relevant findings. First, there is a surprisingly weak relationship between the two dimensions presented. None of the types of bullying seems to be associated with higher or lower SWB, as indicated by the linear fit and Spearman's Rho values. That can be interpreted as an argument against Hypothesis 1. Second, the range of affected students in each classroom varies widely, suggesting that the social dynamic in these groups



**Fig. 7** Predicted subjective well-being by gender and exposure to bullying (Data: UWE Survey 2021;  $n = 1168$  students)

differs just as much. Third, the school type does not appear to be a factor in the distribution here; all types are distributed randomly across the scatter plots.

Although descriptive figures show a weak relationship between classroom-level bullying victimization and average SWB, the multilevel regression analysis reveals more nuanced insights. The low ICC indicates that only a small proportion of the variance in SWB is due to differences between classrooms. This suggests that while classroom-level occurrences of bullying might not significantly affect the overall SWB, individual experiences within these classrooms have a more substantial impact. The variance in the share of targeted students in each classroom hints at great diversity in the social dynamics of each classroom. The findings are evidence for the inefficiency and deficiency in terms of knowledge gain when formulating hypotheses on the context level.

Hypothesis 2 aims at the individual level: “Individual experiences of victimization are linked to reduced personal SWB.” The analysis robustly supports this hypothesis. Victims of bullying reported significantly lower SWB across multiple dimensions, consistent with extensive previous research (Espelage 2013; Wolke & Lereya, 2015; Moore et al., 2017; Bradshaw et al., 2017; Katsantonis et al., 2024). The significant negative coefficients for physical, verbal, social, and cyberbullying in the regression models underscore the detrimental impact of direct victimization on individual well-being. These findings align with prior studies highlighting the adverse effects of bullying on victims (Rigby, 2003; Romano et al., 2020).

Hypothesis 3 introduces the classroom perspective: “The occurrence of bullying in the classroom negatively affects individual SWB, regardless of personal victimization.” The evidence for this hypothesis is also compelling. The regression analysis shows that the presence of bullying in the classroom correlates with lower SWB among students who are not directly victimized. This aligns with psychological literature indicating significant impacts on bystanders, who often experience internalising symptoms such as anxiety and depression (Rivers et al., 2009; Werth et al., 2015). The finding that witnessing bullying can negatively affect non-targeted students is significant, emphasising the broader impact of bullying on the entire classroom environment, supporting the idea of an Echo of Aggression.

Hypothesis 4 is more complex than the former, as it aims to find differences in the effects described before based on gender: “The impact of bullying victimization and classroom bullying on SWB varies by gender, with girls experiencing a stronger negative effect.” The analysis provides partial support for this hypothesis. Gender differences in SWB and experiences of bullying were evident, with girls reporting lower overall well-being and different types of bullying experiences compared to boys. Specifically, girls experienced more social and cyberbullying, whereas boys reported more physical victimization. In line with previous research (Rivers & Smith, 1994; Scheithauer et al., 2006; Iossi Silva et al., 2013; Cosma et al., 2022), boys have reported more physical victimization, while girls have been victim to all other kinds more often, although cyberbullying and verbal victimization do not differ substantially, contradicting previous research (Smith et al., 2019). This aligns with existing research suggesting gender-specific patterns in bullying and with sociological gender theories. For example, the stronger impact of social and cyberbullying on girls reflects how relational aggression targets social roles tied to appearance and likability (West & Zimmerman, 1987; Eder, 1985). Meanwhile, the muted interaction effects between gender and bullying on SWB may partly reflect boys’ underreporting, shaped by hegemonic masculinity norms that discourage displays of vulnerability (Connell, 2005; Hellström & Beckmann, 2020). However, the interaction effects between gender and bullying on SWB were not as pronounced, indicating that while the types of bullying and overall well-being levels differ by gender, the negative impacts of bullying victimization and witnessing bullying are significant for both boys and girls.

The study’s findings resonate with a substantial body of literature on the impacts of bullying on adolescents’ well-being. The evidence supporting Hypothesis 2 aligns with well-documented negative effects of direct victimization on mental health and social outcomes. The results also reinforce the notion that bullying’s impact extends beyond immediate victims, affecting bystanders significantly (Rivers & Noret, 2010, 2013). This finding aligns with the ecological understanding of how interactions in the mesosystem indirectly affect well-being (Bronfenbrenner, 1979). Bullying operates as a stressor within the mesosystem, where peer dynamics and classroom climate interact to shape individual well-being. The echo-effect observed here reflects how harmful peer interactions reverberate through the social environment, indirectly affecting those not directly targeted. Furthermore, the role of macrosystem-level norms, such as gendered expectations of toughness or likability, helps explain why certain students may be more vulnerable to these indirect effects.

The partial support for Hypothesis 1 suggests that while the overall classroom climate might not be drastically altered by bullying, individual experiences within these classrooms play a crucial role. This is consistent with findings that individual perceptions and interac-

tions are more impactful on SWB than broader environmental factors (Guhn et al., 2013; Oberle, 2018; Stefes, 2024a).

Gender differences in bullying experiences and their impact on SWB are also corroborated by previous research (Rivers & Smith, 1994; Scheithauer et al., 2006). The study's finding that girls experience lower SWB and are more affected by social and cyberbullying aligns with the notion that gender roles and expectations significantly influence adolescent experiences of bullying (Hellström & Beckmann, 2020). Unfortunately, due to the small group of gender-diverse youths in the sample (three respondents identified as "diverse"), an evaluation of effects on youth outside of the binary gender spectrum could not be made in this article. Since we know that they are targeted even more often than cis-gender youth (Sares-Jäske et al., 2023), the echo effect be stronger among them as well. Future research should investigate this and make sure to adjust their assessment of gender in questionnaire accordingly (Gower et al., 2022). The survey this study is based on is no exception to this.

Limitations of this study include its focus on one specific cultural context (Germany), its reliance on self-reported data and the cross-sectional design. While the study's sample is limited to a specific cultural context, which may not capture the full range of experiences and effects of bullying in different cultural or geographical settings, it is still a valid contribution to the puzzle of bullying effects on bystanders. The study's cross-sectional design limits the ability to draw causal inferences. Longitudinal studies are needed to establish the directionality of the relationship between bullying and SWB and to examine how these effects evolve over time. It should also be noted that data for this study were collected during the COVID-19 pandemic, a period that may have influenced peer interactions, exposure to bullying, and adolescents' well-being in unique ways. While this study aimed to provide generalizable insights, future research could further explore how pandemic-related disruptions moderated the echo effect of aggression.

Although age differences were not a primary focus of this analysis, it is important to consider how developmental stage may influence adolescents' responses to indirect exposure to bullying. As peer relationships take on greater importance during adolescence, younger students may be more susceptible to the emotional impact of witnessing aggression, given heightened sensitivity to peer acceptance and belonging during early stages of adolescence (Eder, 1985; Larson & Richards, 1991; Swanson et al., 1998). Older adolescents may possess more advanced coping strategies, yet also face intensified challenges related to identity formation and social positioning (Brown & Larson, 2009; Guhn et al., 2013). These developmental considerations suggest that the echo-effect of bullying could vary across age groups, an area that warrants deeper exploration in future research. Future research should include more diverse populations to enhance the generalizability of the findings. Quantitative surveys would benefit from greater efforts to not only include but also represent adolescents from ethnic, religious and sexual minorities. The reliance on self-reported data introduces potential biases, such as social desirability bias or recall bias. Participants might underreport or overreport their experiences with bullying and their subjective well-being. Response behaviour might differ between genders, with boys being more likely to underreport, causing models based on biased results to underestimate differences in SWB. Incorporating multiple data sources, such as teacher reports or peer assessments, could provide a more comprehensive understanding. Additionally, in recent years, the German educational system has increasingly employed social workers or psychotherapists in schools. Their perspectives on the matter of indirect effects of bullying would be a worthy addition to future

research. Also, it would be worthwhile to differentiate between witnessing bystanders, non-witnessing bystanders and intervening bystanders. A promising approach could be the use of vignettes, as proposed by Wachs et al. (2020).

The empirical support for the echo effect aligns with ecological and sociological models that emphasise the shared social environment as a key determinant of adolescent well-being. It highlights that harm is not confined to direct victims but is embedded in the collective experience of the classroom. The findings underscore the importance of fostering supportive and inclusive school environments to mitigate the detrimental effects of bullying on all students, helping to dampen the Echo of Aggression. Interventions should include strategies to disrupt the normalisation of aggression and support bystanders, recognising that indirect exposure can be as harmful as direct victimization. They must also recognise the structural embeddedness of bullying in a broader societal context, such as gender-specific patterns and school climates where aggression can be a norm. Future research should further investigate the mechanisms by which the echo effect operates and how these may differ across contexts or cultural settings. Possible mechanisms include fear of becoming a target, reduced feelings of safety, or internalisation of aggressive norms.

## Appendix

**Table A1** a: psychometrics of scales and indices (Dependent Variable)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
<i>Dependent Variable<sup>1</sup></i>						
Subjective Well-Being			0.449	0.935	2	0.497
<i>Subscales of Subjective Well-Being<sup>1</sup></i>						
Optimism			0.555	0.787	1	0.792
	I feel better more often than I feel bad.	0.778				
	I think I will experience more good things than bad.	0.732				
	In the morning I usually think it's going to be a good day	0.729				
Self Esteem			0.627	0.833	1	0.535
	Most of the time, I like it the way I am.	0.828				
	I have a lot to be proud of.	0.724				
	Many things about me are good.	0.813				
Life Satisfaction			0.662	0.854	1	0.856
	Most of the time, my life is the way I want it to be.	0.756				
	Everything is really good in my life.	0.823				

**Table A1 a:** psychometrics of scales and indices (Dependent Variable)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
(Absence of) Worries	I am happy with my life.	0.858	0.599	0.818	1	0.83
	I'm worried about being teased or annoyed.	0.660				
	I worry a lot that other people might not like me.	0.845				
(Absence of) Sadness	I worry about what other children might say about me.	0.831	0.590	0.810	1	0.818
	I often feel unhappy.	0.698				
	I am often sad.	0.865				
Body Image	Most of the time I feel alone.	0.759	0.738	0.891	1	0.893
	I usually like the way I look.	0.849				
	Most of the time I am happy with my weight.	0.811				
	I feel good in my body.	0.920				

**Table A1 b** psychometrics of scales and indices (Independent variables I)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
<i>Control Variables<sup>2</sup></i>						
Family: Affluence			0.442	0.700	1	0.703
	My family can afford many things	0.810				
	My family often has to save money (recoded).	0.630				
	I can often do things with my friends that cost money.	0.565				
Relationships: Adults at school - There is an adult at school...			0.540	0.820	1	0.822
	who really cares about me.	0.737				
	who believes that I will be successful.	0.765				
	who listens to me when I have something to say.	0.727				
	with whom I can talk about my problems.	0.713				
Relationships: Adults at home - There is an adult at home...			0.603	0.847	1	0.872
	who really cares about me.	0.686				

**Table A1 b** psychometrics of scales and indices (Independent variables I)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
Relationships: Peers	who believes that I will be successful.	0.671	0.508	0.755	1	0.757
	who listens to me when I have something to say.	0.908				
	with whom I can talk about my problems.	0.831				
	I am part of a group of friends.	0.634				
Relationships: Friends	I think I usually fit in with the children I'm dealing with.	0.759	0.677	0.862	1	0.864
	When I'm with other children my age, I feel like I belong.	0.747				
	I have at least one good friend who I can talk to if something is bothering me.	0.856				
	I have a friend who I can tell everything to.	0.853				
	There is someone my age who really understands me.	0.765				

**Table A1 c** psychometrics of scales and indices (Independent variables II)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
School: Subjective success			0.558	0.789	1	0.794
	I am sure that I will manage this school year.	0.624	0.593	0.853	1	0.856
	If I have enough time, I can do all my homework well.	0.769				
	Even if some things are difficult at school, I can learn them.	0.857				
School: Climate						
	At my school, teachers and pupils treat each other with respect.	0.681	0.593	0.853	1	0.856
	At my school, pupils treat each other with respect.	0.768				
	In this school, people look after each other.	0.859				
	The pupils in this school help each other, even if they are not friends.	0.776				

**Table A1** c psychometrics of scales and indices (Independent variables II)

Variable	Item	Factor loading (std.)	Avg. inter-item correlation	Cronbach's Alpha ( $\alpha$ )	No. of Factors	Raykov's Rho ( $\rho$ )
School: Feeling of Joy			0.444	0.707	1	0.72
	I like going to school.	0.806				
	I am often in a bad mood at school. (recoded)	0.526				
	There are many things at my school that are really fun.	0.684				
School: Belonging			0.608	0.821	1	0.822
	I have the feeling that I belong at my school.	0.820				
	I think I am important for this school.	0.716				
	I am part of this school.	0.805				
Sleep and nutrition - If you think of a normal week...			0.271	0.591	1	0.601
	how many days do you have the opportunity to have breakfast?	0.620				
	on how many days do you eat sweets, crisps or similar?	0.305				
	how many days do you eat with your parents or other adult family members?	0.605				
	how many days do you sleep well at night?	0.573				

<sup>1</sup> Factor loadings for the dependent variable (subjective well-being) are based on a joint SEM including all 18 items across the six subscales. <sup>2</sup>Factor loadings for the independent variables are based on separate SEMs estimated for each scale individually

**Table A2** Data quality indicators of the dataset

Variable	age group	median	mean	sd	min	max	n
Item-nonresponse	12	1	18.446	30.902	0	89	157
	13	2	29.598	36.812	0	86	378
	14	4	35.408	38.337	0	92	250
	15	2	21.064	33.107	0	91	328
	16/17	2	5.127	11.317	0	78	55
Straightlining (max. 6)	12	0	0.159	0.474	0	3	157
	13	0	0.238	0.624	0	4	378
	14	0	0.180	0.511	0	3	250
	15	0	0.180	0.526	0	3	328
	16/17	0	0.164	0.373	0	1	55

**Author Contributions** Only the corresponding author contributed to the study conception and design. Material preparation, data collection and analysis were performed by the corresponding author. The first draft of the manuscript was written by the corresponding author.

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**Data Availability** The data used for this study are available from the CESSDA Data Catalogue under the number 10.7802/2613

## Declarations

**Ethical Approval** Ethical approval for the study was not required, as we have not included especially vulnerable research participants. The study was prospectively approved by the legal office and data protection officer of the Ruhr-University Bochum before fieldwork started. Also, the municipality officers, school administration and representatives of respondents' parents approved the study.

**Informed Consent** Written informed consent from the research participants and written informed consent from parents or legal guardian has been acquired prior to the study.

**Research Involving Human Participants and/or Animals** The research did not involve Animals. The data used for this study is derived from a survey using questionnaires. Informed consent was obtained from all individual participants included in the study. Informed consent was also obtained from parents / legal guardians.

**Competing Interests** The authors declare no competing interests.

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