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WORST OF TIMES, BEST OF TIMES

Assessing pandemic impact on adolescents

Juuso Repo

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SARJA – SER. B OSA – TOM. 707 | HUMANIORA | TURKU 2024

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ABSTRACT

The COVID-19 pandemic (2020–2022) caused unprecedented disruptions worldwide, significantly challenging adolescents' emotional and academic adjustment. This thesis explored these impacts through four studies across multiple psychological, social, and academic outcomes, among adolescents of varying ages and across Nordic countries and South-Australia.

Study I examined the effects of the first school lockdown in 2020 on bullying victimization among Finnish adolescents, revealing a significant decrease in bullying rates during the lockdown and no increase in cyberbullying. Study II applied latent change score modeling to explore changes in anxiety levels among Finnish emerging adults who graduated in 2020, identifying marginal increases in anxiety and failing to find evidence of prior anxiety or loneliness predicting negative effects. Study III utilized longitudinal multi-cohort data following two age cohorts of South-Australian adolescents before and during the pandemic, and applied multigroup latent change curve modeling to assess the pandemic's impact on academic self-efficacy and cognitive reappraisal, finding minimal negative effects after disentangling developmental effects. Study IV analysed PISA 2018 and 2022 data on 15-year-old Nordic students to evaluate changes and social disparities in student well-being and in the association of well-being and academic performance, indicating stable latent well-being profiles and no significant pandemic-induced inequalities related to student well-being.

Applying a multidisciplinary resilience perspective, the findings contribute to understanding the varied effects of the pandemic on youth and challenge the prevailing public narratives of widespread negative impacts and exacerbated inequalities. Additionally, the thesis offers insights into methodological considerations for future research on population-level crisis impacts.

KEYWORDS: COVID-19, nuoret, resilienssi, hyvinvointi, eriarvoisuus

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TIIVISTELMÄ

Maailmanlaajuinen COVID-19 pandemia (2020–2022) aiheutti ennennäkemättömiä häiriöitä, jotka haastoivat nuorten emotionaalista ja akateemista kehitystä. Tämä väitöskirja tutki pandemian vaikutuksia neljän osatutkimuksen kautta, keskittyen useisiin psykologisiin, sosiaalisiin ja akateemisiin tekijöihin eri-ikäisten nuorten keskuudessa Pohjoismaissa ja Etelä-Australiassa.

Osatutkimus I tutki tarkasteli ensimmäisen koulusulun (2020) vaikutuksia suomalaisnuorten kokemuksiin ja osoitti kiusaaminen merkittävän vähenemisen ilman nettikiusaamisen lisääntymistä. Osatutkimus II tutki ahdistuneisuusoireiden muutoksia pandemian keskellä valmistuneiden suomalaisten nuorten aikuisten keskuudessa, havaiten lievää kasvua mutta ilman aiemman ahdistuksen tai yksinäisyyden ennustavaa vaikutusta. Osatutkimus III hyödynsi laajaa eteläaustralialaisista pitkittäistutkimusaineistoa vertaamalla kahta ikäkohorttia, joista vain toinen oli käynyt koulua pandemian aikana. Tutkimus ei löytänyt näyttöä pandemian vaikutuksesta akateemiseen pystyvyyden tai tunnesäätelyn kehitykseen sen jälkeen, kun nuorten normatiivinen kehitys otettiin kohorttivertailun avulla huomioon. Osatutkimus IV selvitti muutoksia pohjoismaalaisten nuorten hyvinvoinnissa sekä hyvinvoinnin ja akateemisen suoriutumisen välisissä yhteyksissä, vertaamalla vuoden 2018 ja 2022 PISA -tuloksia. Nuorten hyvinvointiprofiilit pysyivät vakaina, eikä pandemia näyttänyt lisäävän eriarvoisuutta, kun sitä arvioitiin perhetaustan yhteydellä hyvinvointiin ja hyvinvoinnin ja oppimisen välisiin yhteyksiin.

Monitieteellistä resilienssitutkimusta soveltava väitöstyö lisää ymmärrystä pandemiavaikutusten moninaisuudesta sekä haastaa yleiset julkiset narratiivit, jotka korostavat pandemian kielteisiä vaikutuksia ja lisääntynyttä eriarvoisuutta. Väitöskirja tarjoaa kriittisiä metodologisia huomioita tulevaa kriisitutkimusta varten.

ASIASANAT: COVID-19, nuoret, resilienssi, hyvinvointi, eriarvoisuus

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A multitude of individuals and serendipitous encounters have shaped and supported this journey. While such a project demanded solitude, focus, and social isolation, it was the spontaneous opportunities to connect with inspiring individuals in person that truly made this work possible.

The first serendipity was discovering the INVEST doctoral program and research centre – an unparalleled international and multidisciplinary community that has been an incredible fit and learning environment over the past five years. Thanks to its broad mission and start-up mentality, I was able pivot my thesis focus quickly as the pandemic unfolded. I wish to express my thanks for the leaders of INVEST for creating such a dynamic and inspiring research community, and to my colleagues for their conversations, feedback, and support. It has been a privilege to work with such a diverse, ambitious, and fun group. A special thanks to Vesku for organizing the best parties and to the INVEST Psychology people for always kicking off the dance floor!

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My deepest appreciation and thanks go to Lucy Bowes, whose encounter during a transformative writing retreat in Räyskälä inspired me to frame this thesis through the lens of resilience theory and sparked my ambition to pursue academia beyond my PhD. Yes, all that – and so much more.

Lucy's influence on resilience led me to join a related project proposal and later the INVEST sociology group. Mia Hakovirta and Elina Kilpi-Jakonen, by welcoming me to your project, provided me an important opportunity to extend the reach of this thesis – and my academic work - beyond its original scope.

I am also deeply thankful for a chance encounter at a conference in Montreal, where I met the highly talented and inspiring scholar Nicky Wright. I am grateful for Nicky for graciously agreeing to serve as the pre-examiner and opponent of this thesis, and to my other reviewer, Olli Kiviruusu, for their accurate observations and thoughtful feedback. Their insights not only helped me refine this work but also encouraged me to reflect on my learnings and the future significance of the results.

This research was made possible through the generous support of the Research Council of Finland, the University of Turku, the Alfred Kordelin Foundation, NordForsk, and the Ministry of Education and Culture, Finland. I also owe thanks to the anonymous referees of the academic articles for their constructive feedback, which strengthened this work significantly.

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Above all, I cherish the years with my late wife Laura. Your immense strength, wisdom, groundbreaking work, and love for children in need will always be my greatest inspiration.

December 2024
Juuso Repo

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List of Original Publications

This thesis is based on the following original publications, which are referred to in the text by their Roman numerals:

I Repo, J., Herkama, S. & Salmivalli, C. (2023). Bullying interrupted: victimized students in remote schooling during the COVID-19 pandemic. International Journal of Bullying Prevention 5, 181–193. https://doi.org/10.1007/s42380-022-00146-6

II Repo, J., Herkama, S., Yanagida, T., & Salmivalli, C. (2023). Transition to emerging adulthood during the COVID-19 pandemic: Changes in anxiety and the role of inclusion/exclusion experiences. European Journal of Developmental Psychology, 20(4), 649–665. https://doi.org/10.1080/17405629.2022.2122434

III Repo, J., Herkama, S., & Salmivalli, C. (2024). Equitable shifts in youth resilience? Distinguishing normative changes and pandemic effects on academic self-efficacy and cognitive reappraisal. Developmental Psychology. https://doi.org/10.1037/dev0001913

IV Repo, J., Reimer, D., & Kilpi-Jakonen, E. (in review). Student well-being and educational disparities in Nordic countries. A PISA-based latent profile analysis of pandemic impact (2018-2022).

1 Introduction

In Spring 2020, the rapid spread of a highly contagious and deadly virus resulted in unprecedented consequences across the globe. Governments imposed stringent restrictions, including school lockdowns, primarily to protect older adults, with no available evidence to assess the magnitude of the social and psychological repercussions on children and adolescents. The emergency measures varied across nations and lasted about two years, until early 2022.

During the critical years for social and personal development, adolescents were compelled to dramatically alter their lives: keeping a low profile, staying at home, engaging in online learning, halting their active lifestyles, avoiding meeting others, and postponing their future plans, all without a clear ending in sight. The sudden educational disruptions concerned approximately 1.6 billion schoolchildren globally, which is about 94% of students across the globe (UNSDG, 2020). The psychosocial impacts on young people remained to be studied retrospectively.

A surge in interest to understand and mitigate the effects of these disruptions led into a 'pandemic' of pandemic-related surveys and studies, albeit with varied data quality and methodologies. This thesis, being part of that epidemic, initiated in the spring of 2020 with two main objectives: to understand how the pandemic affected adolescents' emotional and academic adjustment and to identify which subgroups were most impacted. The urgency for this knowledge became critical as governments deliberated over the duration and severity of lockdowns and restrictions. The public concern on adolescents focused heavily on (1) negative impacts on mental health, such as depression, anxiety, and loneliness, and (2) on growing disparities, i.e., harmful effects accumulating among those with prior vulnerabilities related to family background, mental health, social relationships, or academic adjustment (see e.g., Kauhanen et al., 2022; Shergold et al., 2022). Despite these prevalent public narratives, emerging empirical evidence such as studies in this thesis, began to present more nuanced view of the pandemic's effects.

To assess individual differences and the influence of pre-existing vulnerabilities on adolescents' responses to the pandemic, this thesis employs a multidisciplinary resilience framework (see chapter 1.1). In also incorporates knowledge on adolescent psychosocial development, which is crucial for disentangling 'change-in-change';

i.e., the pandemic affecting adolescents during their development. This research takes place in a unique socio-historical context, where data and understanding of the phenomena were still developing, and the full implications were yet unknown. The object of the thesis, the pandemic impact, was a moving target, as the crisis effects fluctuated throughout the ongoing pandemic, evolving with research. The pandemic had potential to leave lasting and intertwined effects on adolescents' emotional, social, and academic adjustments. Thus, the four individual studies that compose this thesis each tackle different aspects of the pandemic impact, using various outcomes, diverse datasets collected at various pandemic stages and from different age groups and countries. The studies are presented in chronological order to reflect the accumulation of research evidence and the evolution of study designs throughout the crisis.

Despite the variations in data and designs, the findings from all four studies reveal some interesting commonalities. Surprisingly, they fail to find evidence of widespread adverse pandemic effects on the population level, nor do they find strong evidence that pre-existing vulnerabilities predicted more severe pandemic impacts.

The thesis not only summarizes these four studies but also critically reflects on them as examples of different approaches to assessing the pandemic impacts as they unfolded. By crafting and introducing a narrative around "five waves of pandemic impact research", the thesis discusses how the complex question of global crisis's effects on adolescents has been and can be approached through quantitative research.

Overall, the thesis contributes to a deeper understanding of the complexity of pandemic effects in various youth subpopulations, providing insights for crisis recovery and shaping future research and policies. The main findings are discussed from three distinct perspectives: (1) exploring the pandemic effects across diverse negative and positive outcomes, (2) applying resilience theory to understand the complex processes through which individuals and communities adapt to stress, and (3) evaluating the methodological approaches employed in pandemic research, pinpointing shortcomings that can obscure understanding of the causal dynamics of such crisis. Paradoxically, despite of four years of intensive research, reaching a definitive conclusion about pandemic impact remains challenging. Nonetheless, this thesis meaningfully advances methodological toolkit, better preparing the academic community to approach similar global crises in the future. This work not only addresses immediate research needs but also paves the way for more robust and timely scientific inquiries.

In all four studies, there was also an attempt to find an additional perspective beyond the question of pandemic impact, as abnormal conditions sometimes shed new light on the normal. Given the rapid digital transformation of education, and not ignoring the possible positive effects of the social restrictions, the crisis offered a

unique context for exploring the psychosocial dynamics of adolescents emotional and academic adjustment and schooling more generally.

1.1 Resilience perspective on pandemic effects

Adopting a socio-ecological view of resilience, this study presumes that successful adjustment to challenging life experiences, i.e., resilience, is best understood as an ongoing process where multiple biological, psychological, social, and ecological systems interact in ways that help individuals to regain, sustain, or improve their functioning – despite of atypical stress (Ungar et al., 2013; Ungar & Theron, 2020). Understanding adolescents' reactions to the pandemic thus requires consideration of their varying stress exposures, diverse individual responses over time, and the influence of multiple systemic factors (Masten, 2019).

In this context, the COVID-19 pandemic emerges as a multisystem disaster, disrupting nations, communities, schools, families, and individuals in complex and evolving ways (Masten & Motti-Stefanidi, 2020). Such disruptions lead to varied stress exposures, heavily influenced by differences in individual capabilities and the unequal distribution of socio-ecological resources.

In line with the socio-ecological framework, Conservation of Resources (COR) theory explains how individuals strive to secure and conserve valuable resources to bolster well-being and manage stress (Hobfoll, 2011). The COR theory brings both environmental and cognitive components together by showing how stress occurs as a result of actual and perceived loss of resources. Interestingly, the very resources intended to shield individuals from stress can become stressors themselves when they are perceived as threatened, such as social networks during the pandemic.

From the onset of the crisis, public concerns have highlighted the pandemic's potential to worsen existing inequalities among youth, particularly affecting those with pre-existing vulnerabilities. This aligns with a well-documented stress sensitization hypothesis, suggesting that previous adversities lower the threshold for negative emotional responses to new stressors (Rutter, 2012). Conversely, resilience research also introduces a less explored hypothesis of *steeling effect*: moderate earlier adversity may actually strengthen one's resilience, better preparing individuals for future challenges (Rutter, 2012). For example, some individuals with prior experiences of social isolation may have been better prepared to cope with the pandemic-induced social restrictions.

Emerging studies on resilience suggest that stress-related experiences often lead to stress-related growth or post-traumatic growth (Tedeschi & Calhoun, 2004; Vaughn et al., 2009). The pandemic, while potentially hampering socioemotional development, also presented opportunities for individuals, families, and educational institutions to develop new skills, connect in new ways, build socio-emotional

competencies, and discover new resources to cope with stress. For example, a study based on a representative sample among young people in Baden-Württemberg, German, found that those personally affected by the COVID virus maintained a more optimistic outlook compared to their peers without such experiences (Hartz et al., 2023).

Although much of the existing research has focused on negative psychological effects of the pandemic such as depression, loneliness and anxiety (Kauhanen et al., 2022; Marchi et al., 2021; Mucci et al., 2024), positive outcomes such as optimism, life satisfaction, and self-regulation capabilities are equally vital. The positive aspects of well-being are closely linked with adolescents' future social integration, academic success, health, and overall resilience (Honicke & Broadbent, 2016; McRae & Gross, 2020).

The Resilience Portfolio Model summarizes the abovementioned perspectives by describing four processes through which protective factors can lead to positive outcomes. These include the insulating effect, where a protective factor reduces the likelihood of adversity; the additive effect, promoting healthy functioning regardless of stress levels; the buffering effect, mitigating the impact of stressors; and the steeling effect, where manageable stress exposure enhances future coping abilities (Grych et al., 2015).

While the pandemic has undoubtedly presented significant challenges, it has also created opportunities for psychological growth and enhancing societal resilience. Previous research indicates that resilience is the predominant response to various forms of acute adversity (Bonanno et al., 2011). Importantly, resilience should be viewed as a dynamic process, continually shaped by our responses to new challenges and experiences.

1.2 Controversies related to pandemic effects

In psychological research, particularly in quantitative studies, it is common to classify factors influencing adjustment into negative (risk/vulnerability) and positive (protective/promotive/resilience) categories. For example, social networks are typically viewed as protective, while experiences of peer victimization are considered as risk factors. However, resilience scholars have argued that this binary categorization fails to capture the interdependent and context-specific impacts of these factors, and additionally, factors predicting resilience often differ from antecedents of positive adjustment in general (Luthar et al., 2000; Ungar et al., 2013). Moreover, focusing solely on individual risk factors can inadvertently place the burden on vulnerable individuals, overlooking systemic issues that contribute to these adversities (e.g., obesity as a risk factor for peer victimization).

The pandemic provided a unique context to explore these complexities. For instance, the increase in family time due to the social restrictions resulted in varied outcomes – while some families experienced more support and positive interactions, others faced increased conflict, abuse, or anxiety. Similarly, the rise in screen time and social media usage during the pandemic, especially with adolescents seeking connection to, has shown mixed effects. Studies indicate that these factors correlate with increases in anxiety and depression, yet the evidence for the direction of these relationships remain unclear (Lee et al., 2022; Orben, 2020).

Another point of contention involves the sociopsychological aspects of schooling. While school attendance is generally considered essential for academic, emotional and social development, the pandemic and prior research on home schooling has shown that disconnection from school-related social networks might sometimes benefit those who are victimized or socially anxious (Farrell et al., 2024; Havik & Ingul, 2021; Lorijn et al., 2023). Promoting school-related peer relations and belonging is considered positive, yet the social aspects of schooling are also one key domain of adolescents' emotional difficulties.

Overall, adolescence is a critical period of development marked by increased emotional intensity and sensitivity to social interactions. While this phase typically involves the acquisition of new competencies, it also sees a decline in subjective well-being (Steinberg, 2005). Pandemic conditions may have further amplified these developmental challenges, yet also provided relief from some social stressors. One particularly notable age cohort during this time was adolescents transitioning to tertiary education or employment and moving away from home during lockdowns. This group faced unique challenges as they navigated significant life changes amidst unprecedented restrictions, and they were the focus of Study II.

Finally, mixed findings on pandemic impact may also be related to cultural or regional differences in several respects. Countries and regions varied in their policy responses, including the extent of social restrictions and school lockdowns, as well as in their efforts to mitigate the negative psychosocial effects. Cultural differences may also influence how children are raised and integrated into society in general, adding another layer of complexity to the pandemic effects. However, it is worth nothing that in the Nordic countries studied, school lockdowns were relatively short (OECD, 2022) and in Finland, the social transfers effectively shielded families from the negative economic impacts of the pandemic, especially those who were most vulnerable (Kärkkäinen et al., 2023). In both Nordic countries and South-Australia, school lockdown policies were applied universally, making it impossible to compare areas with major differences in social restrictions. Given these extensive complexities, it was beyond the scope of this thesis to elaborate on the differences in cultural or regional contexts of the conducted studies. Thus, this thesis focuses on average population-level trends rather than comparing specific regions or countries.

1.3 Five waves of pandemic impact research

Several scholars have highlighted concerns regarding the methodological quality of pandemic research, noting the complexities involved in assessing the impact of such a global event (Gorman, 2023; Neugebauer et al., 2023; Sonuga-Barke, 2021; Vaillancourt et al., 2021). The urgency of the crisis often led to studies that lacked theoretical depth, rigorous methodology, and robust data, resulting in weakly grounded conclusions, especially concerning the causal effects of the pandemic. As the public focus has shifted away from the pandemic, a more robust body of research has begun to emerge. This section provides an overview of the evolution of quantitative pandemic impact research, identifying five distinct waves, each characterized by differing methodological approaches and challenges. Furthermore, it contextualizes the studies of this thesis within this evolving research landscape.

The *five waves of pandemic research* illustrate the progression in study designs and methodologies aimed at capturing the varying impacts of the pandemic. While not exhaustive, this narrative highlights the evolving nature of research during a global crisis and sets the stage for developing future research. Figure 1 presents an approximate timeline, mapping the five waves, the studies of this thesis, and the pandemic.

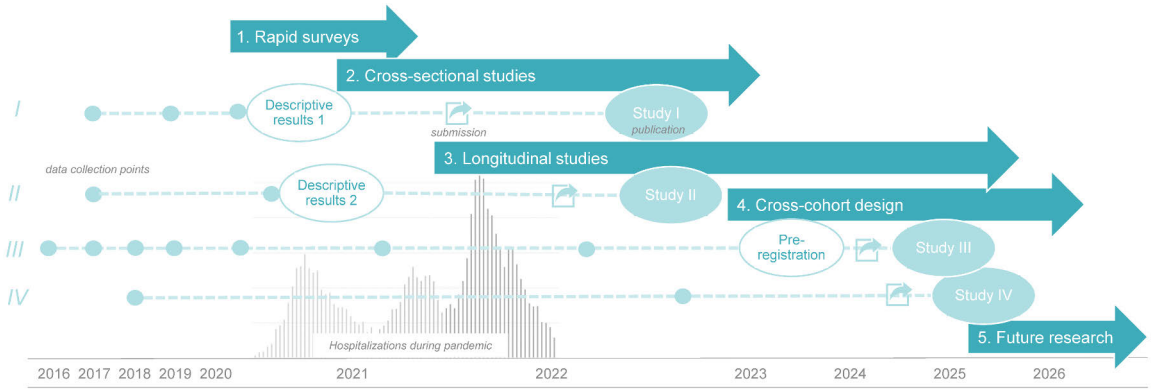

Figure 1. Timeline for the five waves of the pandemic impact research and the thesis' studies.

The first wave, *Rapid survey reports*, primarily provided descriptive statistics without theoretical contextualization or statistical testing. These early surveys quickly informed policymakers and the public about adolescents' immediate reactions to school closures and other sudden changes. In Finland, at least, governmental bodies were active in initiating this wave. As an illustrating example, this thesis project, starting with two rapid survey data collections in April 2020, published the initial findings in early May 2020 (Liiten, 2020; Repo, Poskiparta, et

al., 2020), followed by an applied report and a policy brief in October 2020 (Repo, Herkama, et al., 2020; Repo & Herkama, 2020). This early work positioned us among the first to inform Finnish policymakers and educational institutions about students' reactions to school closures, showing some students suffering but others enjoying the unforeseen conditions. These applied publications are not part of the academic thesis, yet the data collected were used in Study I and Study II.

In the second wave, *Cross-sectional studies*, academic journals were filled with studies with one-time measurements, often based on low-quality samples. A recent paper reviewing all COVID-19 related research reports in 15 top-ranked generalist public health journals in 2020 (N = 72) found that nearly two-thirds of them were cross-sectional surveys, mostly using convenience samples, or analyses of social media data. Median time in peer review was only three weeks, only one study was pre-registered, and several very highly cited studies went beyond the capacity of their cross-sectional study designs to draw invalid causal inferences (Gorman, 2023).

Such cross-sectional studies primarily assessed respondents' subjective perceptions of immediate pandemic impacts, such as perceived increase in stress, fear, or concerns regarding the impact of the pandemic. A key limitation with such retrospective assessments is that they may be biased in ways that are not always predictable, as study participants may either idealise their mental health prior to the pandemic or minimise their pre-pandemic problems relative to current psychological distress. Another limitation with such impact measures is that certain subpopulations may generally report emotional impacts more negatively than others, regardless of the stressful event (Van Vaerenbergh & Thomas, 2013). Additionally, these studies may suffer from common method bias, resulting in inflated correlations (Podsakoff et al., 2003). For example, a recent Australian study demonstrated that even though a great majority of students perceived a negative pandemic impact on their capacity to study, their academic performance and self-efficacy levels mirrored those of a pre-pandemic cohort (Talsma et al., 2021). Together, these limitations may impact study findings and lead to unknown over- or under-estimation of the extent of change / pandemic effects.

Study I illustrate this wave, building on cross-sectional data and examining student's reports on home schooling experiences during the first school lockdown. However, to strengthen the assessment of pandemic impact it compared the during-pandemic survey results to pre-pandemic studies using similar measures.

The third wave, *Longitudinal studies,* offered significant advantages over cross-sectional studies, providing a dynamic insight into changes over time and allowed some determination of causality by controlling for individual differences. However, these studies often lacked baseline (pre-pandemic) data, focused on a limited period of the pandemic, or faced issues such as sample attrition, a profound problem especially during the pandemic. These studies often tell little about the lasting

pandemic effects, as there is no reason to expect that the initial effects can be extrapolated linearly to the substantially longer pandemic experiences (Werner & Woessmann, 2023). In addition, longitudinal studies with 2-3 measurement points cannot detect nonlinear change which is typical for youth development as well as pandemic effects (Vaillancourt et al., 2021).

Many ongoing research projects were adapted to feed the knowledge demand regarding pandemic impact. Such was the case with Study II, which builds on a pre-pandemic study data, adding a new survey data collection among the same respondents. With the two-wave longitudinal design, the study aims to evaluate changes in anxiety symptoms among students affected by the pandemic.

The fourth wave, *Cross-cohort studies*, aimed to address a major problem in earlier studies: the lack of a control group which had not experienced the crisis (see e.g., Neugebauer et al., 2023). These studies, such as Study III of this thesis, compared adolescents' trajectories across different time periods and age cohorts to separate normative developmental changes from those specifically related to the pandemic. Cross-cohort comparison was also used with cross-sectional data, like in Study IV, which compared two cross-sectional PISA datasets from 2018 and 2022, with nationally representative samples from three Nordic countries. While powerful, limitations with this approach include unmeasured differences between cohorts as well as cohort effects unrelated to pandemic effect (e.g., longer term increases in reporting mental health symptoms).

In addition to these waves, numerous reviews have attempted to combine evidence on pandemic impact (Bevilacqua et al., 2023; Kauhanen et al., 2022; Mucci et al., 2024; Panchal et al., 2021; Prati & Mancini, 2021; Samji et al., 2022; Windarwati et al., 2022; Wolf & Schmitz, 2024). Despite quality criteria applied in selecting the reviewed studies, summarizing evidence with previously mentioned shortcomings does not make the evidence base much better, and might misguide the decision-makers. Firstly, summarizing existing studies does not increase the (small) number of studies based on representative random probability samples. Secondly, no amount of cross-sectional observational studies of the link between lockdown and mental health problems can tell us anything about causal pathways (Sonuga-Barke, 2021). In two well-cited systematic reviews on mental health outcomes, more than 70% of reviewed studies were cross-sectional (Panchal et al., 2021; Samji et al., 2022). Even if the authors of the review do not explicitly infer causal pandemic impacts, they leave a lot of responsibility for the reader by reporting associations which are not actually pandemic-related but mirror normative conditions; for example an abstract of a well-cited review states: "Older adolescents, girls, and children and adolescents living with neurodiversities and/or chronic physical conditions were more likely to experience negative mental health outcomes." (Samji et al., 2022).

The fifth wave, *Future studies*, is described in the concluding chapter.

2 Aims of the Thesis

The main purpose of the thesis was to investigate adolescents' socio-emotional and academic adjustment during the COVID-19 crisis and to explore the differences accounting for the variability in their pandemic responses. The overarching research questions were as follows:

A. To what extent did the pandemic have an effect on adolescents' emotional, social and academic adjustment?
B. To what extent did adolescents' pre-existing psychological and socio-ecological vulnerabilities predict their pandemic responses? To what extent did the pandemic exacerbate pre-existing inter-individual differences?

The key questions addressed in the individual studies were:

Study I:

1. What happened to the prevalence of school bullying in general in Finnish schools when its offline context was locked down? To what extent did the rates of cyberbullying increase?
2. How did before-lockdown victimized students experience remote schooling, in terms of experiences of school adjustment and perceived support from parents, teachers, and peers?

Study II:

3. How did the extent of anxiety symptoms change from the onset of secondary school to the time of expected graduation in the midst of the pandemic among Finnish emerging adults?
4. Did prior adversities (i.e., pre-pandemic anxiety, loneliness, or peer victimization) predict or protect from an increase in anxiety symptoms?

Study III:

5. To what extent did the pandemic affect the development of academic self-efficacy and cognitive reappraisal in adolescents in South-Australian schools?
6. Did the pandemic exacerbate between-person differences in the development of these two outcomes?
7. To what extent did gender, family background, or initial levels of anxiety, peer belonging, and teacher support predict possible pandemic effects?

Study IV:

8. Are there differences in adolescent well-being between the 2018 and 2022 PISA cohorts, based on latent profile analysis of school attendance, life satisfaction, and school belonging?
9. To what extent has the pandemic intensified the family background effects on well-being, and the association between well-being and academic performance?
10. Has the relationship between family background and academic performance become more pronounced within specific adolescent well-being profiles?

3 Method

3.1 Participants and Procedure

Data for the thesis was both collected for this study and drawn from existing research projects or data infrastructures (see Table 1). For Study I, survey data was collected from Finnish basic education schools, and supplemented with data from the Finnish KiVa annual student survey (Herkama & Salmivalli, 2018) and School Health Promotion Study (Finnish Institute for Health and Welfare, 2024). For Study II, survey data was collected in Finland and merged with data from a previous research project from upper secondary schools. Data for Study III was drawn from the Wellbeing and Engagement Collection from South-Australia (Gregory et al., 2022), and for Study IV from the PISA datasets (OECD, 2023), covering three Nordic countries.

Table 1. Study datasets and key outcomes.

	Key outcome	**Country**	**Year**	**N**	**Age**
Study I	*Peer victimization*				
School Lockdown Survey*		Finland	2020	34 771	10-16
School Health Promotion Study		Finland	2017, 2019	24 727	10-16
KIVA Survey		Finland	2019	43 216	10-16
Study II	*Anxiety symptoms*				
Post-graduation Survey*		Finland	2020	330	~19
Opintokamu Survey		Finland	2017	330	~16
Study III	*Self-efficacy and cognitive appraisal*				
Wellbeing and Engagement Collection		South-Australia	2016-2022	28 307	11-14
Study IV	*Student well-being profiles*				
PISA student survey and learning assessments		Finland, Sweden, Iceland	2018, 2022	33 147	15

Note. * = data collected for this study.

3.1.1 Study I

The main data of Study I came from a large student survey conducted during the school lockdown in spring 2020 (hereafter School lockdown survey, N = 34 771), including participants from 406 Finnish public basic education schools (~20% of all basic education schools in Finland). Participants were from grade levels 4–9 (10- to16-year-olds). All schools implementing the KiVa antibullying program in Finland (Herkama & Salmivalli, 2018) were invited to participate in the survey instead of the annual KiVa survey. Teachers advised students to fill in the anonymous online questionnaire during distant learning classes or as homework. The data were gathered in the first two weeks of May in 2020, 7–8 weeks after the school lockdown had started. The schools reopened nationwide on May 14, and Finnish primary schools have not been fully closed thereafter.

The School lockdown survey data were supplemented with data from two previous cross-sectional student surveys collected in the same schools (see Table 1.). They provide a reference point to the results even though individual respondents could not be matched between the samples. The KiVa survey is conducted annually in all grade levels in schools implementing the KiVa antibullying program. The KiVa survey data used in Study I were collected in spring 2019 (N = 43,216 with 335 matching schools).

The national School Health Promotion Study is a biennial comprehensive student survey conducted in Finnish primary and secondary schools nationwide. It consists of two versions, one for grade levels 4–5 and another for grade levels 8–9. The subsample with matching schools with the School lockdown survey included respondents from 249 schools from grades 4–5 (n=13 735), and from 100 schools from grades 8–9 (n=10 992). These samples were collected in Spring 2017. In addition, previously published national results from the SHP Study were used to assess for a possible bias in the study samples. Detailed information on data can be found at: www.thl.fi/kouluterveyskysely.

3.1.2 Study II

The Study II comprises 330 emerging adults (Mean age = 19.1, SD = 0.4, 67% female) finishing their secondary education in a Finnish high school or vocational institute. They were surveyed initially during their first study year (fall 2017) in the context of another research project and again during the pandemic first wave in summer 2020, right after their expected graduation. In total, 330 individuals participated in both waves and provided informed consent. Compared to the initial survey (N=3,007), respondents in the final longitudinal sample were more likely to be females (67% vs. 53%) and from high school (73% vs. 56%). The initial survey

sample did not differ from the final longitudinal sample regarding age, maternal education level, pre-pandemic anxiety, and pre-pandemic loneliness.

3.1.3 Study III

Study III used data from two sources: an annual student well-being survey and school enrolment data, both part of the South Australian Wellbeing and Engagement Collection (WEC) administered by the South Australian Department for Education since 2013 (Gregory et al., 2022). Our sample included students from governmental schools, where about 65% of South Australian students were enrolled. The sample consists of two age cohorts. The first cohort completed grades 6 to 9 before the pandemic in 2016 – 2019, and the second during the pandemic, in 2019 – 2022. The annual data collection took place at different times: in 2016 (October/November), 2017 (July/August), 2018 (July/August), 2019 (March/April), 2020 (February and July/August), 2021 (February), and 2022 (February). The school year in Australia runs from late January to mid-December.

The final sample included 13,372 respondents in the pre-pandemic cohort and 14,935 respondents in the during-pandemic cohort. Both cohorts had 49% females, 51% males, and mean age 11.2 at T1 (grade 6). The proportion of missing responses varied between 28.0 - 46.2% by wave and cohort, whereas the number of respondents ranged from 7,786 (T4, pre-pandemic) to 10 584 (T1, during-pandemic). The greatest difference between cohorts was in T2 (during-pandemic NA% 46.2 and pre-pandemic 31.9). Overall, the missing data patterns were similar across cohorts.

3.1.4 Study IV

Study IV utilized two cross-sectional datasets from PISA 2018 and 2022 (OECD 2023). Specifically, it used student questionnaires and learning assessments conducted in three Nordic countries: Sweden, Finland, and Iceland. After excluding cases with missing data on all well-being indicators, it analysed data from 5,452 (2018) and 10,036 (2022) Finnish adolescents; 5,288 (2018) and 5,952 (2022) Swedish adolescents; and 3,112 (2018) and 3,307 (2022) adolescents from Iceland.. The pooled sample size was 33,147 (50 % girls). Detailed information on the PISA data can be found at www.oecd.org/pisa.

3.2 Measures

3.2.1 Outcome Variables

In Study I, peer victimization was measured in the School lockdown survey with two single item measures, adapted originally from the Olweus Bully/Victim Questionnaire (Olweus, 1996). First, during-lockdown peer victimization was assessed with a global item: "Have your peers from school bullied you during the remote schooling?". Secondly, before-lockdown peer victimization was measured by asking respondents to assess their experiences retrospectively: "Have your peers from school bullied you during this year, before the remote schooling began?". Response options for both items were "not at all", "once or twice", "2 or 3 times a month", "about once a week" and "several times a week". School liking was measured with a question "How do you like schooling at the moment?" with response options "not at all", "quite little", "quite a lot", and "a lot"; corresponding to the School Health Promotion Study. Perceived teacher support was measured with two questions. For the question "Do you think there has been something positive in the remote schooling?" the respondents selected all options that applied to them, from a pre-defined list of options. For the teacher support measure, the option "I have got more support from teachers" was used (1=yes, 0=no). The second question was "How did your teacher organize the remote schooling?" with items "By sending us assignments and material", "By giving out video lessons", "By talking with me one-to-one", and "By organizing group discussions in addition to lessons." (1=yes, 0=no).

In Study II, anxiety symptoms were measured with the 7-item Generalized Anxiety Disorder Scale (GAD-7) assessing symptoms severity during the preceding two weeks (Spitzer et al., 2006), with response scale from 1 (not at all) to 4 (nearly every day) both before (α=.91) and during the pandemic (α=.92). Sample items are "Feeling nervous, anxious or on edge" and "Trouble relaxing".

In Study III, academic self-efficacy and cognitive reappraisal were measured at four waves using a 5-point scale varying from 0 ("strongly disagree") to 4 ("strongly agree"). Academic self-efficacy, measured with three items (e.g., "I am certain I can learn the skills taught in school this year.") had a Cronbach's alpha ranging from .82 to .87 across time and cohort. Cognitive reappraisal, also measured with three items (e.g., "When I'm worried about something, I make myself think about it in a different way that helps me feel better.") had a Cronbach's alpha ranging from .84 to .91 across waves and cohorts.

In Study IV, the profiles of student well-being were identified based on indicators of school belonging, school attendance, and life satisfaction. School belonging was measured using a 6-item scale with four response options ranging

from “strongly disagree” to “strongly agree”. Sample items were “I make friends easily at school” and “I feel like I belong at school”. After recoding the reversed items, higher scores on the combined index indicated higher levels of school belonging. In terms of reliability, Cronbach’s alpha in the full sample was .86. School attendance was measured using three items: (1) skipping the whole school day; (2) skipping some classes; or (3) arriving late to school in the previous 2 weeks. Responses included “never”, “one or two times, “three or four times”, and “five or more times”. Items were log-transformed to reduce skewness and inversed to create a combined index, where higher scores indicated higher school attendance. In terms of reliability, Cronbach’s alpha in the full sample was .66. Life satisfaction was measured using a single item “Overall, how satisfied are you with your life as a whole these days?” with possible answers ranging from 0 to 10, with higher scores reflecting higher life satisfaction. The three indicators were standardised by country, resulting in a mean of 0 and a standard deviation of 1 in each country. Literacy and math competences were measured comparably in PISA 2018 and PISA 2022. Literacy competence reflects students’ capabilities to “access and retrieve information, understand, use, evaluate, reflect on and engage with one or more texts”, and math competence one’s capabilities to “formulate situations mathematically”, “employ mathematical concepts, facts, procedures and reasoning” and “interpret, apply and evaluate mathematical outcomes” (OECD, 2019).

3.2.2 Key independent variables

Key independent variables were assessed with multiple item measures, and overall, the generated scales demonstrated satisfactory reliabilities. In Study II, pre-pandemic loneliness was measured with a 12-item version of the UCLA loneliness scale (Hughes et al., 2004). Peer victimization history was measured retrospectively during pandemic with two items. Experiences of social inclusion were measured during the pandemic with 10 items measure (Leemann et al., 2021). In Study III, Anxiety symptoms were measured at baseline using a 4-item scale, Peer belonging with a 3-item scale, and Teacher support with a 5-item scale, all developed for the WEC survey (Gregory et al., 2022). In Study IV, the PISA index of student’s students’ economic, social, and cultural status (ESCS) derived from three variables related to student’s family background was used. All measures except peer victimization history were adopted from previous studies.

3.3 Study Designs and Analytic Strategies

The key outcomes and analyses assessing the pandemic impact are summarized in Table 2. Studies I and II compared data from the first pandemic wave (2020) to pre-

pandemic data, while studies III and IV included data collected before and after major pandemic waves. Statistical analyses ranged from simple mean comparisons (Study I) to latent change score modeling (Study II), multigroup latent change curve analysis (Study III) and latent profile analysis and mediation analysis (Study IV). Study I descriptively compared pandemic survey results with pre-pandemic studies using the same measures but different samples. Study II followed adolescents over two measurement points but lacked a non-pandemic comparison, so effects found were not necessarily pandemic-related. Study III compared adolescents' development during the pandemic with a pre-pandemic cohort, testing differences in change rates. Study IV compared cross-sectional PISA cohorts from 2018 and 2022. After finding similar latent profiles of student well-being in both cohorts, the study explored the associations of SES and well-being, well-being and academic performance, and SES-effects on performance mediated by well-being. Pandemic effects were tested through cohort differences in these associations.

Table 2. Outcome variables and main analysis for assessing pandemic impact.

Domain	Outcome	Study	Main analysis for assessing impact	Year(s)
Emotional				
	Anxiety symptoms	I	T-tests, Chi-square tests	17 vs 20
	Anxiety symptoms	II	Latent Change Score Modeling	17 vs 20
	Cognitive reappraisal	III	Multigroup Latent Change Curve Modeling	16-19 vs 19-22
	Life Satisfaction	IV	Multigroup Latent Profile Analysis	18 vs 22
Academic				
	Difficulties in learning and school liking	I	T-tests, Chi-square tests	17 vs 20
	Academic Self-Efficacy	III	Multigroup Latent Change Curve Modeling	18 vs 22
	Literacy and Math scores	IV	Causal Effect Decomposition Analysis	
Behavioral				
	Peer Bullying	I	T-tests, Chi-square tests	17 / 19 vs 20
	School attendance	IV	Multigroup Latent Profile Analysis	16-19 vs 19-22
Social				
	Loneliness	I	T-tests, Chi-square tests	17 vs 20
	Parental support	I	Self-assessment of impact	20
	School connectedness	IV	Multigroup Latent Profile Analysis	18 vs 22
Economic				
	Employment/education transition disruptions	II	Frequencies of self-assessments	20

3.4 Open Science Practices Applied

The thesis implemented several open science practices across its studies. For Study I and II, the author developed an interactive online tool to share survey results with the public and participating schools (Repo, Poskiparta, et al., 2020). The descriptive results from the School Lockdown Survey (Study I) were published on the same day Finland's first school lockdown ended, 14 May 2020, accompanied by interviews, presentations, and blog posts[1] (Liiten, 2020). For Study II, the survey was co-created, co-collected, and co-interpreted with key stakeholders, including national student unions representing high school and vocational students in Finland. Initial results were rapidly published as an applied research report and policy brief (Repo, Herkama, et al., 2020; Repo & Herkama, 2020).

All four studies utilized secondary data, from five different data collections. Study III was preregistered before data analysis, and the publication includes the analytic code and supplementary online materials to ensure research transparency, see https://doi.org/10.17605/OSF.IO/HKQ39. For Study IV, the author developed procedures for a reproducible workflow in R, published as an online educational tutorial (Repo, 2024). This approach ensures 100% replicability, with both data and analytic code openly shared, making it easy to verify and replicate using publicly available PISA data from other countries. Study IV will be published as a pre-print. All studies were published with Open Access.

[1] Interestingly, the largest Finnish newspaper summarized the survey results already on May 14, 2020, as follows: Experiences with distance education were mostly positive; bullying decreased; older pupils were worried about learning losses; most students missed their peers but enjoyed sleeping longer. Interviewed professor Christina Salmivalli noted that disparities in both learning and well-being likely increased during the lockdown. She also mentioned that some students might have been relieved from school-related social pressures and suggested that distant education could be utilized in future schooling (Liiten, 2020).

4 Overview of the Studies

STUDY I

Repo, J., Herkama, S. & Salmivalli, C. (2023). Bullying Interrupted: Victimized Students in Remote Schooling During the COVID-19 Pandemic. *International Journal of Bullying Prevention* 5, 181–193.

The first study focused on the dynamics of bullying victimization during the pandemic. With a substantial sample of 34,771 students aged 10 to 16, we collected and analysed survey data from the spring of 2020, during the height of remote schooling, and compared it with pre-pandemic data from the same schools. Our findings indicated that bullying victimization saw a significant decrease across all grade levels as schools went into lockdown. The relative difference in prevalence ranged from 49.3% to 73.9% (depending on grade) between pre-lockdown and during lockdowns in 2020. On average, every third before-lockdown victimized student continued to be victimized during the lockdown. Furthermore, there were very few new victims during the 8-week lockdown period.

Our study was among the first to explore how students suffering from prior bullying victimization experienced remote schooling during the COVID-19 pandemic. The pandemic proved to be a relief for many bullied students. Before-lockdown victimized adolescents seemed to experience higher school liking and less difficulties in learning during than before the school lockdown. During the remote learning, the pre-existing gap in school liking between victimized and non-victimized students was non-existent. Furthermore, victimized students reported receiving more teacher support compared to other students during the lockdown.

Despite increased internet usage during the lockdown, a feared rise in cyberbullying did not materialize: the prevalence of overall during-pandemic victimization was lower compared to cybervictimization in the before-pandemic conditions. Taken together, sadly, the school lockdown seemed to be the most effective universal anti-bullying intervention ever documented.

STUDY II

Repo, J., Herkama, S., Yanagida, T., & Salmivalli, C. (2023). Transition to emerging adulthood during the COVID-19 pandemic: Changes in anxiety and the role of inclusion/exclusion experiences. ***European Journal of Developmental Psychology*****, 20(4), 649–665.**

In the second study, we investigated changes in anxiety among emerging adults who were about to experience an important normative educational transition, namely secondary school graduation, during the first lockdown in 2020. Data (N = 330) were collected in Finland from adolescents during their first year in secondary school in 2017 and, again in the summer 2020, right after most of these students had graduated.

We analysed whether the anxiety levels of study participants increased between the first year in secondary school and graduation and whether perceived pandemic-related educational disruptions, pre-pandemic vulnerability factors (e.g., peer victimization and loneliness), during pandemic protective factors (e.g., social inclusion experiences and living with parents) or gender were predictive of these changes.

First, we observed slight overall increase in anxiety levels. Next, we found that higher levels of perceived pandemic disruptions were related to both higher anxiety levels during the first year in secondary school and after graduation. However, perceived pandemic disruptions and gender were unrelated to the increase of anxiety over time. Instead, higher increases in anxiety were associated with lower levels of pre-pandemic anxiety and lower levels of pre-pandemic loneliness, yet with lower levels of social inclusion experiences and not living together with parents.

Although we were not able to rule out normative developmental changes and the findings cannot be generalized to the entire pandemic, the study offered an interesting spotlight on a group that was in a normative educational transition during the first COVID-19 lockdown. It also indicated that, for the emerging adults, the first lockdown might have been more anxiety inducing among less vulnerable individuals who had less experiences of anxiety and loneliness when starting the secondary school.

STUDY III

Repo, J., Herkama, S., & Salmivalli, C. (2024). Equitable Shifts in Youth Resilience? Distinguishing Normative Changes and Pandemic Effects on Academic Self-Efficacy and Cognitive Reappraisal. ***Developmental Psychology.***

The third study expanded the scope of the thesis to cover the entire duration of the crisis and broadened its geographical reach. The author negotiated to leverage data from the Well-being and Engagement Collection, which is claimed to be the world's largest longitudinal dataset monitoring youth well-being at the individual level (Gregory et al., 2022).

The preregistered longitudinal study III examined the long-term effects of the pandemic on academic self-efficacy and cognitive reappraisal in early adolescence (N = 28,307). It followed and compared two cohorts over four years: one pre-pandemic (11–14 years, 2016–2019) and one during the pandemic (11–14 years, 2019–2022). Employing latent growth modeling and a novel cohort comparison design, the study addressed a major limitation in pandemic studies: it separated pandemic effects from normative developmental changes.

Results indicated that the pandemic cohort largely followed typical yet declining developmental trajectories, showing resilience at a population level, but with a slight exacerbating effect harmful for those initially low in the measured outcomes. Unexpectedly, the examination of multiple covariates (i.e., gender, socioeconomic status, non-English background, anxiety, peer belonging, teacher support) showed that pre-existing vulnerabilities did not predict adverse pandemic effects. This study underscored the value of longitudinal data infrastructures and the importance of understanding normative youth development and resilience research in discerning the effects of pandemics or other widespread crises.

STUDY IV

Repo, J., Reimer, D., & Kilpi-Jakonen, E. (in review). Student Well-being and Educational Disparities in Nordic Countries. A PISA-Based Latent Profile Analysis of Pandemic Impact (2018-2022).

Study IV conducted a cross-cohort comparison using PISA 2018 and 2022 data from 15-year-old Nordic students (N = 33,147) to evaluate shifts in student well-being and its relationship with academic performance in reading and math, particularly in the context of the COVID-19 pandemic. This study employed a person-centered approach to identify distinct segments of students based on their school attendance, life satisfaction, and school belonging.

Four well-being profiles were identified in both cohorts: High Well-being, Moderate Well-being, Present but Disconnected and Disengaged. Unexpectedly, the proportions of students within each well-being profile remained stable over time. Lower socioeconomic status (SES) was consistently associated with less favourable well-being profiles, though the interaction between SES and cohort was not significant, indicating persistent but not worsening disparities. Academic performance declined across all profiles, with smaller losses observed among students with lower well-being, suggesting a slight levelling effect. The SES effect on academic performance strengthened only within the High and Moderate Well-being profiles. Mediation analysis indicated that well-being played a minimal impact on the relationship between SES and academic performance, with no significant increase in the mediation effect over time.

In conclusion, the study results contrast with the prevailing public narrative that the pandemic exacerbated educational disparities related to well-being, particularly for disadvantaged students. This research contributes to the ongoing discussion on academic well-being and socio-educational inequalities in the post-pandemic era.

Table 3. Summary of study results regarding pre-existing vulnerabilities.

Domain	Predictor	Study	Effects	Effect type
Emotional				
	Pre-pandemic anxiety	II	Predicted smaller declines in anxiety.	Levelling
	Pre-pandemic anxiety	III	No evidence for effect on self-efficacy or cognitive reappraisal.	Ns. effect
	Pre-pandemic cognitive reappraisal	III	Those starting low negatively affected in cognitive reappraisal development.	Amplifying
	Student well-being profiles	IV	No significant cohort difference in profiles.	Ns. effect
Academic				
	Pre-pandemic teacher support	III	Those high had steeper declines in on self-efficacy and cognitive reappraisal.	Levelling
	Pre-pandemic Academic Self-Efficacy	III	Those starting low were negatively affected in academic self-efficacy development.	Amplifying
	Well-being effects on learning outcomes	IV	Disconnected students seemed to suffer less from pandemic learning losses.	Levelling
Behavioural				
	Pre-pandemic victimization	I	Victimized students less adversely affected.	Levelling
	Pre-pandemic victimization	II	No evidence for effect on change in anxiety.	Ns. effect
Social				
	Pre-pandemic loneliness	II	Predicted smaller declines in anxiety.	Levelling
	Pre-pandemic peer belonging	III	No evidence for pandemic effect on academic self-efficacy or cognitive reappraisal.	Ns. effect
Socio-economic				
	Maternal education level	II	No evidence for effect on anxiety change.	Ns. effect
	Highest parental education level	III	No evidence for pandemic effect on academic self-efficacy or cognitive reappraisal.	Ns. effect
	Socio-economic background	IV	No evidence for increased effect on student well-being or for indirect effect on academic performance via well-being.	Ns. effect
	Socio-economic background	IV	Direct effects on academic performance increased modestly. Effect on academic performance increased among students with higher well-being.	Amplifying

5 Discussion

Regarding the main topic of this work – the pandemic impact on adolescents' adjustment – the four conducted studies only provide a partial exploration of this vast question. Despite their varied outcomes, pandemic timepoints, analytic approaches, geographical reach, and target age groups, all results share some notable commonalities. First, the average negative pandemic effects were generally marginal or negligible. Specifically, there were no increases in cyberbullying (study I, ages 10-16), a marginal increase in anxiety (study II, age ~19), no effect in academic self-efficacy and only a marginal decrease in cognitive reappraisal (study III, age 11-14), and no change in student well-being profiles (study IV, age 15).

Secondly, in aiming to identify subgroups most affected and test whether the pre-existing vulnerabilities and disparities were amplified, we found interesting similarities across the studies. The results indicated that pre-pandemic victimized pupils were less negatively affected (Study I), pre-pandemic anxiety, victimization, or loneliness did not predict increases in anxiety (Study II), and family background, pre-pandemic anxiety, peer belonging, or teacher support did not predict decreases in academic self-efficacy or cognitive reappraisal (Study III). Additionally, the association of family background and student well-being did not strengthen during the pandemic (Study IV). Across the four studies, only two findings indicated that prior vulnerabilities predicted adverse pandemic effects. In Study III, lower initial levels of academic self-efficacy and cognitive reappraisal were associated with greater negative pandemic effects on these competences. In Study IV, the effect of family background on academic performance seemed to increase slightly, but only among students with higher well-being.

Taken together, these results do not indicate a substantive negative pandemic impact, nor do they align with the prevailing discourse suggesting a pandemic-induced aggravation of adolescents' adjustment, particularly for those with pre-existing vulnerabilities. These findings and their implications are discussed in more detail below.

5.1 Average pandemic effects

Study I was among the first to explore how students previously subjected to peer victimization experienced remote schooling during the pandemic, and what happened to bullying during school lockdowns. Several reviews and meta-analyses have corroborated our findings, showing decreasing rates of traditional bullying and no major increase in cyberbullying despite the surge in screen time (Huang et al., 2024; Kennedy, 2024; Sorrentino et al., 2023; Vaillancourt et al., 2023). However, the results vary somewhat due to differences in study methodologies, timeframes, and cultural contexts.

Study II highlighted a special group of adolescents who graduated from secondary school amid the pandemic. Our results showed only marginal increases in anxiety levels compared to the onset of secondary school studies, though the sample was not representative and restricted to the first wave of the pandemic. Several studies with more robust designs have reported heightened anxiety levels during the pandemic (Windarwati et al., 2022). However, evidence on whether long-term increases deviate from the pre-pandemic (increasing) trends is only emerging (Kiviruusu et al., 2024). Studies examining long-term changes and including post-pandemic data have shown inconclusive results. For example, in Finland, the proportion of anxiety symptoms increased from 2021 to 2023 in girls and decreased among boys, based on nationwide school surveys (Kiviruusu et al., 2024).

While most studies have focused on adolescents' ill-health, Study III focused on positive psychological functioning, namely on academic self-efficacy and cognitive reappraisal. The cohort comparison design indicated that, aside an initial dip, the trajectories of the during-pandemic cohort (2019-2022) largely mirrored the normative developmental changes of a pre-pandemic cohort, suggesting no substantive pandemic effects. These results are in contrast with several studies reporting negative pandemic effects on academic self-efficacy (Alemany-Arrebola et al., 2020; Berman et al., 2022; Rohmani & Andriani, 2021). Fittingly, an Australian cross-cohort study corroborated our findings, reporting no changes in self-efficacy beliefs due to the pandemic (Talsma et al., 2021).

In Study IV, student profiles on school attendance, life satisfaction, and school belonging had similar distributions in the 2018 and 2022 cohorts, providing no evidence of pandemic effects. Given the open availability of the PISA data and our analytic code, it would be interesting to test whether these results replicate in countries outside of those studied, namely Finland, Sweden, and Iceland.

Taken together, the results predominantly illustrate the inherent resilience in youth. Despite facing numerous pandemic-related disruptions and negative emotional impacts during a critical developmental phase, adolescents participating in our studies largely maintained their prior states or followed normative developmental trajectories during the pandemic. However, these results do not fully

capture the long-term pandemic impact, leaving the first research question of the thesis unanswered. Nevertheless, these results, which contrast the common narrative and public concern, are significant and can be understood from several perspectives.

Firstly, none of our main results were based on self-assessed pandemic effects. Especially during the first wave, many studies relied on surveys asking respondents to evaluate whether the pandemic had affected them. Despite their popularity, later studies have shown that self-assessed pandemic effects may have no association with observable changes (Repo et al., 2022; Talsma et al., 2021). Secondly, many effects often attributed to the pandemic may actually be part of normative developmental patterns. As illustrated in Study III, without a longitudinal cohort comparison design, it is challenging to distinguish developmental effects from pandemic effects. Thirdly, great proportion of pandemic impact studies were based on cross-sectional design or convenience samples, drawing invalid causal inferences on pandemic impact (Gorman, 2023). Fourthly, this thesis focused mostly on mid-adolescence, some studies indicating that late adolescents and emerging adults may have been more adversely affected (Wolf & Schmitz, 2024).

Finally, regarding some of the outcomes used, specifically, academic self-efficacy, there is some prior evidence that these beliefs can be unexpectedly stable even in extreme circumstances (Foster et al., 2017). On the other hand, academic self-efficacy is a common target of interventions and educational curriculums, and thus considered malleable (Bergey et al., 2019). Study III may well be among the largest study ever conducted reporting adolescent's longitudinal changes (declines) in academic self-efficacy, thus contributing to discussion and future research on this topic.

5.2 Oversimplification of the lost years

Given these results, it is worth noting that public narratives such as the "lost years" or "generation COVID" may become self-fulling prophecies, if not based on strong evidence. Minors tend to reflect and model the moods and behaviours of the adults around them (Burstein et al., 2010), and a culture of increasing worry and stress may have not necessarily aided in preventing psychological sequelae in adolescents. Critics have argued that increased public awareness has paradoxically contributed to the rise in reports of mental health symptoms (Foulkes & Andrews, 2023), media attention devoted to the psychological pandemic impact may have created expectancy effects (Prati & Mancini, 2021), and that normative emotional experiences are increasingly pathologized (Xiao et al., 2023).

Moreover, according to a recent during-pandemic Finnish study (Martikainen & Sakki, 2021), the media tended to position adults as having power while depicting youth as lacking power, offering them merely the identities of villains or victims.

Such public narratives may have amplified the perception of pathological and deterministic pandemic effects. Interestingly, another recent Finnish study indicates that mental disorders are transmitted socially via peer networks, suggesting a mechanism of mental disorder normalization through increased awareness and receptivity to diagnosis and treatment (Alho et al., 2024).

Finally, attributing negative trends solely to the pandemic can be problematic as it diverts attention from long-term trends and their underlying causes. There is clear evidence of ongoing declines in both emotional well-being and academic performance among adolescents, independent of the pandemic (Armitage et al., 2024; Kiviruusu, 2024; OECD, 2023). Speculating about the pandemic effects should not delay policy efforts aimed at addressing these concerning trends.

Taken together, these examples demonstrate the importance of studying and mitigating adverse pandemic impacts not only from a psycho-epidemiological perspective, but also with multiple social science perspectives. This aligns with the socio-ecological model of resilience, emphasizing the need to consider broader social contexts in understanding and fostering youth adjustment.

5.3 Disproportional pandemic effects

Overall, the four studies failed to find strong evidence that prior vulnerabilities predicted more adverse pandemic effects on adolescents. Given that these findings contrast with the public narrative, it is worth discussing similar results found in other studies.

Similar to study I, several studies have found that students suffering from school bullying reported fewer adverse effects compared to their peers. Importantly, reduced victimization seemed to go hand in hand with reductions in mental health difficulties among the victimized students (Farrell et al., 2024). Correspondingly, the finding from study II that individuals with higher levels of pre-existing anxiety had lower increases in anxiety has been corroborated in several studies (Bouter et al., 2022; Haikalis et al., 2022; Hamza et al., 2021; Kleine et al., 2023; Morales et al., 2022; Wolf & Schmitz, 2024). The same applies to the finding in study II regarding pre-existing loneliness (Hamza et al., 2021; Mlawer et al., 2022).

Regarding family background effects, pre-existing socioeconomic disparities related to anxiety (Study II), noncognitive skills (Study III) or student well-being (Study IV) did not seem to amplify during the pandemic. Although research often highlights more adverse pandemic impacts on lower-SES adolescents, the effects of family background are intricate and not straightforward (Ng & Ng, 2022; Wolf & Schmitz, 2024; Wong et al., 2024). Taken together, the overall evidence of the pandemic amplifying the pre-existing inequalities and vulnerabilities among adolescents is mixed (Wolf & Schmitz, 2024).

Some reasons for these findings may include that the pandemic, at least in the short term, may have brought relief to those being victimized in school or suffering from social anxiety. Additionally, social restrictions may have represented a smaller deviation from the typical situation for those already experiencing loneliness or lower peer belonging before the pandemic (Badger et al., 2024). Following the Conservation of Resources theory (Hobfoll, 2011), those with more social resources may have perceived a greater loss, thus showing more declines in their adjustment. Another interesting explanation may be that those with weaker social networks and social cohesion may have been more egocentrically oriented and thus emotionally protected from the burdens and worries related to the global crisis (Hartz et al., 2023).

Additional vulnerable subgroups showing more positive trends compared to their peers include transgender youth (in Finland, see Kiviruusu et al., 2024), and young people low in social cohesion (Hartz et al., 2023). For children with disabilities, pandemic response seemed to vary from positive to negative, depending at least partly on individual's specific disability (Holm et al., 2024; Yusuf et al., 2022). Naturally, these positive findings do not apply to all vulnerable subgroups, but they reveal that concluding the pandemic primarily exacerbated pre-existing gaps among youth is clearly an oversimplification.

The alarmist public narrative of the pandemic amplifying inequalities was strongly constructed during the early stage of the crisis in 2020. Many academic journals speeded up the peer review process which resulted in a lot of poor-quality rapid surveys and cross-sectional studies being published - and heavily cited (Gorman, 2023). It is possible that later pandemic research has suffered from assuming the negative impacts with growing inequalities, thus leading to some degree of publication bias. This could have resulted in less frequent publication of evidence that contrasted the prevailing narrative. Whether a moral imperative to 'worry about the vulnerable' did drive research, is a question to be scrutinized empirically.

Additionally, research designs that do not distinguish between developmental and long-term trends and possible pandemic effects may have led to conclusions that align with expected findings. For example, a recent UK study with robust design and data showed how the pandemic seemed to amplify depressive symptoms among girls. However, after adjusting for developmental effects, it was actually boys - not girls - who seemed to suffer more from the pandemic (Wright et al., 2024).

5.4 Oversimplification of growing inequalities

While the overarching findings of this thesis suggest a surprisingly muted impact of the pandemic on exacerbating pre-existing inequalities among adolescents, a deeper

examination reveals nuanced complexities. This section elucidates the potential repercussions stemming from oversimplified interpretations of these outcomes, particularly regarding the experiences of disproportionately disadvantaged adolescents.

The tendency to oversimplify pandemic-induced inequalities may inadvertently perpetuate stigma and reinforce self-fulfilling prophecies. By solely focusing on negative narratives surrounding disadvantaged groups, there is a risk of overlooking the positive adaptations and resilience demonstrated by these adolescents and their families during the pandemic. Such oversimplification not only obscures the nuanced realities of their experiences but also undermines the potential to glean valuable insights from their coping mechanisms and successes amidst adversity. Rather than succumbing to a narrative of despair, acknowledging the strengths and adaptive strategies employed by vulnerable students can inform more effective prevention and interventions. An interesting example is the past (not present) experiences of loneliness and social isolation (see e.g., Repo et al., 2022).

Exclusive emphasis on the detrimental effects of the pandemic may obscure the silver linings and unexpected benefits experienced by vulnerable populations. While acknowledging the challenges faced, it is imperative to recognize instances where pandemic-induced changes in schooling, social dynamics, or support structures have inadvertently facilitated more equitable conditions for certain groups. For example, blended learning, reduced class sizes, and more caring teacher supervision reducing bullying and benefitting the disconnected students (Lorijn et al., 2023; Vaillancourt, Brittain, Krygsman, Farrell, et al., 2021). By neglecting these positive developments, we risk overlooking valuable lessons that could inform future educational or therapeutic practices and policies aimed at mitigating disparities (Sonuga-Barke, 2021).

Moreover, exaggerating the extent of growing inequalities without considering the broader context of policy responses and interventions may hinder opportunities for meaningful change. Ignoring the positive impacts of interventions and policy measures implemented during the pandemic risks perpetuating a fatalistic view on social disparities. Instead, it is essential to critically assess the efficacy of existing interventions, identify promising strategies and innovations, and leverage lessons learned from both challenges and successes of pandemic-era policies to inform future initiatives. This proactive approach addresses immediate needs and fosters a more resilient and equitable educational system capable of navigating future crises. From a resilience perspective, it is not the adversities themselves but the perceptions, narratives, and socio-ecological system's capacity to cope with them that determine long-term effects.

In summary, while acknowledging the complexities inherent in assessing pandemic-induced inequalities, it is imperative to resist the temptation to

oversimplify narratives and instead embrace a more nuanced understanding of the multifaceted experiences of vulnerable adolescents. By reframing the discourse surrounding inequalities to encompass both challenges and opportunities, we can foster a more inclusive and responsive approach to education policy and practice.

5.5 Limitations

The study suffered from several typical shortcomings of pandemic studies. First, it lacked data from low- and middle-income countries, despite most of the world's young population living in these areas. Secondly, the data gathering was not driven by a focused theoretical framework nor consistency in measures, due to 1) rapid data collection at the onset of the crisis in 2020, 2) integration of applied and academic research interests (Studies I -III), and 3) use of secondary data not originally gathered for measuring pandemic impact (Studies II- IV). This resulted in a variety of outcome measures and perspectives, which are both a limitation and a strength of the current study.

Further, the studies did not assess the variability in individual's actual stress exposure related to pandemic, which is stressed to be essential in inferring a resilient response (Ungar et al., 2013). Yet, using subjective assessments of pandemic-related stress was considered methodologically problematic, as stated above. Days spent in lockdown would have been more objective measure, but it's stress effects most probably varied by individual: a rare study exploring this found no association of lockdown length and wellbeing or internalising and externalising symptoms (Fujimoto et al., 2024), although with PISA learning assessments lockdowns length seemed to have an effect (Jakubowski et al., 2024).

As the findings of the thesis contradict with numerous pandemic studies, it is important to discuss whether the findings are due to measured outcomes, the utilized data, or the study designs. First, the studies used a variety of outcomes: peer victimization, anxiety, academic self-efficacy, cognitive reappraisal, and student well-being measured as school attendance, life satisfaction and school belonging. Despite this variety, the results surprisingly consistently showed no growing inequalities in youth well-being. Even though no major average changes in the outcomes were found, individual variability was strong enough to grasp potential amplifying effects. However, close to none were found.

Secondly, the datasets used in this thesis included adolescents from different countries, yet only from affluent ones. Previous studies have shown that pandemic effects have varied substantially across cultural contexts and adolescent age groups. The datasets in this thesis, drawn from Finland, South-Australia, Iceland, and Sweden, primarily focused on early adolescents aged 10 to 15 years. Some evidence

suggests that the negative impacts may have been greater among older adolescents (Bevilacqua et al., 2023; Neugebauer et al., 2023; Sandner et al., 2023).

All studies except study II used substantially large datasets, yet with some unknown sample biases, and only the PISA datasets in Study IV were nationally representative. It is important to note that survey studies often underrepresent most vulnerable individuals due to various participation barriers. Therefore, the findings indicating no growing inequalities should be interpreted as rough general averages.

Thirdly, the thesis had a limited focus on gender effects, with only studies II and III testing for them – and finding none. This contrasts with several pandemic studies that report greater negative impacts among females (Samji et al., 2022). Notably, however, most pandemic studies have not accounted for normative developmental changes, including the increase in mental health issues during puberty, which is especially pronounced among girls (Kauhanen et al., 2022; Wright et al., 2024).

Fourthly, identifying true pandemic effects is challenging. We utilized pre-pandemic data and avoided using self-assessed effects and cross-sectional correlations in inferring pandemic effects. These methodological strengths contrast with many pandemic studies. Particularly, the longitudinal cohort comparison design in Study III demonstrated how pandemic effects can be conflated with normative developmental effects without comparison to pre-pandemic cohorts and conditions.

This thesis does not provide a comprehensive review of all pandemic effects on youth. Despite the multi-outcome approach and large samples, it only offers snapshots of the extensive question of pandemic impact. Substantial pandemic effects may have been related to outcomes not measured in this thesis.

5.6 Conclusions and future research

This thesis offers an insightful yet somewhat kaleidoscopic exploration of the COVID-19 pandemic effects on adolescents' adjustment. Taken together, the studies fail to find evidence of adverse average pandemic effects on youth, and the results advise against a simplistic view that individuals with pre-pandemic vulnerabilities faced the worst effects.

On the contrary, this thesis reveals several cracks and contradictions in pandemic research, showcasing how the public narrative of the pandemic impact may have been too alarmist and oversimplified, and requires adjustment. During the crisis, the demand for rapid dissemination of scientific knowledge led to a 'pandemic' of pandemic research and lots of poor-quality studies being published. Signals that might have been truly useful in responding to the pandemic might have been lost in the overwhelming noise. High-quality datasets and robust study designs were mostly lacking when the demand for evidence was at its peak and when the main narratives of pandemic impact on youth were constructed in 2020-2021.

Recognizing the likelihood of future pandemics and environmental crises, it is crucial to reflect on the methodological shortcomings of pandemic research to better prepare the research community for future crises. Additionally, it's vital to enhance public education about science and evidence, ensuring that policy decisions are informed by scientific reasoning and a nuanced understanding of the complexities involved in determining cause and effect.

It's important to support those who have suffered without creating self-fulfilling narratives such as a 'lost generation.' Although it's tempting to feel relieved that the pandemic is over, focusing too much on the negative impacts might prevent us from recognizing valuable lessons and innovations that emerged during the crisis. Worryingly, pandemic studies often highlight the challenges of regular schooling for socially vulnerable students rather than revealing the harmful effects of the crisis itself.

Future research should keep in mind the evidence from resilience research and developmental psychology: the effects of pandemic are likely to vary substantially from one person and one setting to another, fluctuate over time, and follow nonlinear patterns. Thus, research on the crisis impact on adolescents needs to adopt developmental, socio-cultural, and resilience perspectives using robust designs that strengthen causal inference. Study results will most likely be confounded with normative developmental effects and long-term trends, making it complex to decompose the true effects of any crisis at a full population level. Therefore, with future adults, it is as important to expect the best (a resilient response) as it is to expect and prepare for the worst.

The fifth wave of pandemic research is still developing and may only fully materialize during the next pandemic or another global crisis. To be better prepared, it should include data across multiple systems related to resilience, employ measures for multi-domain outcomes, and utilize study designs that can differentiate between crisis effects and developmental or long-term trends. This research should go beyond estimating the scale of adverse effects for vaguely defined groups, focusing instead on identifying levels of stress exposure, underlying causes of negative outcomes, and specific modifiable predictors of resilience. Additionally, it should apply data collection methods that move beyond rapid surveys with convenience sampling to better capture the experiences of different vulnerable subpopulations.

This approach requires both cross-cohort and mixed-methods research, alongside high-quality data and study designs that adjust for sample bias and confounding factors to analyse causal mechanisms driving true effects. Thus, to reliable monitor youth well-being in turbulent times, governments and research institutions should invest in longitudinal data collections, integrating surveys with register data, gathering comparable data in repeated population cohorts, and funding studies with robust causal designs instead of ad hoc single cross-sectional ones.

Moreover, the academia should incentivize open science practices such as pre-registration, replication, and sharing of analytic code and data, encouraging the research community to be more efficient in addressing the shortcomings of first-wave studies with questionable conclusions. Most importantly, future research should better include low- and middle-income countries to observe and examine the largest scale of disproportionate effects.

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