The Educational Gradient in Depression:
A European Multilevel Study

Illustration by Fontaine, T. (2019), from the article "The Great Fortune of Ordinary Sadness"

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Abstract

This thesis investigates the extent to which depressive symptoms are unequally patterned across levels of individual and parental education, and whether these patterns differ by gender. Using data from the European Social Survey (n = 18,251, 12 countries), I apply multilevel linear regression models to four indices of depressive symptomatology. The results show a negative association between years of education and depressive symptoms. While parental education has a limited direct effect, paternal education moderates the impact of respondents' own education. The protective effect of education is found to be stronger for women, suggesting education may reduce gender disparities in depressive symptoms.

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1 Introduction

Depression is one of the most widespread mental health conditions globally and remains a leading cause of disability (Chlapecka et al., 2020). Beyond the individual suffering it entails, depression carries significant social and economic consequences, including reduced labor market participation, social isolation, and increased healthcare usage (Fan et al., 2025). While nearly everyone experiences periods of sadness, low mood or emotional hardship throughout life (American Psychiatric Association, nd; MacKerron and Powdthavee, 2022), the frequency and intensity of these symptoms are far from evenly distributed across the population. Some individuals face persistent or elevated levels of depressive symptoms, while for others, such experiences remain occasional or mild. As an example, this burden is disproportionately borne by individuals with lower socioeconomic status (Lorant et al., 2003) and women (Parker and Brotchie, 2010). Understanding how depression is shaped by social conditions is therefore essential from both a public health and a sociological standpoint.

Mental health, and depression in particular, has traditionally often been investigated through biomedical and psychological lenses that conceptualize emotions as internal, private, and individual phenomena. However, there is a growing effort to integrate these perspectives with sociocultural approaches that emphasize how emotions are shaped by social structures (Zembylas, 2007). This thesis builds on that broader shift by approaching depressive symptomatology not just as a clinical condition but also as a socially patterned outcome.

At the center of this analysis is the concept of cultural capital. Numerous studies suggest that cultural resources play a central role in shaping individuals' ability to manage difficult situations and mental distress. In empirical research, cultural capital is frequently operationalized through indicators such as one's own level of education or that of one's parents (Barone, 2006). There is a well-established association between educational attainment and health, with evidence supporting a bidirectional relationship: education shapes health, and health in turn influences educational attainment (Eikemo et al., 2008). If this link also holds for mental health outcomes such as depression, it strengthens the case for investment in education as a matter of both equity and efficiency.

Within this framework, the thesis examines whether educational attainment is associated with lower levels of depressive symptoms, and whether this association varies by gender. To address these questions, I use a set of multilevel linear models applied to data from the European Social Survey, which includes information on 18,251 individuals from across Europe. The following research question is posed:

To what extent are depressive symptoms unequally patterned across levels of individual and parental education in Europe, and does this differ by gender?

2 Literature review

2.1 Education and mental health

Numerous studies highlights the relationship between educational attainment and mental health, particularly symptoms of depression. Most point to a robust negative association, where higher levels of education are linked to a lower risk of depressive symptoms both for own educational level (Chlapecka et al., 2020; Bjelland et al., 2008; Lorant et al., 2003; Dudal and Bracke, 2016; Kondirolli and Sunder, 2022; Lee, 2011) and parental (Park et al., 2013; Xiang et al., 2024). The protective effects of education have been documented across age groups and contexts. A comprehensive meta-analysis by Lorant et al. (2003), found that individuals with lower socio-economic status hold higher odds of suffering from depression while Bjelland et al. (2008) found, using data from almost 51.000 Norwegian individuals, that low educational levels were significantly associated with depression. Furthermore, Chlapecka et al. (2020) found that the association between education and lower depressive symptoms was particularly strong in Central and Eastern Europe, and weaker in Scandinavia, suggesting that institutional and cultural contexts shape the meaning and impact of education on mental health. Lastly, Dudal and Bracke (2016) applies ESS data, like in this thesis, using a depression scale as response variable and educational level as explanatory variable in a country specific regression analysis. The results suggest higher risk of depressive symptoms among lower educated individuals.

Mirowsky and Ross (2003) and Niemeyer et al. (2020) argue that achieving higher education may give better access to material resources, information and the health system and it furthermore may provide individuals with psychosocial resources such as a sense of personal control, the ability to pursue meaning in life, and more effective coping strategies in the face of adversity. These psychological tools may reduce vulnerability to depressive symptoms, independently of material advantages or somatic health. Individuals with higher educational attainment often report higher degree of perceived control, higher self-efficacy, and stronger cognitive resources for emotional regulation, suggesting that education both opens material opportunities, but also shapes the tools people use to navigate life.

However, it is unclear in the literature to what extent this association reflects a causal relationship, as discussed in Cutler et al. (2015); Bjelland et al. (2008); Kuklová et al. (2020) and Chlapecka et al. (2020). As Chlapecka et al. (2020) note, it is possible that individuals who attain higher education differ systematically in underlying characteristics such as cognitive skills or emotional regulation, which themselves may protect against mental distress. Moreover, people with higher educational backgrounds often enjoy better physical health, more stable financial conditions, and broader social networks, all of which may independently contribute to improved mental health. So, a part of this association may reflect socioeconomic advantage.

The relationship between education and depression may also be bidirectional as discussed in Cermakova et al. (2018) and Cutler et al. (2015). Low educational attainment may increase social and health risks but, as Ross and Wu (1995) point to a predisposition to depression can interfere with educational trajectories, particularly when symptoms emerge during adolescence or early adulthood, which are important periods for the completion of formal education. Individuals experiencing emotional distress early in life may face barriers that can limit their educational attainment. Moreover, individuals from lower socioeconomic backgrounds are more likely to experience emotional distress and also face greater barriers to completing longer educational trajectories. Psychological vulnerability may simultaneously be an outcome of limited educational opportunities and a contributing factor to educational disadvantage, reinforcing the inter-generational transmission of inequality. And not only may the relationship likely be bidirectional, there may also exist confounding factors such as genetics influencing e.g. intelligence, inherited health risks etc.

2.1.1 Gender, educational level and depression

Lastly, several studies point to the importance of considering heterogeneity across social groups when examining the relationship between education and depressive symptoms. One key dimension is gender. Although education is generally associated with better mental health outcomes, the size and nature of this association may differ between women and men (Witter et al., 1984). Education may, for example, act as a stronger protective factor for women, not

because the psychological benefits of education differ biologically, but because women, on average, face more structural barriers and stressors that education can help mitigate (Reshi and Sudha, 2022). A longitudinal study by Platt et al. (2020) supports this idea, showing that increases in women's educational attainment - particularly college degrees - accounted for nearly 40 % of the decline in the gender gap in depressive symptoms across U.S. cohorts born between 1957 and 1994. Their mediation analysis highlighted educational expansion as the most significant factor explaining the narrowing gender difference. Similarly, Chevalier and Feinstein (2007) find in a British context that the protective effects of education on depression are consistently stronger for women than for men, even after adjusting for family background and early-life characteristics.

Beyond these social factors, psychological mechanisms may also help explain why education can be especially beneficial for women's mental health. Research consistently shows that women are more likely than men to engage in rumination - a cognitive style characterized by repetitive, passive focus on distress and its causes (Lilly et al., 2023; Alıcı and Hasanlı, 2023). According to Johnson and Whisman (2013), rumination both prolongs and intensifies depressive episodes. This difference is partly rooted in socialization, as women are often encouraged from an early age to reflect on emotions and relationships, which can foster habits of inward focus and persistent thinking about problems. Specifically, brooding, which is a more maladaptive form of rumination involving passive dwelling on negative feelings, is more common among women than men, in contrast to reflection, which can be more constructive (Zou et al., 2025; Bastin et al., 2014). As mentioned before, education may provide cognitive and reflective skills, such as abstract thinking, problem-solving, and self-regulation, that help individuals break out of ruminative cycles. Thus, it is plausible that women, who are more vulnerable to rumination, might benefit disproportionately from the resources and coping strategies often made in higher education.

All in all, the research literature points to a variety of mechanisms and possible causal links. In this thesis, data does not allow me to test causal relations. Instead, data is offering insightful possibilities for estimating the strength of the relationship between education and symptoms of depression, as well as exploring heterogeneity across population groups, and

possibly extending with further findings on factors pointing to protective mechanisms or the opposite.

2.2 Habitus and dispositions

Even though causality is highly discussed in the literature, sociological theory offers a framework for explaining the underlying reasons for education working as a protective factor. The theories bind together the psychological mechanisms working inside the individual and the understanding of social structures and group mechanisms, ultimately shaping life courses for the individual. As such, this thesis draws on Bourdieu's theory of habitus and Diane Reay (2015) research on integrating emotional life in sociology.

Following the French sociologist Bourdieu, dispositions are not innate tendencies but rather structures shaped through socialization. They reflect the conditions under which an individual grew up. This is the result of being predisposed to certain ways of engaging with the world i.e. predispositions that emerge through being shaped (or disposed) by one's broader social and educational context (Sestoft, 2018). That is, individuals are disposed to act, think, or feel in certain ways because their orientations have been shaped by their position in the social structure. Bourdieu define habitus as:

(. . .) habitus, systems of durable, transposable dispositions, (...), as principles which generate and organize practices and representations, that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary in order to attain them. Objectively 'regulated' and 'regular' without being in any way the product of obedience to rules (...) (Bourdieu, 1990)

This means that practices often appear consistent, not because individuals follow formal rules, but because their dispositions lead them to act in ways that are appropriate to the social context.

In the theory of practice, the dispositions are seen as probabilistic rather than deterministic mechanisms, which contrasts with other approaches that see behavior as the direct

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effect of external constraints or intentionalism and rational choice, which treats actions as the result of decision. Instead, the dispositional explanation assumes that individuals are likely to think, feel, or act in certain ways depending on their socially acquired orientations - without guaranteeing any specific outcome. An example of the logic comes from the British philosopher Gilbert Ryle, who suggested that a disposition functions like the fragility of a glass: it does not cause the glass to break itself, but it explains why it tends to break when struck (Sestoft, 2018; Ryle, 2002). In the same way, individuals may be dispositioned to certain emotional or cognitive responses, such as easily feeling worried or joyful, depending on their conditions. From this perspective, statistical models can be seen as an effort to make a representation of these 'probabilistic tendencies' as Bourdieu described in the theory. They allow us to estimate how likely certain outcomes are to occur under given social conditions, and in this way try to operationalize the concept of dispositions.

This thesis further builds on the British sociologist Diane Reay's (2015) research on integrating emotional life into the sociological conceptualizations of habitus and dispositions. She argues that the conceptual framework of habitus and dispositions lack the emotional and cognitive aspect. She does so by highlighting the fact that it has had a large focus on observable behaviors, be it the propensity of going to the theater or buying an expensive car, and lesser on the affective aspects e.g. being resilient, feeling rage or being depressed (Reay, 2015). She does not suggest that specific emotions are tied to particular social classes, but rather that the emotional experiences individuals live in different social contexts can become a part of the habitus over time. For example, growing up in stigmatized or precarious conditions may create a heightened disposition toward anxiety, worry, or shame, while the internalization of privilege can give rise to feelings of lightness, ease or entitlement. Moreover, Reay points out that when this integration is disrupted e.g. through upward or downward mobility, people may experience conflicting expectations or environments that do not match their socialization. This can give rise to internal tensions and strong emotions (Bourdieu, 1990). Feelings like anxiety or shame can in this way reflect a misalignment between past dispositions and present circumstances.

2.2.1 Cultural capital, emotional and cognitive dispositions

Having established dispositions as socially conditioned tendencies to think, feel, and act, this section turns to one of the key social mechanisms through which such dispositions are shaped and reproduced: cultural capital. In particular, I focus on education, both in the sense of formal achievement and also a process through which cognitive and emotional orientations become internalized. In this thesis cultural capital is specifically studied through educational attainment - both of the individual and the inter-generational transmission through parents (Sullivan, 2001; Jæger and Breen, 2016). Beyond serving as a marker of knowledge, education could also be argued to function as a proxy for exposure to certain cognitive and emotional dispositions. These include habits that are proved to minimize symptoms of depression, such as abstraction, reflection and emotional regulation, which in turn may be unequally distributed across social backgrounds (Rehm et al., 1987; Yang et al., 2018). Educational institutions, through both their formal content and norms, may create modes of thinking and feeling that contribute to patterns of psychological well-being (Farkas, 2018). The dispositions are shaped through the formal curriculum (where students are taught to engage with diverse perspectives and develop analytical thinking) and through the broader cultural context of the educational field and environment itself, which encourages particular modes of self-expression, discipline, and emotional control.

Looking towards the effect of parental education, individuals raised in families with higher cultural capital are more likely to have been socialized into dialogic communication, encouraged to express and regulate emotions verbally, and taught to engage in reflection rather than reaction (Lareau, 2011; Thomsen et al., 2024). Parental education level, used in this thesis as a proxy for origin-based cultural capital, reflects the extent to which such resources were available during formative years. Thus, differences in depressive symptoms across educational gradients may reflect material inequalities and variation in e.g. regulatory strategies available to individuals. The depressive symptom patterns measured in this study, e.g. diminished vitality, low self-worth, and pessimism, can be interpreted as affective expressions of a habitus shaped through unequal access to emotional, cognitive, and cultural resources.

In this way, the analysis aims to illuminate how broader patterns of educational stratification become ingrained in both material outcomes but also in psychological states.

2.3 Hypotheses

Together, the prior empirical evidence and the theoretical contributions lead to the following hypotheses:

H_1 The numbers of years of education are associated with lower levels of depressive symptoms.

H_2 Higher parental education is associated with lower levels of depressive symptoms.

H_3 The association between years of education and depressive symptoms is moderated by parental education.

H_4 The association between years of education and depressive symptoms is moderated by gender.

3 Presentation of Data and Research Design

This thesis utilizes data from Round 3 of the European Social Survey (ESS), a cross-national survey conducted in European countries. The analytical sample consists of 18,251 respondents across the 12 following countries: Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Netherlands, Norway, Portugal, Spain and Sweden. The sample is not restricted by age; however, all students have been excluded (approximately 2,000 observations) to ensure that the results are not skewed by individuals who have not yet finished their education. The main descriptive statistics of the used variables can be seen below in Table 1:

Table 1: Descriptive statistics

	Mean	SD	Missing	Min–Max	N
Years of education	12.94	1.36	0	5–25	18,251
Father's education	2.41	1.34	0	1–5	18,251
Mother's education	2.15	1.18	0	1–5	18,251
Income (quantiles)	7.17	2.21	3.076	1–12	15,175
Age	49.3	16.8	23	15–101	18,228
Retired (dummy)	0.24	0.42	0	0–1	18,251
Unemployed (dummy)	0.03	0.18	0	0–1	18,251
Gender (dummy)	1.52	0.50	0	1–2	18,251
Has child (dummy)	0.27	0.44	15	1–2	18,236
Lives w/o partner (dummy)	0.33	0.47	30	1–2	18,221

3.1 Development of indices

The dataset includes a wide range of self-reported variables reflecting sadness, fatigue, low self-worth, sleep disturbances, loss of feeling pleasure, and difficulty concentrating. They resemble symptoms of depression defined by clinical sources such as the UK National Health

Service (NHS, 2023). To make sense of the complexity and construct meaningful indices that capture symptoms of depression, I apply Principal Component Analysis (PCA) to a set of items that align with official definitions of depressive disorder. The goal is to reduce dimensionality while preserving the most meaningful underlying structures.

I first conducted a principal component analysis (PCA) on the full pooled dataset. The PCA was performed using promax rotation[1], and components were kept based on the Kaiser criterion (eigenvalues less than 1) (Brown, 2009). This initial PCA served to identify a set of psychological components that structure symptoms of depression in the sample as a whole.

To assess the robustness of these components, I then conducted separate PCAs for each participating country (van de Vijver and Leung, 1997). Rather than starting from scratch in each national sample, I used the components created in the global PCA as a reference point and examined whether they also appeared within each country-specific analysis. Items were selected for index construction if they had high loadings on conceptually consistent components across multiple countries and aligned with theoretical understandings of depression (see appendix 4). For each resulting dimension, an index was created by averaging the relevant items, with reverse coding applied where necessary so that higher scores consistently reflect greater symptom intensity. All indices were rescaled from 0 to 10 to ensure comparability. The indices will be described in section 3.1.1 to 3.1.4. The descriptive statistics of the indices can be seen here:

Table 2: Descriptive statistics for indices

	Mean	SD	Missing	Min–Max	N	Cronbach's α
Depression index	3.05	1.35	471	0–10	17,780	0.79
Heaviness	1.94	1.63	131	0–10	18,120	0.74
Negative outlook	3.05	1.47	199	0–10	18,052	0.64
Anhedonia	4.20	2.02	268	0–10	17,983	0.68

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[1]promax rotation is an oblique rotation method in PCA that allows the components to correlate, making it suitable when underlying factors are expected to be related (Kieffer, 1998).

3.1.1 Depression index

The overall depression index combines a broad set of variables reflecting multiple dimensions of depressive symptomatology, including affective, cognitive and somatic aspects. It integrates all items from the three sub-indices that will be described below: core depressive symptoms such as feeling sad, depressed, lonely, tired, and experiencing restless sleep; items capturing pessimism, low self-worth, and reduced perceived autonomy (e.g., feeling like a failure or lacking control over one's life); and symptoms of lack of enjoyment, diminished energy and emotional engagement. By averaging across this comprehensive set of variables - each rescaled and directionally aligned so that higher scores indicate greater intensity - the index reflects both the presence of emotional distress and the absence of vitality or life satisfaction.
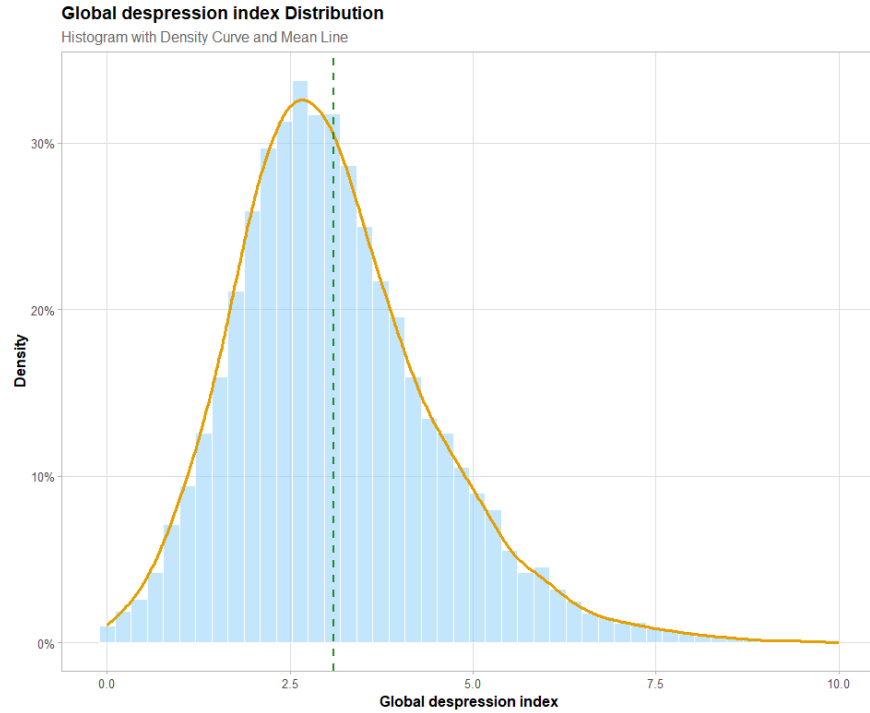

Figure 1: Depression index

The index aligns closely with clinical definitions of depressive states offered by organizations such as the World Health Organization (2023) and the UK National Health Service (NHS, 2023), which emphasize persistent sadness and fatigue, hopelessness, low self-worth,

feeling isolated and reduced capacity for enjoyment. It is especially suitable for large-scale comparative analyses, as it incorporates symptoms that emerged consistently across countries in principal component analyses while maintaining conceptual connection to clinical frameworks.

3.1.2 Heaviness

The first sub-index, referred to as 'heaviness', captures central affective and somatic symptoms of depression. Its construction draws conceptually on diagnostic frameworks provided by NHS (2023) and the World Health Organization (2023), both of which emphasize persistent low mood, emotional withdrawal, and physical disturbances as core indicators of depressive states. The index is composed of five items:

1. "I felt depressed the past week"
2. "I felt sad the past week"
3. "I felt lonely the past week"
4. "I felt tired the past week"
5. "I experienced disrupted sleep the past week"

The index was calculated as the average of these five items and rescaled from 0 to 10, with higher values indicating greater symptom intensity. It should however be noted, that all items refer to experiences within the past week. This means the index captures a snapshot of recent emotional states. A respondent who is generally well may report high scores due to an difficult week, while someone with a chronic depressive disorder might report lower scores if their symptoms were temporarily alleviated. In this sense, the measure reflects current emotional state rather than a stable or diagnostic mental health condition.

The distribution of the index is strongly right-skewed, with most reporting low to moderate levels of the symptoms. It reflects the general population nature of the sample, in which subclinical or mild symptoms are common but severe depressive symptoms are comparatively rare. Such distributional features are consistent with epidemiological findings across

Europe, which estimate that approximately 6–10 % of adults experience clinically significant depressive symptoms at any given time (Wittchen et al., 2011).
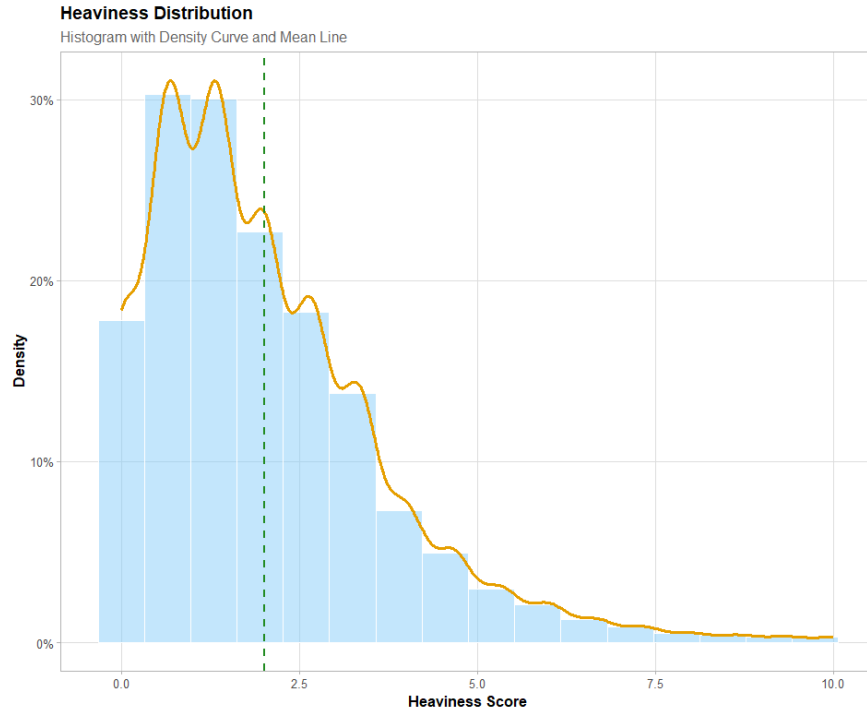
Figure 2: Heaviness index

3.1.3 Negative outlook

The second sub-index captures a psychological state characterized by pessimism, diminished self-worth, and a perceived lack of autonomy. Individuals with high scores on this index tend to express hopelessness about the future and dissatisfaction with their life trajectory. They often report feeling incapable of shaping their own outcomes or making meaningful choices. In contrast to the 'heaviness' index, which reflects emotional states over the past week, this sub-index is oriented toward more persistent perceptions of personal agency and outlook. The index includes five items that all are positively framed items were inverted so that higher scores reflect a more negative psychological sensation:

1. "I feel optimistic about my future", (inverted)
2. "I feel positive about myself", (inverted)

3. "Life is close to how I hoped it would be", (inverted)

4. "I feel free to decide how to live my life", (inverted)

5. "I feel like a failure".

The structure of this component is supported both conceptually and empirically. According to the World Health Organization (World Health Organization, 2023), feelings of hopelessness, negative view of self and a diminished sense of control are central to depressive states. The distribution, as visualized in the histogram below (Figure 3), is right-skewed but close to being symmetrical and normally distributed. Most respondents cluster around 2 to 4 out of 10, and fewer fall at the extreme high or low ends. This shape contrasts with the skewed distribution observed in the first component and suggests that feelings of low autonomy and self-worth are more evenly spread across individuals in the sample.
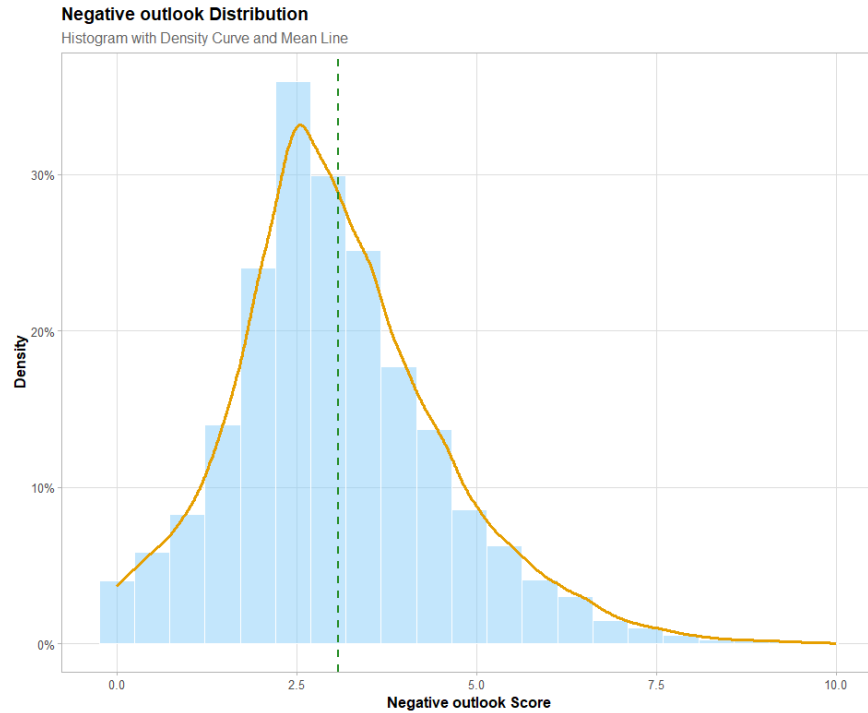
Figure 3: Negative outlook index

3.1.4 Disengagement

The third component captures a psychological state characterized by diminished vitality and emotional engagement. Individuals with high scores on this index report low energy, limited enjoyment of life, and difficulty becoming absorbed in activities. Rather than reflecting acute emotional distress, this is a state marked by detachment, passivity, and a lack of stimulation. The index consists of four items:

1. "I have felt absorbed in what I was doing," (inverted)
2. "I've had a lot of energy," (inverted)
3. "I've enjoyed life," (inverted) and
4. "I've been feeling happy lately." (inverted)

This pattern closely aligns with the concept of anhedonia - defined by the World Health Organization (2023) as a diminished ability to experience pleasure - and is recognized as a central symptom of depressive disorders.
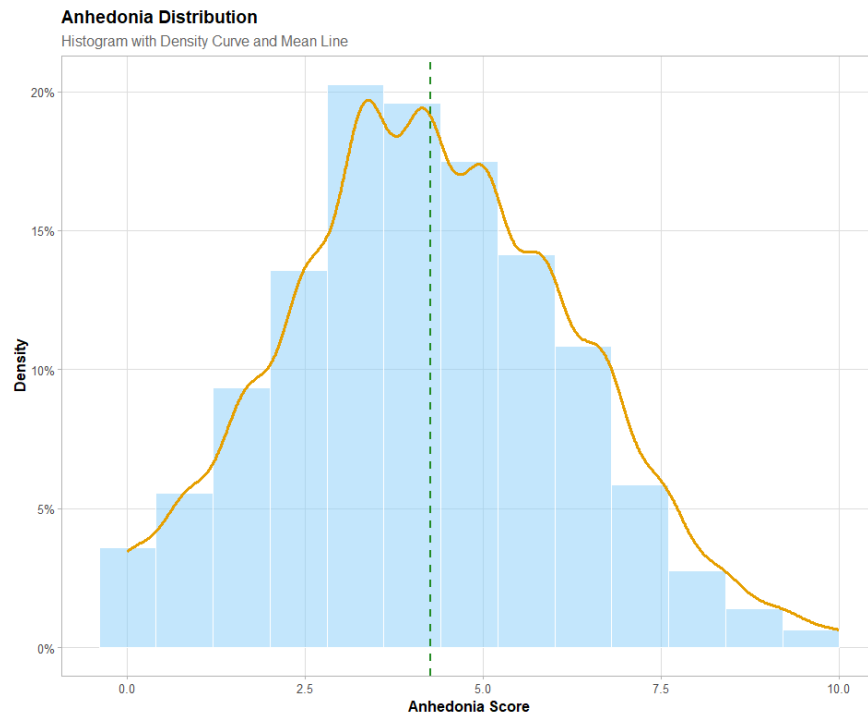
Figure 4: 'Disengagement' index

Unlike the heaviness index, which reflects the presence of sadness, fatigue, or emotional pain, this index highlights the absence of positive feelings and vitality. In that way, it serves as a complementary dimension, offering a more nuanced picture of psychological well-being by capturing both distress but also disengagement. The distribution of the disengagement index, shown in Figure 4, is slightly right-skewed, with the majority of respondents scoring between 3 and 6 on the 0–10 scale. This suggests that moderate levels of disengagement and low vitality are common experiences in the population. However, the extended tail toward higher values indicates a smaller group of individuals reporting more severe levels of psychological detachment and difficulty staying engaged.

3.2   Socio-demography of the sample

In addition to the psychological indicators, the dataset contains rich socio-demographic information that enables the study of structural associations between mental health and education. In the following section a description will be made of the main predictors: 1) years of education, and 2) parental education.

3.2.1   Years of education

The variable measuring years of education serves as a proxy for cultural capital and is included to assess the relationship between educational attainment and depressive symptoms. As illustrated in Figure 5, the distribution is slightly right-skewed, with most respondents reporting between 10 and 15 years of education. This corresponds roughly to upper secondary and tertiary education. Fewer respondents report fewer than 9 years or more than 20 years of education.
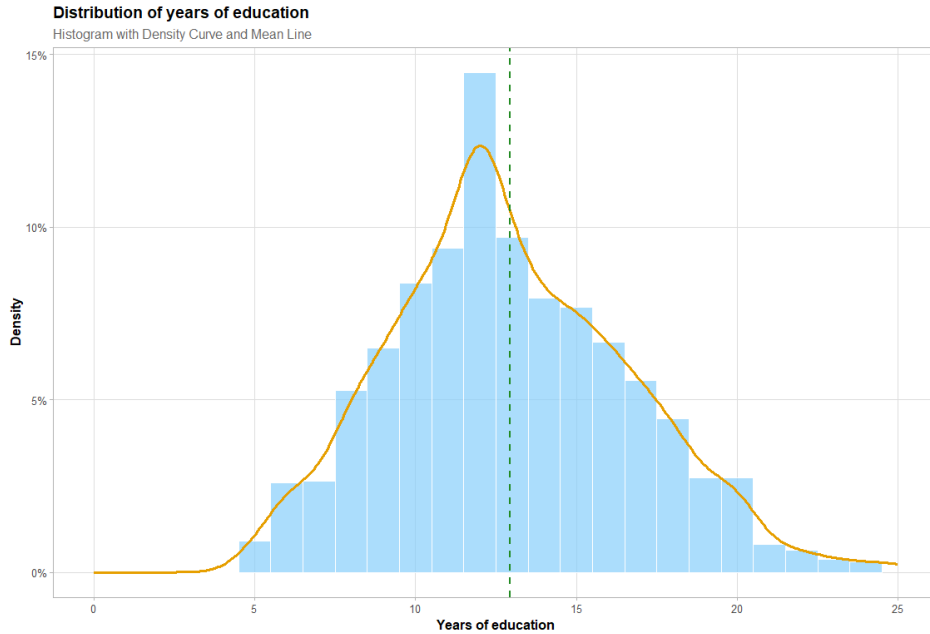
Figure 5: Years of education

3.2.2 Parental education

Moving on to parental background, Figure 6 displays the distribution of educational attainment among respondents' fathers and mothers, categorized by ISCED levels. The overall structure of the two distributions is similar, with the largest proportion falling into the "less than lower secondary education" category (ISCED 0–1), followed by lower and upper secondary levels (ISCED 2 and 3). Tertiary education (ISCED 5–6) is more common among fathers than mothers, while mothers are slightly more represented in the lower secondary category. Post-secondary non-tertiary education (ISCED 4) is rare for both groups.

Figure 7 shows the distribution of parental education across respondent age deciles, separately for fathers (left panel) and mothers (right panel), using ISCED categories. The visualized pattern reflects a clear intergenerational educational gradient: younger respondents (deciles 1–3) are more likely to have parents with higher levels of education, while older respondents (deciles 8–10) more often report having parents with less than lower secondary.
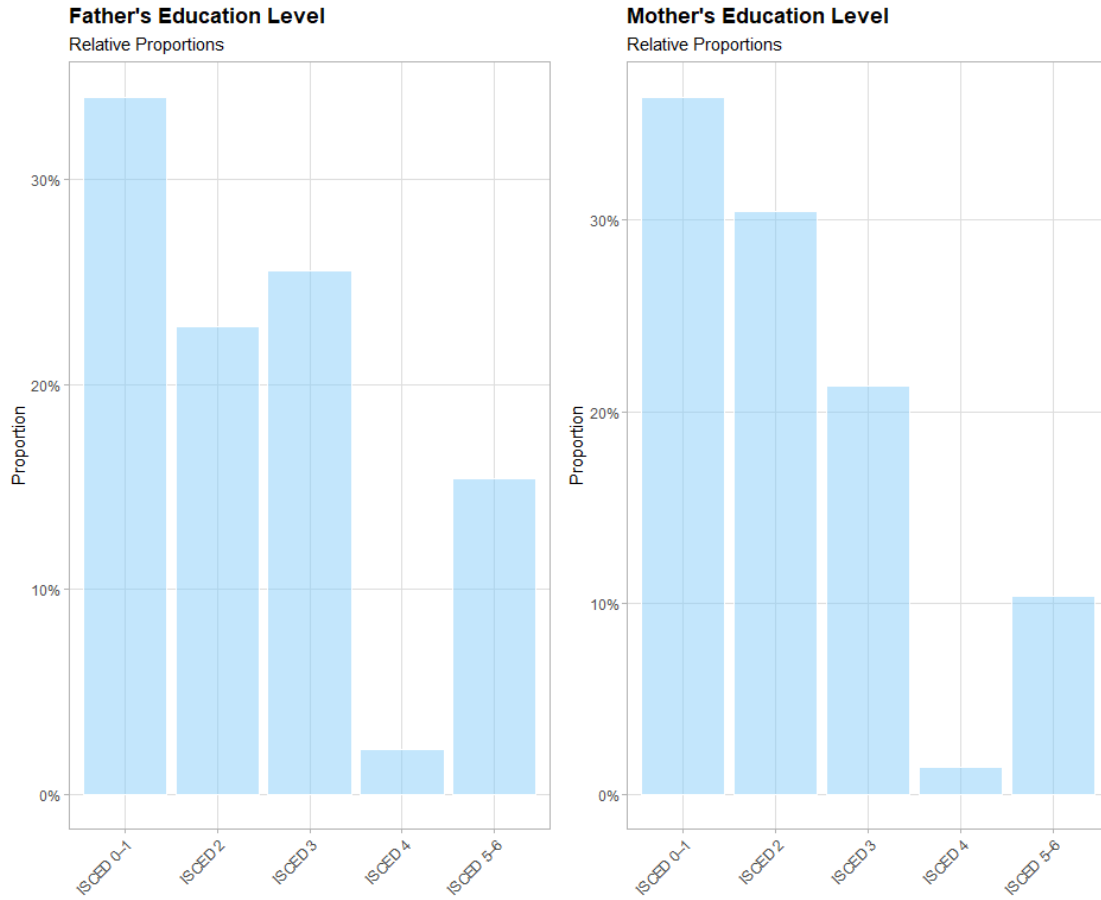
Figure 6: Parental education

Among respondents in the youngest deciles, the proportion of fathers with tertiary education reaches around 25 %, compared to only around 5 % in the oldest decile. The same pattern holds for mothers, but the overall proportion with tertiary education is lower, especially in the older cohorts. This indicates that gendered educational inequality was more pronounced in previous generations. For example, among respondents in the oldest decile, over 80 % report that their mother had at most lower secondary education, while that share is lower for fathers. It likely reflects historical barriers to women's access to higher education, which may influence how parental capital is transmitted.
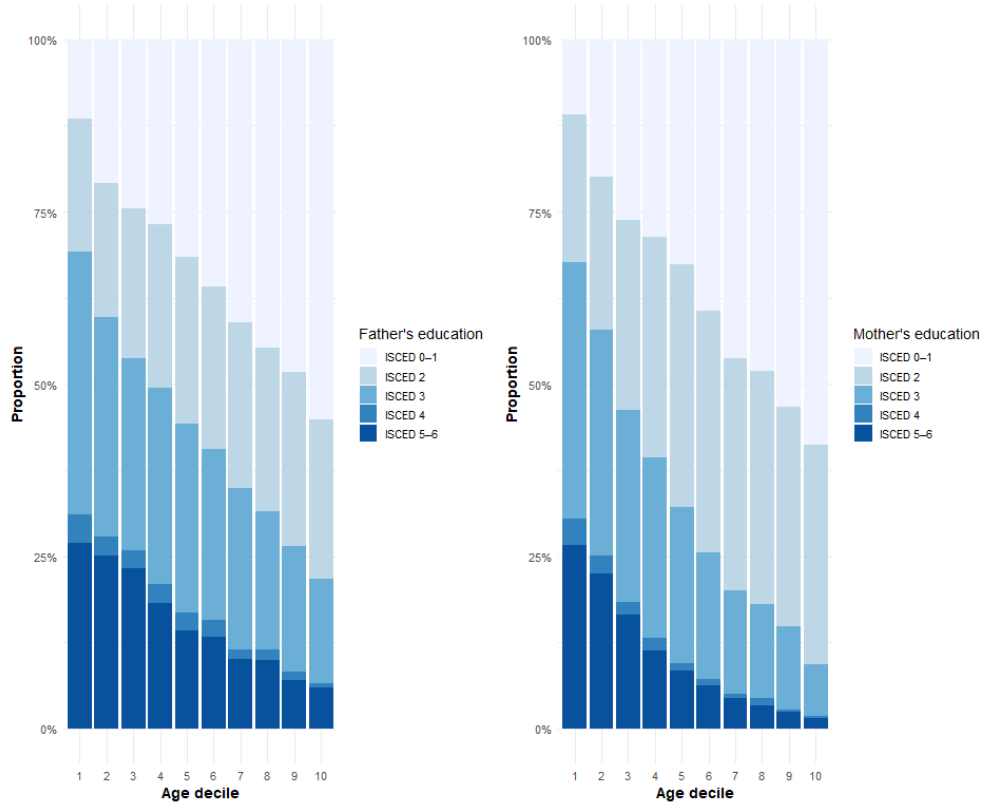
Figure 7: Parental education by age deciles

3.3 Model description

To explore the hypotheses, this thesis applies a set of linear mixed-effects regression models. To account for the nested data structure, linear mixed-effects models with a random intercept for country were estimated using the lmer() function from the 'lme4' package in R (Bates et al., 2015). The dependent variables are:

- Overall depression index, which aggregates core symptoms, low autonomy, pessimism, and disengagement
- Heaviness, reflecting emotional burden (e.g., sadness, loneliness, disrupted sleep)
- Negative outlook, capturing low perceived autonomy, pessimism, and self-worth
- Lack of engagement, indicating diminished emotional engagement and vitality

Given the nested structure of the data where individuals are grouped within countries, a

random intercept for country of residence is included to account for unobserved heterogeneity in mental health reporting, healthcare systems, and broader socioeconomic environments. Failing to account for clustering would violate the assumption of independent residuals, which could bias standard errors (Field, 2009). Furthermore, the intra-class correlation coefficients (ICCs) indicate that a non-trivial share of the variance comes from differences between countries: 2.1 % of the variance in the 'overall depression index', 3.6 % in 'heaviness', 2.6 % of the 'negative outlook' index and 3.2 % of the 'disengagement' index is explained by country-level clustering (Appendix 1), which justifies the use of multilevel modeling in the subsequent analyses.

Then, I conduct a baseline model including only gender and age to establish a demographic reference point. Age is modeled using a flexible, smooth function that allows for nonlinear relationships with depressive symptoms. Instead of assuming a straight-line effect, the function captures more complex patterns in how age relates to mental health across the life course. In the second model, educational background is added - including both the respondent's years of education and parental education levels. The third model includes additional control variables that may confound these relationships: household income, employment status, student or retirement status, partnership status and parenthood. In the final step of the analysis, interaction effects were included, to allow for testing of moderation effects, i.e. whether the relationship between years of education and the indices depends on parental education or gender.

3.3.1 Nonlinear associations for Age and Education

In modeling the associations between individual characteristics and the indices, both age and years of education are treated as non-linear predictors using natural cubic splines. The relationship between variables like age or education and mental health are often not linear. For example, age may show varying associations with depression across the life course or the impact on mental health of moving from 7 to 9 years of education might not be the same as moving from 15 to 17 years. This is a flexible way to fit smooth curves to continuous predictors without assuming a linear form across their entire range.
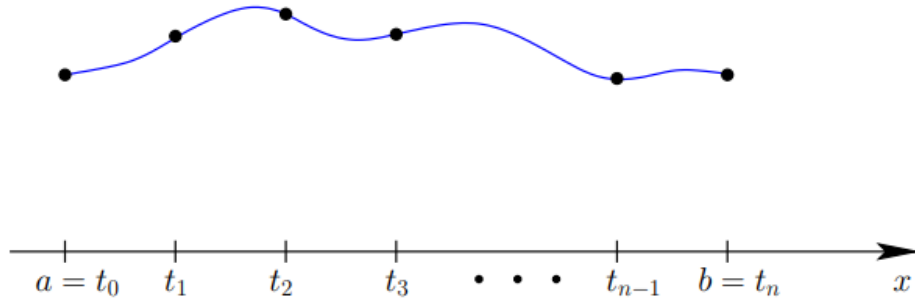
Figure 8: Illustration of a smooth curve constructed from connected segments. The x-axis represents a continuous predictor (could be age or education), and the black dots indicate knot positions where the function can change slope. In each interval, a separate curve is estimated to describe the relationship between the predictor and the outcome. These curves are joined at the knots so that the overall curve remains continuous without sharp angles (Kvarving, 2008)

As illustrated above, a natural cubic spline breaks up a continuous variable (such as age or education) into smaller segments at specific points called knots. Within each segment, a separate curve (a cubic polynomial) is fitted. These curve segments are then smoothly connected at the knots to ensure that the overall function is continuous and smooth in shape.

This approach allows the model to flexibly estimate non-linear relationships while accounting for country-level clustering. The non-linear terms are generated in R using the ns() function from the splines package with 4 degrees of freedom. This creates 4 transformed variables from each continuous predictor, which are included in the regression models.

3.3.2 Multicollinearity

To assess potential multicollinearity among predictors, variance inflation factors (VIFs) were calculated using the car package in R (Fox et al., 2024), which supports generalized VIFs for models including interactions. In the first, second and third model, all adjusted VIF values remained well below conventional thresholds (VIF less than 2), showing no concerns regarding multicollinearity. However, in the next models including interaction terms between own education and gender, and between own and parental education, multicollinearity increased,

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as expected:

- In the interaction models with years of education and gender, the adjusted VIF for gender exceeded 6.2, and for the interaction term approximately 3.8.
- For models including the interaction between years of education and maternal education, the VIF for maternal education rose to $\tilde{9}.5$, and for the interaction term to 3.15.
- Similar levels were observed in models including paternal education, with VIFs of around 9.0 and around 3.13 respectively.

While these VIFs approach thresholds of concern, especially for parental education variables, they do not exceed the commonly used critical threshold of 10. Therefore, the models were retained due to theoretical importance, and findings involving parental education are interpreted with appropriate caution.

4   Results

Firstly, a baseline model with age and gender shows statistically significant associations with all depression indices. Women report consistently higher levels of symptoms than men do, with the gender coefficient remaining positive and significant in all indices. This gender difference is highest in the measurement of 'heaviness' (i.e. feeling depressed, sad, lonely and having slept badly lately) with a predicted score of 0.43 higher than men on the scale of 0-10. These findings align with patterns reported in other studies (Kuehner, 2017; Parker and Brotchie, 2010)

Table 3: Baseline model with gender and age

	Depression (combined index)	**Heaviness** (sadness, sleep problems)	**Negative outlook** (low self-worth, pessimism)	**Disengagement** (loss of interest or joy)
(Intercept)	2.673***	1.574***	2.747***	3.733***
	(0.091)	(0.122)	(0.103)	(0.152)
Gender	0.313***	0.428***	0.262***	0.241***
	(0.020)	(0.024)	(0.022)	(0.030)
Age (df= 1)	0.030	-0.277***	0.147*	0.200*
	(0.061)	(0.073)	(0.066)	(0.091)
Age (df= 2)	-0.274***	-0.350***	-0.300***	-0.083
	(0.067)	(0.079)	(0.072)	(0.100)
Age (df= 3)	0.049	-0.054	-0.454**	0.986***
	(0.151)	(0.178)	(0.163)	(0.224)
Age (df= 4)	0.909***	1.217***	-0.092	2.255***
	(0.126)	(0.145)	(0.134)	(0.185)
AIC	60557.11	67954.80	64460.65	75542.65
Observations	17761	18100	18029	17962

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Since age is modeled with a non-linear function with four degrees of freedom, the effect of age is captured through a smooth curve rather than a single linear term. The coefficients reflect parts of this curve and are best understood in combination, as they describe how the relationship between age and symptoms changes across the life course. Several terms are statistically significant, pointing to meaningful non-linear variation. To make these patterns easier to interpret, predicted value plots are generated to illustrate how depressive symptoms vary across the life course for men and women.

For the overall depression index and in the negative outlook index (i.e. feeling negative about oneself, life and one's future, lack of autonomy) there is a rise in the predicted rate of symptoms around the 40's and 50's. For disengagement the expected values rise from the 30's to the 50's and again from the 60's to the 70's. Lastly, for heaviness, expected values are higher in young and old age.
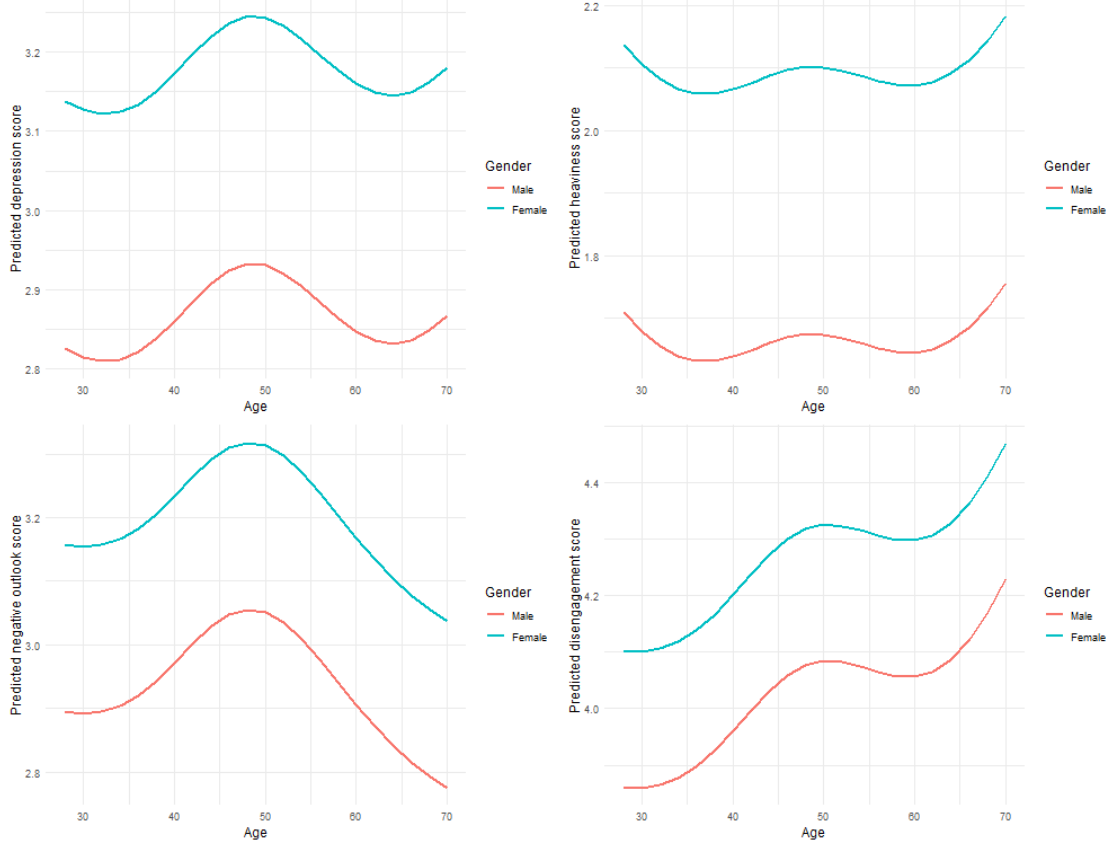
Figure 9: Expected values for gender and age

The second model introduces cultural capital, proxied through respondents' educational attainment (measured in years of completed education) as well as mother's and father's education (measured using ISCED levels). The coefficients for respondents' own education are consistently negative across all indices, although the strength and statistical significance vary (β =-0.17* to -0.62***). This suggests that higher educational attainment is generally associated with fewer depressive symptoms, supporting H_1 and aligning with existing literature

that links education to greater psychological well being.

Table 4: Model with gender, age, own and parental education

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	2.959***	1.908***	2.896***	4.109***
	(0.113)	(0.145)	(0.128)	(0.180)
Gender	0.305***	0.420***	0.257***	0.230***
	(0.020)	(0.023)	(0.022)	(0.030)
Age (spline term 1)	0.045	-0.248***	0.146*	0.232*
	(0.063)	(0.074)	(0.068)	(0.093)
Age (spline term 2)	-0.376***	-0.451***	-0.388***	-0.203*
	(0.069)	(0.081)	(0.074)	(0.102)
Age (spline term 3)	-0.020	-0.138	-0.511**	0.929***
	(0.154)	(0.181)	(0.166)	(0.228)
Age (spline term 4)	0.687***	0.967***	-0.249	1.967***
	(0.128)	(0.148)	(0.137)	(0.189)
Education (spline term 1)	-0.334***	-0.460***	-0.169*	-0.401***
	(0.064)	(0.074)	(0.069)	(0.094)
Education (spline term 2)	-0.415***	-0.528***	-0.246***	-0.530***
	(0.065)	(0.076)	(0.070)	(0.096)
Education (spline term 3)	-0.419**	-0.611***	-0.053	-0.672**
	(0.145)	(0.169)	(0.156)	(0.214)
Education (spline term 4)	-0.252*	-0.259*	-0.122	-0.460**
	(0.100)	(0.118)	(0.108)	(0.148)
Father's education	0.004	0.029*	-0.006	-0.006
	(0.010)	(0.012)	(0.011)	(0.015)
Mother's education	-0.008	-0.007	-0.010	-0.006
	(0.012)	(0.014)	(0.013)	(0.017)
AIC	60483.65	67885.96	64443.56	75487.78
Observations	17761	18100	18029	17962

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

To visualize the association between education and depressive symptoms, predicted value graphs are generated across completed years of education (Figure 10). The graphs illustrate a negative association: higher levels of education are linked to lower symptom scores across all four indices. The decline is most pronounced between 10 and 16 years (equivalent of having finished a Bachelor's degree) of education and the slope tends to level out at higher levels or even rise a bit. This suggests that the protective effect of one year more of education is stronger in the lower and middle parts of the distribution. However, while statistically robust, it is important to note that these effects are not large in substantive terms, and

predicted values remain relatively stable across the number of years of education.
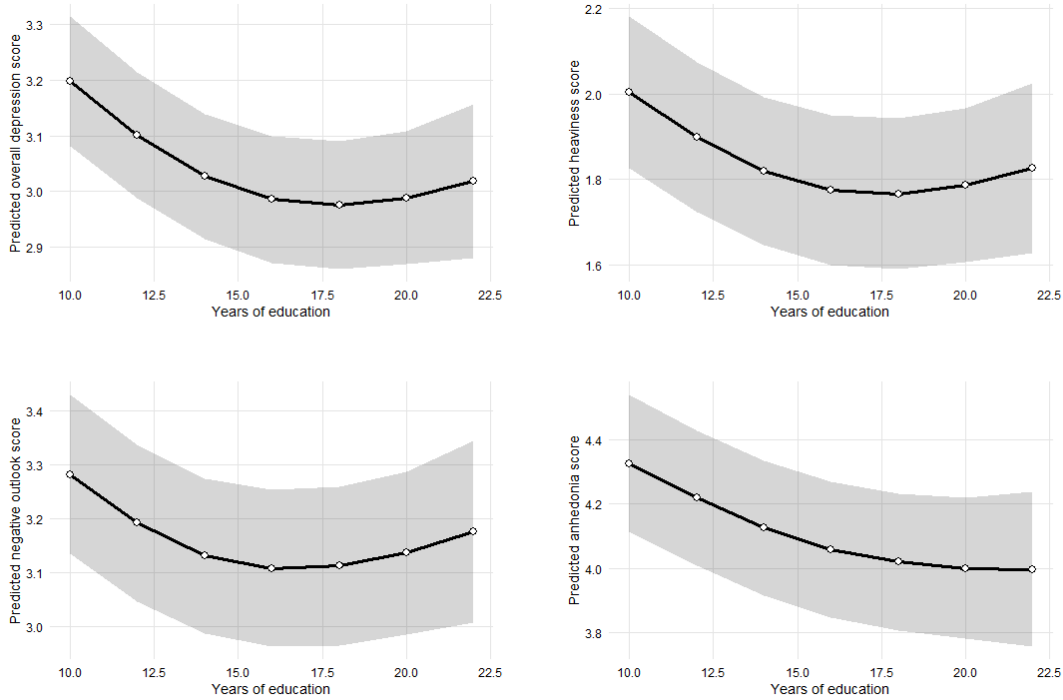
Figure 10: Expected values for years of education

Moving onto parental education, which is expected to influence depressive symptoms by shaping early socialization, emotional resources and access to cultural capital (Bourdieu, 1990; Jæger and Breen, 2016; Reay, 2015), no significant effects are found and the influence seem much weaker than that of respondents' own educational attainment. Therefore, H_2 is rejected.

To analyze the robustness of the association between years of education and the indices, a range of controls that are expected to impact mental well being is also controlled for: labor market status (unemployed, retired), partnership status and parenthood. The full regression model includes all covariates, but Table 5 presents only selected control variables for clarity; the complete results are available in Appendix 2. Being unemployed increases symptoms ($\beta = 0.25^{***}$ to 0.44^{***}), particularly for the negative outlook index (negative view of oneself and one's life and future). Living without a partner also increases the predicted score especially

on the heaviness (feeling sad, heavy and depressed lately, $\beta = 0.45^{***}$) and disengagement (feeling more numb and disinterested, $\beta = 0.46^{***}$) indices.

Table 5: Full model with controls

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	2.859***	1.814***	3.004***	3.731***
	(0.150)	(0.184)	(0.173)	(0.234)
Household income	-0.094***	-0.090***	-0.094***	-0.099***
	(0.006)	(0.007)	(0.007)	(0.009)
Children at home	-0.032	-0.122***	0.009	0.014
	(0.029)	(0.034)	(0.032)	(0.043)
Unemployed	0.376***	0.248***	0.434***	0.384***
	(0.062)	(0.073)	(0.068)	(0.093)
Lives alone	0.322***	0.454***	0.129***	0.461***
	(0.027)	(0.032)	(0.029)	(0.040)
Retired	-0.087	-0.080	-0.099*	-0.005
	(0.045)	(0.053)	(0.049)	(0.067)
AIC	49627.17	55648.52	53176.74	62202.70
Observations	14810	15062	15002	14947

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Conversely, it seems that income has a protective effect - the higher the income decile, the lower the score in all indices ($\beta = 0.09$ to 0.099^{***}). Interestingly, the relationship between years of education and symptom levels weakens (see Appendix 2). This suggests that part of the association initially attributed to educational attainment may, in fact, be explained by structural factors such as income and employment status, which are themselves patterned by education. In other words, education's apparent protective effect may partly reflect its correlation with more stable socioeconomic positions. However, what remains the focus of this thesis is the fact that a part of the variation created by educational attainment remains unexplained after controlling for other socioeconomic factors.

To explore whether the association between educational attainment and depressive symptoms varies across social groups, this section introduces interaction terms involving the key independent variable: years of education. Specifically, two hypotheses are tested: H_3, which put forward that the association is moderated by parental education, and H_4, which put forward that it is moderated by gender.

To test H_3, interaction terms were included between years of education and both mother's and father's educational levels. As Jæger and Breen (2016) note, disentangling the effects of parental and respondent education is challenging, precisely because cultural capital is transmitted across generations. In the present dataset, years of education are moderately correlated with parental education ($r = 0.38$ for paternal and $r = 0.34$ for maternal education), which is consistent with the idea that part of the influence of parental background may be entangled with the individual's own educational attainment.

The full regression results are presented in Appendix 3, and only relevant variables are shown in the below Table 6 and 7.

Table 6: Interaction between own and father's education

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	3.076***	1.907***	3.006***	4.318***
	(0.136)	(0.169)	(0.153)	(0.212)
Years of edu. (term 1)	-0.570***	-0.736***	-0.263*	-0.745***
	(0.115)	(0.135)	(0.124)	(0.170)
Years of edu. (term 2)	-0.512***	-0.563***	-0.371**	-0.658***
	(0.117)	(0.138)	(0.127)	(0.174)
Years of edu. (term 3)	-0.910***	-1.350***	-0.351	-1.160**
	(0.265)	(0.310)	(0.286)	(0.392)
Years of edu. (term 4)	-0.353	-0.494*	-0.170	-0.430
	(0.201)	(0.238)	(0.218)	(0.299)
Father's education	-0.181**	-0.203**	-0.114	-0.228*
	(0.067)	(0.078)	(0.072)	(0.099)
Education (df 1) × Father	0.192**	0.231**	0.100	0.251*
	(0.066)	(0.077)	(0.071)	(0.098)
Education (df 2) × Father	0.090	0.088	0.071	0.115
	(0.048)	(0.057)	(0.052)	(0.072)
Education (df 3) × Father	0.352*	0.491**	0.202	0.395
	(0.144)	(0.170)	(0.156)	(0.214)
Education (df 4) × Father	0.082	0.118	0.057	0.047
	(0.062)	(0.074)	(0.068)	(0.093)
	(0.118)	(0.137)	(0.127)	(0.175)
AIC	66986.63	75187.29	71447.99	83736.54
Observations	19736	20107	20031	19960

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Only the model including paternal education provide support for the hypothesis that the association between education and depressive symptoms is moderated by parental education

(H_3). While the main effects of parental education are insignificant, several interaction terms between years of education and paternal education are statistically significant ($p < 0.05$), particularly for the heaviness and overall depression indices. Based on these patterns, H_3 is partly supported: the protective effect of educational attainment on depressive symptomatology is moderated by paternal, but not maternal, education.

Table 7: Interaction between own and mother's education

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	3.066***	2.098***	2.848***	4.377***
	(0.157)	(0.193)	(0.174)	(0.241)
Education (df= 1)	-0.418**	-0.533***	-0.134	-0.642***
	(0.130)	(0.152)	(0.140)	(0.192)
Education (df= 2)	-0.459***	-0.581***	-0.211	-0.712***
	(0.130)	(0.153)	(0.140)	(0.192)
Education (df= 3)	-0.686*	-1.072**	0.015	-1.290**
	(0.295)	(0.345)	(0.318)	(0.436)
Education (df= 4)	-0.366	-0.269	-0.230	-0.646*
	(0.208)	(0.246)	(0.226)	(0.309)
Mother's education	-0.085	-0.109	0.021	-0.219
	(0.086)	(0.101)	(0.093)	(0.128)
Edu (df= 1) × Mother	0.069	0.075	-0.029	0.192
	(0.085)	(0.099)	(0.092)	(0.126)
Edu (df= 2) × Mother	0.043	0.062	-0.024	0.134
	(0.063)	(0.074)	(0.068)	(0.094)
Edu (df= 3) × Mother	0.186	0.323	-0.069	0.452
	(0.185)	(0.218)	(0.201)	(0.275)
Edu (df= 4) × Mother	0.055	0.012	0.036	0.104
	(0.076)	(0.090)	(0.082)	(0.113)
AIC	60495.73	67900.04	64455.96	75495.70
BIC	60628.07	68032.70	64588.55	75628.23
Log Likelihood	-30230.87	-33933.02	-32210.98	-37730.85
Observations	17761	18100	18029	17962
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.035	0.090	0.058	0.128
Var: Residual	1.753	2.476	2.076	3.892

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Controls not shown: Gender and Age

Moving to H_4, the interaction between gender and years of education is statistically significant for two indicies: the overall depression index ($\beta = 0.28$) and heaviness index ($\beta = 0.36$). The coefficients should be seen in the light of the main effect of being a woman that is

positive and significant across all outcomes, indicating higher symptom levels among women on average. The significant interaction suggests that the association between education and depressive symptoms differs by gender - specifically, that education appears more protective for women than for men in relation to heaviness symptoms (such as sadness, loneliness, and sleep problems). For pessimism and disengagement, the interaction terms are not statistically significant, indicating less consistent gender differences in those domains.

gndr 0.348 **

Table 8: Interaction between gender and education (random intercepts for country)

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	2.880***	1.837***	2.778***	4.090***
	(0.213)	(0.255)	(0.232)	(0.322)
Gender	0.348 **	0.496 ***	0.307 *	0.227
	(0.119)	(0.138)	(0.127)	(0.175)
Education (df= 1)	-0.182	-0.237	-0.007	-0.325
	(0.194)	(0.226)	(0.208)	(0.286)
Education (df= 2)	-0.004	0.057	0.041	-0.145
	(0.194)	(0.228)	(0.209)	(0.287)
Education (df= 3)	-0.634	-0.690	-0.231	-1.040
	(0.456)	(0.534)	(0.491)	(0.675)
Education (df= 4)	-0.359	-0.223	-0.298	-0.535
	(0.302)	(0.358)	(0.328)	(0.449)
Education term 1 × Gender	-0.096	-0.133	-0.107	-0.050
	(0.118)	(0.137)	(0.126)	(0.174)
Education term 2 × Gender	-0.276*	-0.365*	-0.204	-0.266
	(0.121)	(0.142)	(0.131)	(0.179)
Education term 3 × Gender	0.142	0.081	0.110	0.232
	(0.280)	(0.326)	(0.301)	(0.413)
Education term 4 × Gender	0.079	0.011	0.113	0.047
	(0.196)	(0.231)	(0.212)	(0.290)
AIC	60464.12	67867.83	64434.24	75475.38
BIC	60588.67	67992.69	64559.04	75600.12
Log Likelihood	-30216.06	-33917.91	-32201.12	-37721.69
Observations	17761	18100	18029	17962
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.036	0.089	0.058	0.132
Var: Residual	1.752	2.474	2.075	3.890

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. Controls not shown: Gender and Age.

Based on these findings, hypothesis H_4 is supported: the association between education

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and depressive symptoms is moderated by gender. Furthermore, it should be noted that the main effect of education disappears after adding the interaction between gender and years of education.
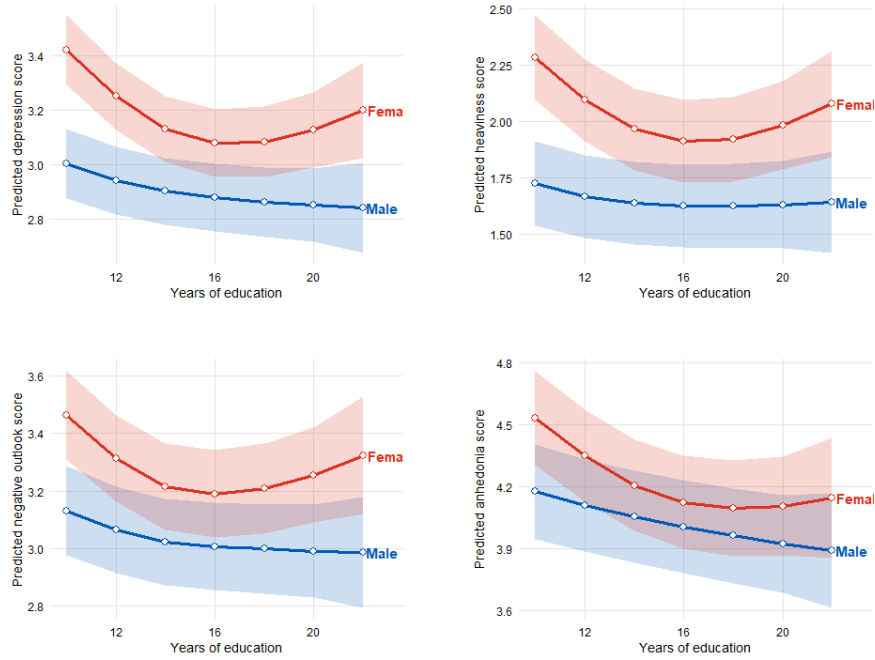
Figure 11: Expected values for gender and years of education (interaction)

To illustrate the interaction between gender and years of education more clearly, the Figure 11 above visualizes predicted levels of the indices across years of education for men and women separately. The graph complements the regression results: while women consistently report higher levels, the gender gap narrows as education increases. For women, higher education is associated with a steeper decline in symptoms than for men, whose scores decrease more gradually. Interestingly, the gap between men and women are especially found in the lower levels of education (10-15 years) whereas the levels align more closely later.

5 Discussion

5.1 Interpretation of results in light of the theoretical approach

The results of this thesis provide knowledge about the association between education and depressive symptoms. This discussion will go through the four hypotheses connecting them to the theoretical approach and former literature.

Starting with H_1, the analysis confirms an association between years of education and lower levels of depressive symptoms, aligning with prior research e.g.Lorant et al. (2003); Bjelland et al. (2008). In line with the theoretical approaches of Bourdieu (1990) and Reay (2015), education might influence how people think and act. It can provide tools like reflection, abstract thinking and self-control, which in turn is shown to minimize symptoms of depression and thus may have a protecting effect (Rehm et al., 1987; Yang et al., 2018). From a sociological perspective, education does not only revolve around learning a curriculum, it also shapes how people handle emotions, solve problems, and think about the world. Furthermore, these dispositions are, according to Reay (2015), not only cognitive but also emotional. Educational environments may encourage ways of feeling and expressing emotion that support psychological resilience. Another possibility is that people who already have these ways of thinking e.g. being reflective or good at planning, are also more likely to stay in school, even when we take their parents' background into account. This thesis cannot say for sure which comes first, but the results suggest that education matters for mental well-being in several ways.

Moving on to H_2 and H_3 the results show no significant direct association between parental education and the indices, rejecting H_2. However, when introducing parental education as a mediating variable in the relationship between years of education and the indices a significant relation appeared for paternal education, partly accepting H_3. Based on these results, it can be discussed, drawing on the conceptualization of cultural capital transmission by Jæger and Breen (2016), if the findings of the limited main effects of parental education should be interpreted as an absence of influence. According to Jæger and Breen (2016) cultural capital is transmitted both actively, through parental engagement and investments, and passively,

via exposure to the home environment. Consequently, the lack of significant coefficients for parental education may not reflect a lack of influence, but rather that its effects are already "absorbed" by the respondent's own education, which is itself an outcome of that transmission process. In that sense, the insignificant role of parental education in the models should be interpreted with caution.
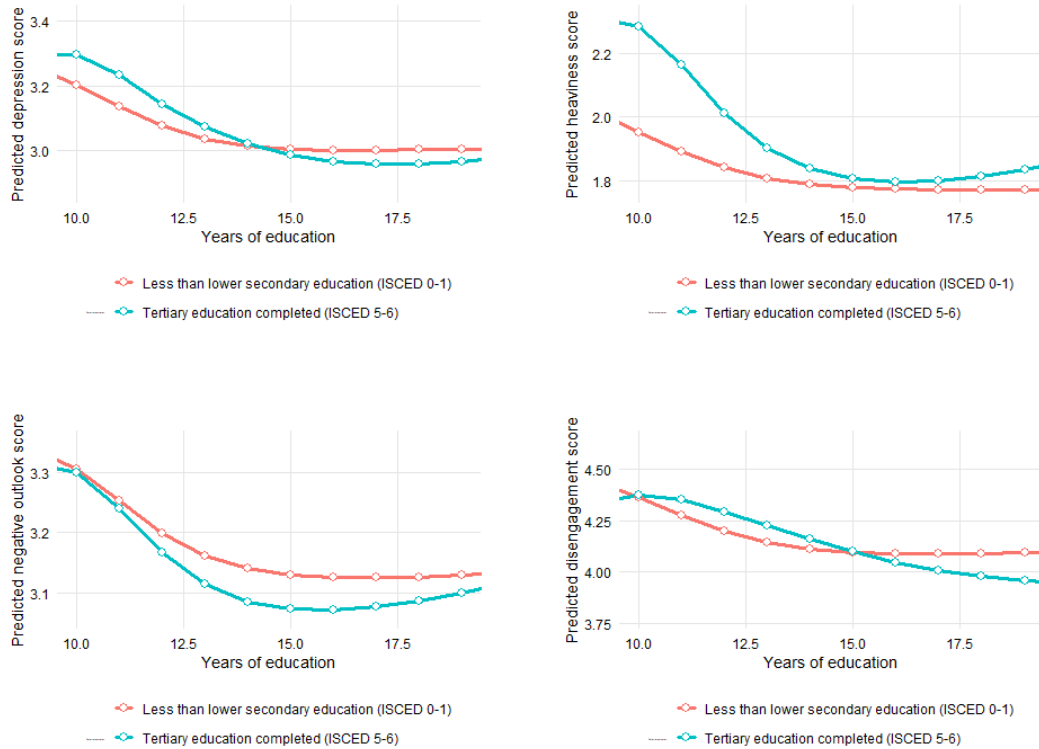
Figure 12: Expected values for years of education (x axis) paternal education (red and blue lines)

Figure 12 visualizes the predicted depression scores across different levels of own education (x-axis) and paternal education (line color). Firstly, a clear pattern is seen: individuals whose fathers have university degrees (blue) show notably higher symptom scores when they themselves have fewer than 14-15 years of education - corresponding to below Bachelor's level. This fits with the idea of downward social mobility, where people who do not match the educational level of their family background may experience increased psychological strain.

In contrast, respondents whose fathers have low education and who themselves remain at that same level (red line, low education) show lower symptom scores - a pattern that echoes Bourdieu's idea that there's less emotional friction when people remain in the social position they were prepared for during childhood.

Interestingly, for heaviness and negative outlook in particular, the protective effect of education appears stronger for those with highly educated fathers: as their own education increases, their symptom scores drop much more sharply than is the case for respondents from less-educated backgrounds. Among those whose fathers only completed lower secondary school, gaining more education does not seem to produce as steep a decline. This may reflect that the benefits of educational mobility are not evenly distributed; moving up in the educational hierarchy does not necessarily result in the same emotional payoff for everyone. According to Bourdieu, part of this may be that the cultural resources passed on in childhood help individuals make the most of further education, while those from less-educated families may not see the same returns in terms of emotional well-being, even if they achieve higher education themselves.

The results also offer support for H_4, which suggest that the association between educational attainment and depressive symptoms is moderated by gender. Across all indices, women report higher levels of symptoms than men, which is consistent with former evidence on gender disparities in mental health (Kuehner, 2017; Parker and Brotchie, 2010). However, the interaction terms show that the mental health benefits of higher education are more pronounced among women, particularly in the domains of emotional heaviness and the overall depression index. Furthermore, the study finds that it is especially the jump from a high school diploma to a Bachelor's or Master's level that benefit women (from around the 10th to the 15th year of education, see Graph 11), which is also found in Chevalier and Feinstein (2007). This suggests that educational attainment may be gender-equalizing, reducing the depressive symptoms more substantially for women than for men. Importantly, this finding suggests that promoting access to education may have higher psychological benefits for women, reducing gender gaps in mental health.

Across Europe, women are outpacing men when it comes to educational attainment (Eu-

rostat, 2025). As higher educational attainment becomes the norm among women, those with lower levels of attainment may experience a sharper sense of relative disadvantage, both in terms of deviating from group expectations and in facing worse options in the labor market, as lower-educated women tend to face more precarious labor market conditions compared to their male counterparts. Multiple studies show that women with low educational attainment are disproportionately represented in insecure, low-paid, and informal jobs, which are strongly linked to poorer mental health outcomes (Vives et al., 2013; Moortel et al., 2025)

Beyond these structural factors, psychological mechanisms may also help explain why the protective effects of education are more pronounced for women. A large body of research shows that women are more likely than men to engage in rumination and brooding, which is a risk factor for both the starting and persistence of depressive symptoms (Johnson and Whisman, 2013; Lilly et al., 2023). This tendency is especially relevant given that the gender difference in depressive symptoms is strongest in the "heaviness" index, which includes items such as feeling depressed, sad, lonely, or experiencing poor sleep. These symptoms are often closely linked to ruminative thinking, where negative mood and repetitive thoughts reinforce each other. The gender gap in rumination is thought to arise in part from socialization processes, as women are more often encouraged to reflect on emotions and interpersonal dynamics. In this context, education may help women develop cognitive skills such as problem-solving, that they are not normally encouraged to practice, which can help disrupt ruminative cycles and provide alternative coping strategies. As a result, women, who are on average more vulnerable to rumination, may experience greater mental health benefits from the resources and strategies gained through education.

However, these interpretations must be approached with caution. The argument is not that women's socialization is bad, but rather that it warrants closer analysis as a factor contributing to different mental health outcomes. Research indicates that masculinity is often associated with traits such as independence, confidence, and decisiveness, whereas femininity is linked to emotional sensitivity, taking other's into account and responsiveness to emotional cues (Simonson et al., 2011). These traits are not shown to be biologically fixed, but appear in different combinations across individuals. Those who identify more strongly with a fem-

inine gender role may tend to attend more to emotions and emotional reactions to stress, which is in turn associated with greater self-focus and more intense negative affect. This helps explain why women are, on average, more prone to ruminative thinking. By contrast, the assertive, action-oriented features commonly associated with masculinity may help reduce excessive emotional focus by promoting more problem-solving-oriented coping styles. These dynamics are supported by findings from Simonson et al. (2011), who tested whether femininity mediates the relationship between sex and interpersonal rumination. Their results confirmed a significant indirect effect of femininity indicating that femininity partially explains the gender gap in interpersonal rumination and therefore also depression levels.

Lastly, multiple studies have shown that individuals with lower socioeconomic status are more likely to endorse traditional gender role attitudes (Marks et al., 2009; Antill et al., 2003). This may mean that women from lower educational backgrounds are both met with and have themselves on average stronger expectations to respond to adversity in ways that align with feminine norms, such as emotional sensitivity, self-blame and passivity. Thus, the structural disadvantage combined with gendered expectations around emotional coping may intensify the psychological burden experienced by lower-educated women.

5.2 Policy implications

The findings offer several implications for public policy, particularly in the domains of mental health and education. H_1 tested the association between years of education and depressive symptoms. The results show a robust, negative association across all symptom indices, meaning that higher levels of education are associated with fewer reported depressive symptoms. This suggests that educational attainment possibly plays a protective role for mental health. Policies that reduce dropout rates, promote lifelong learning, and support access to higher education, particularly for people of lower educational background, may therefore have a double purpose: reducing social inequality and mitigating mental health disparities.

H_3 analyzed if the relationship between education and depressive symptoms is moderated by parental education. The results provided evidence of such moderation, implying that the

mental health benefits of education are shaped by family background. In practical terms, this means that efforts to reduce depression through educational expansion will not reach everyone equally - those whose parents have higher education tend to benefit more. For individuals from less-educated families, the psychological returns to education appear smaller, particularly at the highest levels of attainment. From a policy perspective, this highlights the importance of looking beyond access to education alone. It suggests a need for interventions that recognize the broader cultural capital gaps students bring with them and that help students from less-educated backgrounds acquire the kinds of cultural resources, that can help translate educational achievement into psychological well-being.

Finally, H_4 is supported by the finding that the association between education and depressive symptoms is moderated by gender. While women report higher average levels of symptoms across all indices, the analyses show that the gender gap narrows as education increases particularly for the indices 'heaviness' and 'negative outlook'. The most noticeable decline occurs across the transition from secondary education to higher education, with each additional year between 12 and 16 - roughly corresponding to moving from high school to a Bachelor's degree. This implies that education may be particularly protective for women, therefore, gender-sensitive education policies that support girls' and women's educational trajectories may not only enhance equality in academic and labor outcomes, but also contribute to reducing mental health disparities.

In sum, the findings reinforce the idea that education is a powerful resource for mental well-being. Policymakers should consider educational interventions as an upstream strategy to prevent mental distress, and ensure that such policies are inclusive and attentive to gendered and class-based inequalities. Investing in equitable and accessible education systems thus becomes not only a matter of economic growth or social justice, but also a form of preventive mental health care.

6 Limitations

Several limitations should be acknowledged. First, all mental health indicators are based on self-reported symptom scales, which, while widely used and validated in social surveys, are subject to response bias, including social desirability and variation in interpretation across individuals and cultural contexts (Frederiksen et al., 2016). Moreover, educational attainment is operationalized as years of completed education, which captures quantity but not necessarily quality or field of study. These unmeasured dimensions of education may influence mental health outcomes and contribute to heterogeneity in effects.

Second, although the models reveal robust associations between education and depressive symptoms, the data are cross-sectional, limiting causal inference. There is a risk of reverse causality or endogeneity, where early-life mental health problems may affect educational attainment, rather than the reverse. While parental education and other covariates offer partial control for background factors, longitudinal data would be needed to establish stronger causal claims.

Thirdly, while the models account for clustering at the country level by including random intercepts, they do not estimate random slopes for key predictors such as educational attainment. This implies that although national differences in baseline symptom levels are controlled for, variation in the strength or direction of the education–depression association across countries is not explicitly modeled. Given prior research suggesting that the returns to education, both economic and psychosocial, can vary substantially by national context (e.g., welfare regime, educational system, labor market structure), future studies could benefit from estimating multilevel models with random slopes. These would provide a more nuanced understanding of how institutional and cultural factors moderate the relationship between education and mental health.

Together, these limitations suggest caution in generalizing the findings beyond the sample and analytic framework. Nonetheless, the results highlight the importance of education as a potential resource for psychological well being, particularly among individuals from less advantaged family backgrounds.

7 Conclusion

This thesis set out to examine how depressive symptoms are patterned by educational attainment and whether this association is moderated by social origin and gender. The findings offer consistent evidence in support of the first hypothesis: individuals with higher levels of education report fewer symptoms across all four indices: depression, emotional heaviness, negative outlook, and disengagement. This aligns with existing research and support the view that education functions as a protective factor for depressive symptoms.

Second, it was hypothesized that higher levels of parental education would be associated with lower levels of depressive symptoms. This hypothesis was not supported. The coefficients for both mother's and father's educational level were small and statistically insignificant across all models. This suggests that the direct effect of parental education on adult mental health is weak once the respondent's own educational attainment is taken into account. One possible interpretation is that the influence of parental background operates indirectly, through its shaping of the respondent's educational trajectory, rather than creating a strong independent effect on depressive symptoms.

The third hypothesis suggested that education would be especially protective for individuals from lower parental education backgrounds. This moderation effect was partly supported - only for paternal educational level - particularly in the case of heaviness and disengagement. The results suggest that downward educational mobility is associated with greater level of depressive symptoms. For upwards mobility it seemed that individuals from less advantaged families appear to benefit more from each additional year of schooling from around the 12th to 15th year, likely because they acquire cognitive and emotional orientations less available through early socialization. This highlights the transformative potential of education for those starting from lower levels of inherited cultural capital.

The fourth hypothesis explored whether the association between education and depressive symptoms differs by gender. While women consistently reported higher symptom levels than men, the gap narrowed with increasing education (from the 12th to the 16th year), especially for disengagement and emotional heaviness. These findings suggest that educational

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attainment may give higher psychological benefits for women. Education may thus act as a gender-equalizing force, partially weakening structural inequalities that contribute to mental health disparities.

References

Alıcı, Y. H. and Hasanlı, J. (2023). Effect of gender on the relationship between ruminative thinking and depressive symptoms. *Psikiyatride Güncel Yaklaşımlar - Current Approaches in Psychiatry*, 15(Suppl 1):313–320.

American Psychiatric Association (n.d.). What is depression? `https://www.psychiatry.org/patients-families/depression/what-is-depression`. Accessed 14 June 2025.

Antill, J. K., Cunningham, J. D., and Cotton, S. (2003). Gender-role attitudes in middle childhood: In what ways do parents influence their children? *Australian Journal of Psychology*, 55(3):148–153.

Barone, C. (2006). Cultural capital, ambition and the explanation of inequalities in learning outcomes: A comparative analysis. *Sociology*, 40(6):1039–1058.

Bastin, M., Bijttebier, P., Raes, F., and Vasey, M. W. (2014). Brooding and reflecting in an interpersonal context. *Personality and Individual Differences*, 63:100–105.

Bates, D., Mächler, M., Bolker, B., and Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1):1–48.

Bjelland, I., Krokstad, S., Mykletun, A., Dahl, A. A., Tell, G. S., and Tambs, K. (2008). Does a higher educational level protect against anxiety and depression? the hunt study. *Social Science & Medicine*, 66(6):1334–1345.

Bourdieu, P. (1990). Structures, habitus, practices. In *The Logic of Practice*, pages 52–65. Polity Press, Cambridge. Translated by Richard Nice.

Brown, J. D. (2009). Choosing the right number of components or factors in pca and efa. *Shiken: JALT Testing & Evaluation SIG Newsletter*, 13(2):19–23. ISSN 1881-5537.

Cermakova, P., Formanek, T., Kagstrom, A., and Winkler, P. (2018). Socioeconomic position in childhood and cognitive aging in europe. *Neurology*, 91:e1602–e1610.

Chevalier, A. and Feinstein, L. (2007). Sheepskin or prozac: The causal effect of education on mental health. Technical report, Centre for the Economics of Education, London School of Economics, Houghton Street, London WC2A 2AE. Submitted June 2006. Individual copy price: £5.

Chlapecka, A., Kagstrom, A., and Cermakova, P. (2020). Educational attainment inequalities in depressive symptoms in more than 100,000 individuals in europe. *European Psychiatry*, 63(1):e97.

Cutler, D. M., Huang, W., and Lleras-Muney, A. (2015). When does education matter? the protective effect of education for cohorts graduating in bad times. *Social Science & Medicine*, 127:63–73.

Dudal, P. and Bracke, P. (2016). Absolute and relative educational inequalities in depression in europe. *International Journal of Public Health*, 61(7):787–795.

Eikemo, T. A., Bambra, C., Judge, K., and Ringdal, K. (2008). Welfare state regimes and differences in self-perceived health in europe: A multilevel analysis. *Social Science & Medicine*, 66(11):2281–2295.

Eurostat (2025). Population by educational attainment level, sex and age (%) – main indicators. `https://ec.europa.eu/eurostat/databrowser/view/edat_lfse_03/default/table`. Dataset code: edat_lfse_03. Last updated: 12 June 2025.

Fan, Y., Fan, A., Yang, Z., and Fan, D. (2025). Global burden of mental disorders in 204 countries and territories, 1990–2021: results from the global burden of disease study 2021. *BMC Psychiatry*, 25(486).

Farkas, G. (2018). Family, schooling, and cultural capital. In Schneider, B., editor, *Handbook of the Sociology of Education in the 21st Century*, pages 3–38. Springer, Cham.

Field, A. (2009). *Discovering Statistics Using SPSS (and sex and drugs and rock 'n' roll)*. SAGE Publications Ltd, London, 3rd edition. First edition 2000; Second edition 2005.

Fox, J., Weisberg, S., and Price, B. (2024). *car: Companion to Applied Regression.* Comprehensive R Archive Network (CRAN). R package version 3.1-3.

Frederiksen, M., Gundelach, P., and Skovgaard Nielsen, R. (2016). *Survey - Design, stikprøve, spørgeskema, analyze.* Hans Reitzels forlag, København, 1. oplag edition.

Johnson, D. P. and Whisman, M. A. (2013). Gender differences in rumination: A meta-analysis. *Personality and Individual Differences*, 55(4):367–374.

Jæger, M. M. and Breen, R. (2016). A dynamic model of cultural reproduction. *American Journal of Sociology*, 121(4):1079–1115.

Kieffer, K. M. (1998). Orthogonal versus oblique factor rotation: A review of the literature regarding the pros and cons. In *Annual Meeting of the Mid-South Educational Research Association*, New Orleans, LA. Presented November 4–6, 1998. ERIC Document No. ED427031.

Kondirolli, F. and Sunder, N. (2022). Mental health effects of education. *Health Economics*, 31(Suppl 2):22–39.

Kuehner, C. (2017). Why is depression more common among women than among men? *The Lancet Psychiatry*, 4(2):146–158.

Kuklová, M., Kagstrom, A., Kučera, M., Mladá, K., Winkler, P., and Cermakova, P. (2020). Educational inequalities in mental disorders in the czech republic: Data from czech mental health study (czems). *Social Psychiatry and Psychiatric Epidemiology*.

Kvarving, A. M. (2008). Natural cubic splines. `https://www.math.ntnu.no/~arnekk/NATURAL_SPLINES.pdf`.

Lareau, A. (2011). *Unequal Childhoods: Class, Race, and Family Life.* University of California Press, Berkeley, 2nd edition.

Lee, J. (2011). Pathways from education to depression. *Journal of Cross-Cultural Gerontology*, 26(2):121–135.

Lilly, K. J., Howard, C., Zubielevitch, E., and Sibley, C. G. (2023). Thinking twice: Examining gender differences in repetitive negative thinking across the adult lifespan. *Frontiers in Psychology*, 14:1239112. Open access under CC BY license.

Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P., and Ansseau, M. (2003). Socioeconomic inequalities in depression: A meta-analysis. *American Journal of Epidemiology*, 157(2):98–112.

MacKerron, G. and Powdthavee, N. (2022). Predicting emotional volatility using 41,000 participants in the united kingdom. arXiv preprint arXiv:2205.07742. Version 2, submitted 17 May 2022.

Marks, J., Lam, C. B., and McHale, S. M. (2009). Family patterns of gender role attitudes. *Sex Roles*, 61(3–4):221–234. Author manuscript available in PMC: 2012 Feb 2.

Mirowsky, J. and Ross, C. E. (2003). *Education, Social Status, and Health*. Aldine de Gruyter, New York.

Moortel, D. D., Balogh, R., Engels, M., and Vanderleyden, J. (2025). Employment quality and mental health in germany: The mismatch of low employment quality with work and family values by gender. *Social Science & Medicine*, 371:117906.

NHS (2023). Overview – depression in adults. `https://www.nhs.uk/mental-health/conditions/depression-in-adults/overview/`. Page last reviewed: 5 July 2023; next review due: 5 July 2026.

Niemeyer, H., Bieda, A., Michalak, J., Schneider, S., and Margraf, J. (2020). Education and mental health: Do psychosocial resources matter? *SSM - Population Health*, 11:100569.

Park, A. L., Fuhrer, R., and Quesnel-Vallée, A. (2013). Parents' education and the risk of major depression in early adulthood. *Social Psychiatry and Psychiatric Epidemiology*, 48(11):1829–1839.

Parker, G. and Brotchie, H. (2010). Gender differences in depression. *International Review of Psychiatry*, 22(5):429–436.

Philpott, M. L. (2019). The great fortune of ordinary sadness. *The New York Times*. Opinion piece.

Platt, J. M., Bates, L. M., Jager, J., McLaughlin, K. A., and Keyes, K. M. (2020). Changes in the depression gender gap from 1992 to 2014: Cohort effects and mediation by gendered social position. *Social Science & Medicine*, 258:113088. Author manuscript; available in PMC: 1 Aug 2020.

Reay, D. (2015). Habitus and the psychosocial: Bourdieu with feelings. *Cambridge Journal of Education*, 45(1):9–23.

Rehm, L. P., Kaslow, N. J., and Rabin, A. S. (1987). Cognitive and behavioral targets in a self-control therapy program for depression. *Journal of Consulting and Clinical Psychology*, 55(1):60–67.

Reshi, I. A. and Sudha, T. (2022). Women's access to education and its impact on their empowerment: A comprehensive review. *MORFAI Journal*, 1(2):446–450. Licensed under CC BY 4.0.

Ryle, G. (2002). *The Concept of Mind.* University of Chicago Press, Chicago, reprint edition edition. Originally published in 1949.

Sestoft, C. (2018). Hvad er en disposition? *Praktiske Grunde. Nordisk tidsskrift for kultur- og samfundsvidenskab*, (3–4):77–80.

Simonson, J., Mezulis, A., and Davis, K. (2011). Socialized to ruminate? gender role mediates the sex difference in rumination for interpersonal events. *Journal of Social and Clinical Psychology*, 30(9):937–959.

Sullivan, A. (2001). Cultural capital and educational attainment. *Sociology*, 35(4):893–912.

Thomsen, J.-P., Jæger, M. M., Kohl, K. S., Henze-Pedersen, S., Karmsteen, K., and Klokker, R. H. (2024). Family learning environments in scandinavia: Dimensions, types and socioeconomic profiles. *British Journal of Sociology of Education*, 45(3):347–362.

van de Vijver, F. and Leung, K. (1997). *Methods and Data Analysis of Comparative Research*. Allyn & Bacon, Boston.

Vives, A., Amable, M., Ferrer, M., Moncada, S., Llorens, C., Muntaner, C., Benavides, F. G., and Benach, J. (2013). Employment precariousness and poor mental health: Evidence from spain on a new social determinant of health. *Journal of Environmental and Public Health*, pages Article ID 978656, 10 pages. Academic Editor: Michael Quinlan.

Wittchen, H.-U., Jacobi, F., Rehm, J., Gustavsson, A., Svensson, M., Jönsson, B., Olesen, J., Allgulander, C., Alonso, J., Faravelli, C., Fratiglioni, L., Jennum, P., Lieb, R., Maercker, A., van Os, J., Preisig, M., Salvador-Carulla, L., Simon, R., and Steinhausen, H.-C. (2011). The size and burden of mental disorders and other disorders of the brain in europe 2010. *European Neuropsychopharmacology*, 21(9):655–679.

Witter, R. A., Okun, M. A., Stock, W. A., and Haring, M. J. (1984). Education and subjective well-being: A meta-analysis. *Educational Evaluation and Policy Analysis*, 6(2):165–173. Accessed: 16-11-2015 20:44 UTC.

World Health Organization (2023). Depressive disorder (depression) – fact sheet. `https://www.who.int/news-room/fact-sheets/detail/depression/`. Last updated 31 March 2023.

Xiang, Y., Cao, R., and Li, X. (2024). Parental education level and adolescent depression: A multi-country meta-analysis. *Journal of Affective Disorders*, 347:645–655. Published: 15 February 2024.

Yang, X., Zhao, J., Chen, Y., Zu, S., and Zhao, J. (2018). Comprehensive self-control training benefits depressed college students: A six-month randomized controlled intervention trial. *Journal of Affective Disorders*, 226:251–260.

Zembylas, M. (2007). Emotional capital and education: Theoretical insights from bourdieu. *British Journal of Educational Studies*, 55(4):443–463.

Zou, M., Liu, B., Ji, J., Ren, L., He, Y., Wei, H., Yin, M., Hu, H., Liu, X., Wu, S., Wang, H., and Wang, X. (2025). Gender difference in rumination subtypes connecting to depression. *Archives of Women's Mental Health.* Online first, accepted 9 February 2025.

8 Appendix

The full code used in this thesis, including data preparation, statistical analysis, and model generation, is available on the GitHub repository: https://github.com/sisselhej/thesis.

8.1 Appendix 1 - Empty model with random intercepts for country

Table 9: Empty model (random intercepts for country)

	Depression (combined index)	**Heaviness** (sadness, sleep problems)	**Negative outlook** (low self-worth, pessimism)	**Disengagement** (loss of interest or joy)
(Intercept)	3.047***	1.938***	3.057***	4.196***
	(0.060)	(0.093)	(0.068)	(0.109)
AIC	60896.82	68471.27	64731.46	75925.60
BIC	60920.17	68494.68	64754.86	75948.99
Log Likelihood	-30445.41	-34232.63	-32362.73	-37959.80
Observations	17780	18120	18052	17983
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.042	0.103	0.055	0.141
Var: Residual	1.794	2.554	2.107	3.979

Note: Standard errors in parentheses. ***$p < 0.001$

8.2 Appendix 2- Full model

Table 10: Full model with spline terms, parental education, and controls (random intercepts for country)

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	2.859***	1.814***	3.004***	3.731***
	(0.150)	(0.184)	(0.173)	(0.234)
Gender	0.249***	0.358***	0.208***	0.174***
	(0.021)	(0.025)	(0.023)	(0.032)
Age (spline term 1)	0.410***	0.017	0.504***	0.716***
	(0.079)	(0.093)	(0.086)	(0.117)
Age (spline term 2)	-0.149	-0.295**	-0.174	0.018
	(0.094)	(0.111)	(0.103)	(0.141)
Age (spline term 3)	0.500*	0.112	0.084	1.511***
	(0.197)	(0.232)	(0.216)	(0.294)
Age (spline term 4)	0.375*	0.495**	-0.328*	1.424***
	(0.150)	(0.173)	(0.162)	(0.222)
Education (spline term 1)	-0.183*	-0.311***	-0.023	-0.283**
	(0.072)	(0.083)	(0.078)	(0.106)
Education (spline term 2)	-0.193**	-0.324***	-0.052	-0.266*
	(0.071)	(0.083)	(0.078)	(0.106)
Education (spline term 3)	-0.177	-0.340	0.144	-0.441
	(0.163)	(0.190)	(0.177)	(0.241)
Education (spline term 4)	-0.045	-0.076	0.083	-0.263
	(0.105)	(0.125)	(0.116)	(0.158)
Father's education	0.009	0.026*	0.004	0.002
	(0.011)	(0.013)	(0.012)	(0.016)
Mother's education	-0.004	0.008	-0.009	-0.007
	(0.012)	(0.015)	(0.014)	(0.018)
Household income	-0.094***	-0.090***	-0.094***	-0.099***
	(0.006)	(0.007)	(0.007)	(0.009)
Has child	-0.032	-0.122***	0.009	0.014
	(0.029)	(0.034)	(0.032)	(0.043)
Unemployed	0.376***	0.248***	0.434***	0.384***
	(0.062)	(0.073)	(0.068)	(0.093)
Lives w/o partner	0.322***	0.454***	0.129***	0.461***
	(0.027)	(0.032)	(0.029)	(0.040)
Retired	-0.087	-0.080	-0.099*	-0.005
	(0.045)	(0.053)	(0.049)	(0.067)
AIC	49627.17	55648.52	53176.74	62202.70
Observations	14810	15062	15002	14947
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.027	0.068	0.066	0.112
Var: Residual	1.655	2.334	2.009	3.725

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

8.3 Appendix 3 - Parental education X own education

8.3.1 Appendix 3a - Paternal education X own education

Table 11: Interaction between own and father's education (random intercepts for country)

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	3.122***	2.118***	2.959***	4.358***
	(0.149)	(0.184)	(0.164)	(0.229)
Education (spline term 1)	-0.561***	-0.697***	-0.246	-0.788***
	(0.122)	(0.143)	(0.131)	(0.180)
Education (spline term 2)	-0.427***	-0.487**	-0.264	-0.615**
	(0.129)	(0.152)	(0.140)	(0.192)
Education (spline term 3)	-0.823**	-1.264***	-0.281	-1.052*
	(0.280)	(0.327)	(0.301)	(0.413)
Education (spline term 4)	-0.383	-0.455	-0.246	-0.469
	(0.217)	(0.258)	(0.236)	(0.323)
Father's education	-0.139	-0.143	-0.069	-0.220*
	(0.073)	(0.086)	(0.079)	(0.108)
Age (spline term 1)	0.059	-0.233**	0.155*	0.248**
	(0.062)	(0.074)	(0.067)	(0.092)
Age (spline term 2)	-0.366***	-0.435***	-0.380***	-0.197
	(0.069)	(0.080)	(0.074)	(0.101)
Age (spline term 3)	0.006	-0.103	-0.496**	0.958***
	(0.154)	(0.181)	(0.166)	(0.227)
Age (spline term 4)	0.691***	0.964***	-0.242	1.971***
	(0.128)	(0.147)	(0.136)	(0.188)
Gender	0.305***	0.420***	0.257***	0.231***
	(0.020)	(0.023)	(0.022)	(0.030)
Edu term 1 × Father	0.150*	0.158	0.055	0.255*
	(0.072)	(0.084)	(0.077)	(0.106)
Edu term 2 × Father	0.047	0.033	0.024	0.098
	(0.055)	(0.064)	(0.059)	(0.081)
Edu term 3 × Father	0.298	0.428*	0.143	0.372
	(0.157)	(0.185)	(0.170)	(0.233)
Edu term 4 × Father	0.066	0.072	0.046	0.060
	(0.068)	(0.080)	(0.074)	(0.101)
AIC	60493.27	67890.68	64457.40	75492.63
BIC	60625.61	68023.34	64589.99	75625.16
Log Likelihood	-30229.63	-33928.34	-32211.70	-37729.31
Observations	17761	18100	18029	17962
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.036	0.091	0.057	0.128
Var: Residual	1.753	2.475	2.076	3.891

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

8.3.2 Appendix 3b - Maternal education X own education

Table 12: Interaction between own and mother's education (random intercepts for country)

	Depression (combined index)	Heaviness (sadness, sleep problems)	Negative outlook (low self-worth, pessimism)	Disengagement (loss of interest or joy)
(Intercept)	3.066***	2.098***	2.848***	4.377***
	(0.157)	(0.193)	(0.174)	(0.241)
Education (spline term 1)	-0.418**	-0.533***	-0.134	-0.642***
	(0.130)	(0.152)	(0.140)	(0.192)
Education (spline term 2)	-0.459***	-0.581***	-0.211	-0.712***
	(0.130)	(0.153)	(0.140)	(0.192)
Education (spline term 3)	-0.686*	-1.072**	0.015	-1.290**
	(0.295)	(0.345)	(0.318)	(0.436)
Education (spline term 4)	-0.366	-0.269	-0.230	-0.646*
	(0.208)	(0.246)	(0.226)	(0.309)
Mother's education	-0.085	-0.109	0.021	-0.219
	(0.086)	(0.101)	(0.093)	(0.128)
Age (spline term 1)	0.041	-0.256***	0.143*	0.228*
	(0.064)	(0.075)	(0.069)	(0.094)
Age (spline term 2)	-0.377***	-0.451***	-0.389***	-0.206*
	(0.069)	(0.081)	(0.075)	(0.103)
Age (spline term 3)	-0.026	-0.146	-0.518**	0.917***
	(0.155)	(0.183)	(0.168)	(0.230)
Age (spline term 4)	0.683***	0.957***	-0.249	1.960***
	(0.128)	(0.148)	(0.137)	(0.189)
Gender	0.305***	0.420***	0.257***	0.231***
	(0.020)	(0.023)	(0.022)	(0.030)
Edu term 1 × Mother	0.069	0.075	-0.029	0.192
	(0.085)	(0.099)	(0.092)	(0.126)
Edu term 2 × Mother	0.043	0.062	-0.024	0.134
	(0.063)	(0.074)	(0.068)	(0.094)
Edu term 3 × Mother	0.186	0.323	-0.069	0.452
	(0.185)	(0.218)	(0.201)	(0.275)
Edu term 4 × Mother	0.055	0.012	0.036	0.104
	(0.076)	(0.090)	(0.082)	(0.113)
AIC	60495.73	67900.04	64455.96	75495.70
BIC	60628.07	68032.70	64588.55	75628.23
Log Likelihood	-30230.87	-33933.02	-32210.98	-37730.85
Observations	17761	18100	18029	17962
Num. groups: Country	12	12	12	12
Var: Country (Intercept)	0.035	0.090	0.058	0.128
Var: Residual	1.753	2.476	2.076	3.892

Note: Standard errors in parentheses. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

8.4 Appendix 4 - Principal Component Analysis on country level

	DK	FI	NO	SE	AT	BE	FR	GB	ES	PT
Felt depressed the past week	x	x	x	x	x	x	x	x	x	x
Felt sad the past week	x	x	x	x	x	x	x	x	x	x
Felt lonely the past week	x	x	x	x	x	x	x	x	x	x
Felt tired the past week				x	x	x	x	x	x	x
Restless sleep the past week			x	x	x	x	x	x	x	x

	DK	FI	NO	SE	AT	BE	FR	GB	ES	PT
I feel pessimistic about my future	x	x	x	x	x	x	x	x	x	x
In general, I feel very negative about myself	x	x	x	x	x	x	x	x	x	x
At times, I feel that I am a failure	x		x	x		x		x	x	
On the whole, life is far from what I would like it to be	x	x	x	x	x	x	x	x	x	x
I do not feel free to decide how to live my life	x	x	x	x	x	x	x	x	x	x

	DK	FI	NO	SE	AT	BE	FR	GB	ES	PT
Absorbed in what I was doing	x	x	x	x	x	x		x		x
I've had a lot of energy	x	x	x	x	x	x	x	x	x	x
I enjoyed life	x	x	x	x	x		x		x	x
Were happy	x	x	x		x	x	x		x	x