



**DET PSYKOLOGISKE FAKULTET**

**Does mental health moderate the association between parental education  
and grade point average in Norwegian youth?**

Hovedoppgave  
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### **Sammendrag**

Ungdom med foreldre som har høyere utdanning har større sannsynlighet for å oppnå høyere karakterer, fullføre videregående og å ta høyere utdanning selv. Samtidig er mental uhelse i ungdomstiden en prediktor for lavere karakterer, fravær, frafall og fremtidig arbeidsledighet. Denne studien skal undersøke forholdet mellom foreldres utdanning, mental uhelse (internaliserende problemer, eksternaliserende problemer, depressive symptomer), og karaktergjennomsnitt blant ungdom mellom 16-19 år i Hordaland. Hierarkiske regresjonsanalyser viste signifikante, positive sammenhenger mellom både mors og fars utdanning, og karaktersnitt hos ungdom. Det ble funnet en signifikant, negativ sammenheng mellom eksternaliserende problemer hos ungdom og karaktersnitt. Ingen signifikante interaksjonseffekter mellom foreldreutdanning og mental uhelse ble funnet. Dette indikerer at mental uhelse påvirker ungdom på lignende måter når det gjelder akademisk oppnåelse, uavhengig av utdanningsnivået til foreldrene deres.

### **Abstract**

Youth of parents with higher education are more likely to achieve higher grades, finish high school and go on to higher education themselves. At the same time, mental health problems in adolescence are a predictor for lower grades, absenteeism, drop out and future unemployment. This study seeks to elucidate the relationship between parental education, mental health (internalizing problems, externalizing problems, depressive symptoms), and grade point average (GPA) among youth aged 16-19 years in Hordaland, Norway. Using hierarchical regression analyses, both maternal and paternal education showed significant positive associations with GPA. Externalizing problems were found to have a significant negative association with GPA. No significant interaction effect between parental education and mental health was found. This indicates that mental health problems affect youth with parents who have higher education similarly to youth with parents who have lower education.

*Keywords:* socioeconomic status, parental education, social mobility, mental health, GPA, youth, academic achievement

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## Introduction

As the popular idiom goes: Children are the future. However, children are heading towards vastly different futures. Socioeconomic status (SES) in the family has a well-known association with academic achievement (White, 1982). A meta-analysis of studies published between 1990-2000, including 101,157 students in 6,871 schools in the U.S., found a medium to strong association between SES and academic achievement (Sirin, 2005). The connection between parental education and academic achievement has been identified in Norway as well, where high-performing pupils in primary school are more likely to have parents with higher education and more cultural capital (Bourdieu, 2011; Utdanningsdirektoratet, 2016). When investigating associated factors more closely, research indicates that children of parents who are highly educated, are more likely to achieve higher grades, graduate high school and go on to higher education themselves, as well as have higher income and better health, compared to children whose parents have fewer educational attainments (Entwisle et al., 2005; Kantomaa et al., 2010; Lunde, 2021; Rognerud et al., 2002; Utdanningsdirektoratet, 2016).

Grade point average (GPA), which the present study employs as a dependent variable, is one way to measure academic achievement, and is an important predictor, and in many cases a prerequisite, for academic attainment and achievement (Allensworth & Clark, 2020). For example, a higher GPA is shown to be associated with a higher probability for completing an undergraduate degree within six years (Allensworth & Clark, 2020). Furthermore, researchers have studied the predictive power of GPA, achievement tests, personality, and IQ for life outcomes such as income, education, mental health, physical health, number of arrests, and life satisfaction (Allensworth & Clark, 2020; Borghans et al., 2016). Their findings suggest that both GPA and achievement tests are better predictors than IQ alone. However, GPA was found to first and foremost wield predictive power over future educational attainments (Borghans et al., 2016). As such, a strong association between parental education

and GPA may reduce social mobility in society, making it more difficult for children whose parents are not highly educated to attain higher education.

### **Association between parental education and youth's academic achievement**

Intergenerational social mobility is a term used for the relationship between parents' socioeconomic status and the SES their children will attain as adults. Researchers have assessed patterns of intergenerational social mobility in countries that are members of the Organization for Economic Cooperation and Development (OECD). They found that a son (aged 25-44 years old) of a father with tertiary education was much more likely to end up in the top wage quartile than a son of a father with less than upper-secondary education (Causa & Johansson, 2010). For instance, a man with a highly educated father in Great Britain was nearly 2.5 times more likely to be in the top 25% best paid adults compared to a man with a father with lower education, while the same number for sons in Greece was just over 1, indicating close to equal opportunity.

Similar associations have been found globally. Using a sample of 18,072 undergraduate college students in the US, one researcher explored whether there were any racial differences in intergenerational effects of parental educational attainment on the academic performance of students. He found that higher parental educational attainment (using the parent with the highest education level in analyses) was associated with a higher GPA (as reported by the students themselves), independent of possible confounding variables such as ethnicity and financial distress (Assari, 2019). Another researcher used a sample of 103 fourth-graders in Turkey to investigate associations between parental educational levels, parents' beliefs about children, children's cognitions related to themselves and their relationships, and academic achievement. She found that only the mothers' education was directly related to the children's academic achievement (Hortaçsu, 1995). Furthermore, parental education has found to be associated with sixth-graders' academic performance in

Uganda. The researchers used academic tests to measure performance and identified associations between parental education and the subjects health sciences, reading, and numeracy (Wamala et al., 2013). They found that while both parents' educational levels are associated with performance, the level of education required in fathers to predict whether the child in question would achieve higher test scores was primary education, while mothers needed secondary and post-secondary education to enable the child to obtain higher scores in reading and numeracy, respectively. This indicates that maternal education might be more important for the association with academic performance than paternal education. Others have studied their participants longitudinally; 503 children in Montreal, Canada, were followed from primary school to mid-adulthood. They found a medium-sized ( $r = .32$ ) effect of parental education levels on their adult children's education levels (Véronneau et al., 2015).

Researchers have also investigated *how* parental education is associated with academic achievement. While some researchers have found that parental warmth and the amount of reading at home mediates the association between parental education and academic achievement (Davis-Kean, 2005), others suggest that parental education influences the parents' perceptions of their child's academic abilities, which in turn influences the child's self-concept and values, which again influences the child's engagement in academic tasks and academic achievement (Eccles, 2005). In short, numerous mechanisms behind the association have been identified, but they do not explain the full effect of parental education.

Research suggests that both maternal and paternal education is associated with educational outcomes for youth (Beller, 2009). To what degree studies include both, differ. While some only utilize the parent with the highest education in the household when examining associations between parental education and educational achievement (Assari, 2019), others calculate the average of both parents' education (Entwisle et al., 2005). Yet others include only one of the parents in analyses (Fenzel, 1992; Kantomaa et al., 2010). In

addition to research indicating that models that including both parents' background into class origin measures fit mobility patterns better than models with only fathers included (Beller, 2009), including both maternal and paternal education might be particularly important in a Norwegian context. Youths in Norway generally live with both parents, including after divorce (Nilsen et al., 2020).

### **Association between mental health and academic achievement**

Factors within each youth is also associated with GPA. There is substantial evidence for mental health being associated with academic achievement in youth. How, and to what degree, mental health problems are associated with GPA, differs. The present study focuses on three kinds of mental health issues: Depression, internalizing problems and externalizing problems, which are all studied extensively within the context of youths and GPA.

#### ***Depression***

Depression is a common mental illness, affecting 280 million people across the world at all times (Institute of Health Metrics and Evaluation, 2019). Although it can present in different ways, it is named an affective disorder in the International Classification of Disorders 10 (ICD-10), due to one of the main symptoms being low mood and lack of joy, also called anhedonia, along with lack of energy (World Health Organization, 1993). Research has revealed a large increase in depressive symptoms from childhood to adolescence (Green et al., 2005). Girls report more depressive symptoms, and are diagnosed with depression at a higher rate, than boys. This discrepancy seems to emerge at age 13 (Salk et al., 2016). Depression in adolescence has been shown to increase the risk of later depression, anxiety disorders, academic underachievement and unemployment, for both boys and girls (Fergusson & Woodward, 2002).

Being formally diagnosed with depression, and self-reported symptoms, are both negatively associated with GPA. A study conducted on undergraduate students in the US, divided participants into two groups: Depressed students, who had received a diagnosis of depression ( $N = 121$ ), and a control group of students who had not ( $N = 209$ ), and who did not report more than three (out of six) symptoms of depression (Hysenbegasi et al., 2005). The students' GPAs were reported by the Registrar's Office, and participants completed a survey regarding details on their academic experience, employment, demographic characteristics, and health. The researchers found that a diagnosis of depression was associated with a 0.49 point decrease in GPA, equivalent to half a letter grade (Hysenbegasi et al., 2005). In a different study, Italian adolescents between the ages of 11 and 16 were studied. The research utilized self-reported depressive symptoms (through the Italian version of Children's Depression Inventory), while information on grades were collected from school records. The results showed that depressive symptoms were significantly, negatively correlated with GPA ( $r = -.28$ ) (Moè, 2015). Similarly, researchers studying Canadian youth attending secondary school found that higher depression scores, measured by Center for Epidemiological Studies-Depression (CESD), reduced the likelihood of the student obtaining higher grades in both math and first language-subjects (Duncan et al., 2021). Higher scores on psychological well-being increased the likelihood. Another study investigating mental health and academic success in college found that depression was a significant predictor for lower GPA and higher probability of drop-out. There was a particularly strong association for students who also had an anxiety disorder (Eisenberg et al., 2009). Likewise, college students that reported depression also reported significantly lower GPAs compared to students who did not (Blackdeer et al., 2021). Conversely, in a study of Norwegian 8-12-year-olds, researchers found an initial, negative association between self-reported symptoms of depression and academic achievement (reported by teachers). However, this association was only statistically

significant before adjusting for maternal education level (Pedersen et al., 2019). Further research has indicated a causal relationship between depressive symptoms and GPA. Hishinuma et al. conducted a longitudinal cohort-study of high school students in Hawaii, using self-reported GPAs and self-reported depressive symptoms (through CESD). Their results suggested that depressive symptoms caused subsequent lower GPAs; not the other way around. This result was found for all gender-ethnicity groups, and was consistent throughout grade-levels (Hishinuma et al., 2012).

### ***Internalizing problems***

It is common to divide mental health problems in children/youth into two scales: Internalizing and externalizing problems. The division into these two dimensions are thought to cover relevant mental health diagnoses, and refers to whether or not the person turns their distress inwards or outwards. Internalizing problems refers to problems that are based on “overcontrolled” symptoms, signifying that the problems, in part, show up when the person in question tries to control or regulate their emotional state in an inappropriate or maladaptive way (Merrell, 2008). As the word “internalizing” suggests, feelings of distress are turned inward (McLeod & Kaiser, 2004). Examples of internalizing problems are anxiety, depression, eating disorders, post-traumatic symptoms and obsessive-compulsive symptoms (Salavera et al., 2019).

Several studies have shown a negative association between internalizing problems and academic achievement. Internalizing problems has been found to negatively predict GPA, and vice versa; GPA negatively predicted internalizing problems (Weidman et al., 2015). A longitudinal study conducted in Sweden aimed to examine the development of the association between mental health and academic performance throughout different periods of childhood and youth. Their sample consisted of 695 children/youth and their mothers who were followed from birth to 20 years of age (Agnafors et al., 2021). Mothers were asked to report

their children's mental health through the Child Behavior Checklist (CBCL) at age 3, while the child themselves reported mental health symptoms at age 12, using the Strength and Difficulties Questionnaire (SDQ), and the young adult at age 20 using The Adult Self Report. Teachers reported the participants' academic performance. The results of a bivariate analysis indicated that internalizing problems at age 3 (as reported by mothers) increased the risk for low performance in both math, reading and English at age 12. The negative association between internalizing problems and reading, and internalizing problems and English, remained significant after controlling for parental education and gender (Agnafors et al., 2021). Furthermore, they found a significant association between internalizing problems at age 12 and incomplete grades from compulsory school after controlling for gender and parental education. Similarly, in a longitudinal study where internalizing problems were measured through mothers' completion of the CBCL when the child was 6-8 years, researchers found internalizing problems to significantly reduce the likelihood of the child receiving a high school degree (McLeod & Kaiser, 2004).

Other studies find no evidence for a significant association between internalizing problems and academic achievement. A sample of 1676 youths in upper-secondary (high) school in Northern Norway was studied to examine different predictors for GPA. Mental health status was assessed through the Hopkins Symptom Checklist (HSCL-5), which contains five questions regarding symptoms of depression and anxiety. They identified a range of demographic, cognitive and psychosocial factors that may predict GPA – however, no significant association was found between depression and anxiety symptoms, and GPA (Sæle et al., 2016). A Chinese study found no direct effect of internalizing problems, as measured by Youth Self Report, on academic performance in a sample of 12,672 randomly selected participants between the ages of 9 and 20. They found that attention problems mediated the effect (Lv et al., 2015). Researchers studying anxiety in British 12-14-year-olds

found that trait anxiety was not associated with cognitive test scores, but that working memory capacity explained the variance; anxiety was significantly, negatively related to test performance in youths with low working memory capacity ( $\beta = -.35$ ) and significantly, positively related to test performance in youths with high working memory capacity ( $\beta = .49$ ). However, this study did not control for parental education (Owens et al., 2014).

The present study utilizes both internalizing problems and depressive symptoms as variables, despite depressive symptoms being included in internalizing problems. Previous research conducted on the subject indicates that depression is consistently, negatively associated with academic performance (Duncan et al., 2021; Eisenberg et al., 2009; Hishinuma et al., 2012; Hysenbegasi et al., 2005; Moè, 2015). However, the association between internalizing problems and academic achievement is less clear (Owens et al., 2014; Sæle et al., 2016). For instance, researchers studied 750 children aged 8-12 years in Norway to examine the association between internalizing problems, as reported by both children and their teachers, and academic achievement, as reported by teachers. The children completed the SMFQ for measurement of depressive symptoms, and the Multidimensional Anxiety Scale for Children to measure anxiety symptoms. Internalizing problems as a whole was significantly negatively associated with academic achievement. Adjusting for maternal education did not substantially alter this association (Pedersen et al., 2019). However, the researchers found that self-reported symptoms of depression were only significantly negatively associated with academic achievement when omitting to adjust for maternal education level. Symptoms of anxiety were not found to be significantly associated with academic achievement in any of the models. In other words, utilizing only internalizing as a whole in analyses, might obscure effects that are unique to depression or anxiety.

### *Externalizing problems*

Externalizing problems are thought to be manifestations of distress that are expressed in outward-facing behavior, including continuing disobedience, acting out or physical aggression (McLeod & Kaiser, 2004). In youths, this can manifest as hyperactivity, inattention, conduct disorders, substance use and behavioral problems (Goodman et al., 2010; McLeod et al., 2012).

Several studies suggest that externalizing problems are negatively associated with GPA. For instance, Galera et al. (2009) studied 1264 youths in France from ages 12-24 years in a longitudinal study to examine relationships between childhood symptoms of hyperactivity and inattention and subsequent academic achievement. They found that hyperactivity-inattention symptoms, as assessed by parents through the CBCL, were associated with subsequently being held back in school (grade retention), failure to graduate from secondary school, and lower academic performance (as reported by parents in the subjects “reading, French, or language arts”, “arithmetic or mathematics”, sciences and foreign language). In another longitudinal study, externalizing problems reported by the mother through the CBCL at ages 6-8 significantly and strongly reduced the probability of graduating high school, and of subsequent college enrollment (McLeod & Kaiser, 2004).

Studying different manifestations of externalizing problems yield similar results, indicating a robust association. McLeod et al. (2012) chose to focus on three kinds of externalizing problems; namely substance use, delinquency and attention problems, in addition to depression. Youths completed an extensive questionnaire as participants in the National Longitudinal Study of Adolescent Health, including a revision of the CESD, questions on how often they engaged in “ADHD-related” behavior (based on The Swanson Nolan and Pelham-IV Questionnaire), questions on whether or not they had participated in different delinquent activities, and a series of questions about their use of different drugs in

the preceding 30 days (McLeod et al., 2012). Through regression models, the researchers found that both delinquency, substance use and attention problems was significantly related to GPA in high school, regardless of whether they were considered alone or simultaneously. Youths who experienced a combination of problems generally received lower GPA than a youth with one, and substance use had the most consistent, and strongest, association with GPA. In another study, conducted by Kantomaa et al. (2010), Finnish youth (15-16-year-olds) were recruited to investigate physical activity, emotional and behavioral problems, maternal education and academic performance. Employing the Youth Self Report, youth were asked to report mental health problems along the scales “internalizing”, “externalizing” and “other syndromes”. After controlling for all problems measured in the study, in addition to maternal education, physical activity and family structure, only externalizing problems were found to relate to adverse academic outcomes (self-reported academic performance) (Kantomaa et al., 2010).

### **How parental education and mental health interact**

Though there is an abundance of literature on the associations between parental education and academic achievement, and mental health and academic achievement, there is limited research on how parental education and youth’s mental health interact while studying academic achievement. While there is some evidence that controlling for parental education in analyses of mental health problems and academic achievement diminishes the effect of mental health problems (Kantomaa et al., 2010; McLeod et al., 2012; Pedersen et al., 2019), other researchers have found no such effect (Agnafors et al., 2021).

As both parental education and mental health is associated with GPA, it is possible that they work together in forming an additive effect, meaning that the combined effect is the sum of the effect of each of them separately. In other words, youths reporting externalizing problems and low parental education might be even more likely to receive a lower GPA

compared to youth with either externalizing problems *or* parents without higher education. McLeod et al. (2012) found some evidence for an additive effect of certain mental health problems on GPA; youths with two or more mental health problems received lower GPAs than youths with only one problem, especially so if substance use was one of them. However, youths with three or more problems did not have significantly lower GPA than youths with two problems, indicating that the interaction effect between different mental health problems was not purely additive. No known studies have investigated a possible additive effect of parental education and youths' mental health on GPA.

Another possibility is that one variable moderates the other. For instance, mental health problems in youths with highly educated parents might have a larger effect on GPA than in youths with parents without higher education. Although there is little research to be found on the subject, some studies provide important insight that might support the idea of a moderating effect of mental health and parental education on the association with academic achievement. Nilsen et al. (2020) found that the negative association between parental divorce and GPA was stronger among adolescents with educated or highly educated parents. This result was driven by maternal education: Divorce was found to be more strongly and negatively associated with GPA among youths who had educated mothers compared to youths who had less educated mothers – independent of paternal educational levels and income measures (Nilsen et al., 2020). These findings are thought to be the result of a “floor effect” where youth with highly educated parents lose time with their parents, and thus are less able to benefit from their resources, while youth whose parents have fewer educational resources, lose less. Another possible explanation is that because youth in socioeconomically disadvantaged families experience more negative life events and family stressors, divorce is just one of several adverse experiences during childhood and adolescence, therefore mitigating the independent effect of divorce (Nilsen et al., 2020). A similar result might be

found when investigating possible interaction effects between parental education and youth's mental health – that the GPA of youths with mental health problems and parents with lower education is less likely to be negatively affected because mental health difficulties is one of several stressors, thus diminishing the independent effect of mental health problems.

However, the opposite is also plausible: That highly educated parents are more likely to be involved in their youth's mental health due to having more resources. Furthermore, a previously mentioned longitudinal study found that highly aggressive (as reported by their peers through Pupil Evaluation Inventory) participants did not gain any advantage from having highly educated parents (Véronneau et al., 2015). More research is needed to determine if other mental health problems also interact with parental education in this manner. The researchers conclude that while social policies might raise SES intergenerationally, children with developing psychopathology might need targeted interventions as well (Véronneau et al., 2015).

In sum, few studies are conducted on a possible interaction effect between parental education and mental health and association with academic achievement. However, these are important questions to address to unveil possible interactions and associations that may be concealed, to further knowledge on social mobility and how to best help children in vulnerable populations.

### **Other factors affecting youth's academic achievement**

There is a large body of research on the topic of academic achievement, and possible predictors and associated factors. For instance, there is a significant association between gender and GPA – girls receive higher grades than boys in all major subjects, from elementary school through high school (Duckworth & Seligman, 2006; Marcenaro–Gutierrez et al., 2018). Several mediators for this have been identified, including self-discipline (Duckworth & Seligman, 2006). Additionally, boys' academic performance seem to be more

sensitive to changes in their family's socioeconomic status (Marcenaro–Gutierrez et al., 2018). However, the identification of mediators and moderators do not seem to change the tendency of girls achieving higher grades in school. This is evident in Norwegian youth as well: Girls do, on average, achieve higher grades (in all subjects but physical education) than boys in Norwegian high school. However, this effect greatly attenuates when final exams are scored (Statistisk sentralbyrå, 2019). The gender differences in GPA may lead to greater gender disparity in higher education, as GPA is highly associated with enrollment in college and receiving a college degree (Allensworth & Clark, 2020).

Age is also positively associated with academic achievement across studies, indicating that older students receive higher grades, both among college students (Owen, 2003; Vella et al., 2016) and in elementary school pupils (Fenzel, 1992). Youth in Australia had a higher probability of enrolling in university if they were older than most of their classmates (Parker et al., 2019). A possible explanation for this is that students experience higher self-esteem with age (Fenzel, 1992). Early adolescents who have parents with little education seem to be most at risk for the detrimental effects of being (relatively) young (Fenzel, 1992).

Additionally, symptoms of mental health problems increase with age in youth (Green et al., 2005). As both gender and age are found to be significantly associated with GPA, it is important to include these variables in analyses regarding parental education, mental health and GPA.

## **Aims**

Many studies have found a positive association between parental education and youth's GPA. The same can be said for a negative association between mental health problems and GPA. However, few have investigated how the two variables work together. This study aims to investigate a possible moderating effect of mental health problems on the association between parental education and GPA in youth. This will contribute to a growing

research field examining how youth are impacted by parental education and mental health problems, and what interventions may assist these youths in the educational system.

We expect to find a positive association between both maternal and paternal education and GPA in youth. Although previous research have utilized parental education in different ways (using the highest education in the household, or only one of the parents' education), it is common for youth in Norway to live with both parents, including post-divorce (Nilsen et al., 2020). Furthermore, we expect to find a negative association between depression and GPA, and externalizing problems and GPA, based on previous research (Blackdeer et al., 2021; Eisenberg et al., 2009; Galéra et al., 2009; Hishinuma et al., 2012; Hysenbegasi et al., 2005; Kantomaa et al., 2010; McLeod et al., 2012). Although research on internalizing problems is divided, we expect to find a negative association between internalizing problems and GPA (Agnafors et al., 2021; McLeod & Kaiser, 2004). Lastly, we expect to find a moderating effect between parental education and mental health problems, as some research has indicated (Nilsen et al., 2020; Véronneau et al., 2015).

## **Methods**

### **Participants and procedures**

The present study used previously collected data from the youth@hordaland (Ung i Hordaland) survey of youth in the county formerly known as Hordaland in Norway, conducted in spring 2012. This survey is a cross-sectional study with the main objective of assessing mental health problems and service use in adolescents, and has been the basis for numerous published articles.

### ***Sample***

Every adolescent in Hordaland in three age cohorts (youth born in 1993, 1994 and 1995) received an invitation to take part in the study ( $N = 19,430$ ). Information about the

study and login details were sent to their student e-mail, and the majority also received a reminder via SMS. One school class (45 minutes), where a teacher was present to ensure confidentiality, was allotted for filling out the questionnaire online. Survey staff was available by phone to answer any questions teachers or students might have. If someone did not attend school on the relevant day, they could complete the questionnaire at any time during the data collection period. Some schools organized “catch up days” to ensure maximum response rate. Students who were hospitalized or living in institutions at the time of the study, were included by receiving log in details through postal mail.

Data from the sample contains information on sociodemographic variables, familial socioeconomic status, daily life functioning, use of health care and social services, in addition to extensive information regarding mental health. Out of the 19,430 invited students, 10,220 agreed to participate (53%) and 8844 of these adolescents also consented to their parents being asked to answer a similar questionnaire, and to the linkage to administrative data on grades and school absence. In the current study, we retained only the adolescents for whom parents had responded with valid data for their own education level ( $N = 1302$ ), 14.7% of the total sample.

## **Instruments**

### ***Demographic information***

Gender and age (date of birth) were retrieved from the participants’ personal identity number in the Norwegian national population registry.

### ***Parental education***

Parents of youth who consented to parents being contacted were asked to specify their level of education. The options were “elementary school” (grades 1.-10. which is compulsory in Norway), “high school – vocational”, “high school – general” (where vocational high

school tend to focus on practical skills and learning a specific trade, such as mechanic or carpenter, general studies prepare students for pursuing higher education), “college/university, less than four years”, “college/university, four years or more” and “don’t know”. These responses were recoded into “primary” (elementary school), “secondary” (high school) and “tertiary” (college/university, regardless of duration).

### ***Strengths and Difficulties Questionnaire***

The Strengths and Difficulties Questionnaire (SDQ) is a widely used brief questionnaire for assessing mental health problems in children and youth (Goodman et al., 1998). It was originally developed for children between the ages of 11-16 but has been utilized in older age groups as well (Bøe et al., 2016; Goodman et al., 2010). The questionnaire consists of 25 items, and can be completed by parents, teachers and/or the youth themselves. The present study relied on responses from youth. The respondents were asked to indicate to what degree each attribute (e.g., “I get very angry and often lose my temper”) applies to them on a 3-point Likert scale, using the response options “not true”, “somewhat true” and “certainly true”. Answers are coded as 0, 1 or 2, respectively. Of the 25 items, 10 are positively worded – addressing strengths rather than difficulties.

The SDQ has been utilized in a number of populations worldwide, differing in terms of income, ethnicity and culture (Achenbach et al., 2008). It has been found to be a psychometrically sound measure of overall child mental health problems in multiple studies (Achenbach et al., 2008; Bøe et al., 2016; Goodman & Goodman, 2009). This includes evidence that total scores are correlated with concurrent interview and questionnaire measures, as well as seemingly being able to discriminate adequately between normative and clinical populations, and predicting psychiatric diagnoses (Goodman & Goodman, 2009; Klasen et al., 2000).

The SDQ-items are usually organized into five subscales measuring emotional problems, peer problems, behavioral problems, hyperactivity, and prosocial behaviors, each with a range from 0-10. In the present study, however, we followed guidelines recommended for use in community samples and used the subscales “externalizing problems” and “internalizing problems” (Goodman et al., 2010). The SDQ was scored according to the syntax on the SDQ website and subsequently, externalizing problems were created by adding the symptom scores on conduct problems and hyperactivity together while the internalizing scale consisted of the peer and emotional problems subscales added together.

### ***Short Mood and Feelings Questionnaire***

The Short Mood and Feelings Questionnaire (SMFQ) is a modified, shorter version of the Mood and Feelings Questionnaire (MFQ) (Angold et al., 1995). It is a self-report questionnaire used to evaluate symptoms of depression in children aged 8-18 years. The SMFQ focuses on cognitive and affective symptoms; mood, anhedonia, restlessness, tiredness, difficulties with concentration, and several aspects of negative self-evaluation (Lundervold et al., 2013). The questionnaire presents 13 items regarding depressive symptoms, e.g. “I thought nobody really loved me”, and asks the child or adolescent to respond using a 3-point Likert scale, indicating if the sentence is “not true”, “sometimes true”, or “true”. The responses are coded as 0, 1 or 2, respectively. The scores of each adolescent were summarized to generate a total score with a maximum score of 26.

The SMFQ has shown satisfactory psychometric properties, including a unidimensional internal structure, demonstrated in samples of children aged 7-11 years (Sharp et al., 2006), 12-13 years (Olsen, 2015) and adolescents in high school (using the youth@hordaland sample) (Lundervold et al., 2013). Research utilizing confirmatory factor analysis and Cronbach’s alfa also indicates good reliability and adequate content validity (Olsen, 2015).

### ***Grade point average***

The school grades of each adolescent were obtained from official administrative registries from Hordaland County. In Norwegian schools, grades range from 1 (fail) to 6 (excellent). The GPA was calculated from all grades the students received, except for physical education. Each grade was weighted equally. As such, the grade point average is between 1-6, registered with two decimal points.

### **Ethics and Consent**

The study in its entirety and the linkage between youth@hordaland and data on school absence and grades were approved by the Regional Committee for Medical and Health Research Ethics (Regionale komiteer for medisinsk og helsefaglig forskningsetikk – REK - 2011/811) in Western Norway and National Data Inspectorate (NSD). According to Norwegian law, persons over the age of 16 can consent to decisions regarding their health without parental permission. Parents only consented to the survey they completed themselves, but did receive information about the entire study in advance.

### **Statistical analysis**

IBM Statistical Package for the Social Sciences (SPSS) version 27 was used to perform the statistical analyses in the current study. Parents reported the education of 1279 mothers and 1211 fathers in total. Both parents were asked to complete the questionnaire, however, in a majority of cases only one parent did. This was often the mother. We used reports from the first, or the only, parent that responded, called “parent1” in the dataset. This could be either mother, father or legal guardian.

Hierarchical regression was executed to investigate the association between parental education and GPA, using four models and including different measures of mental health problems in separate analyses. The first model examined the association between

maternal/paternal education and GPA. The second model included internalizing-/externalizing problems/SMFQ as an independent variable, whilst the third model added the interaction effect of maternal/paternal education and internalizing-/externalizing problems/SMFQ. The interaction effects were investigated by creating variables where parental education level was multiplied with the variables measuring mental health problems. The fourth model contained all the variables from model three, in addition to the control variables gender and age.

Missing items were handled by listwise deletion.

## **Results**

As Table 1 illustrates, 616 of the adolescents included in our analyses were boys (47.3%). This is similar to the distribution among the overall respondents in the main sample ( $N = 10,220$ ), where 46.5% of the participants were boys. The youths' ages vary from 16 years to 19.3 years, with a mean of 17.4 years ( $SD = 0.8$ ), reflecting grade 11, 12 and 13 in the Norwegian school system. A greater proportion of mothers had completed higher education than fathers in general: 60% of mothers and 53.5% of fathers are reported to have tertiary education, while 35.5% of mothers and 39.1% of fathers had secondary education as their highest educational attainment. Just 4.7% of mothers and 7.6% of fathers reported having primary education only.

**Table 1**  
*Demographic characteristics and background variables*

Variables	N	%
Age (mean (sd))	17.4 (0.8)	
Gender		
Girl	686	52.7
Boy	616	47.3
Maternal education		
Primary	60	4.7
Secondary	451	35.3
Tertiary	768	60
Paternal education		
Primary	92	7.6
Secondary	473	39.1
Tertiary	646	53.3
SDQ – internalizing problems (mean (sd))	4.79 (3.3)	
SDQ – externalizing problems (mean (sd))	5.38 (3)	
MFQ (mean (sd))	5.88 (5.8)	

When investigating the association between maternal education and GPA, higher maternal education levels were associated with increased GPA in all analyses (*Bs* ranging from .260-.270, all *p*-values<.05) (see Table 2). This indicates that youth with mothers who were highly educated, on average received higher GPAs than their peers with mothers who were less educated.

**Table 2***Hierarchical regression of maternal education and mental health's impact on grade point average*

Independent variable	Model 1			Model 2			Model 3			Model 4 <sup>a</sup>		
	B	SE	$\beta$	B	SE	$\beta$	B	SE	$\beta$	B	SE	$\beta$
Maternal education	<b>.260</b>	.036	.207	<b>.240</b>	.036	.191	<b>.232</b>	.051	.184	<b>.243</b>	.050	.193
Depressive symptoms				<b>-.020</b>	.004	-.150	-.023	.015	-.175	-.026	.015	-.192
Depressive symptoms *							.001	.006	.027	-.001	.006	-.019
Maternal education												
Gender										<b>-.341</b>	.043	-.231
Age										.042	.025	.046
Maternal education	<b>.270</b>	.036	.212	<b>.265</b>	.037	.207	<b>.275</b>	.062	.217	<b>.277</b>	.062	.217
Internalizing problems				-.013	.007	-.055	-.007	.028	-.031	-.016	.027	.217
Internalizing problems *							-.002	.011	-.025	-.004	.010	-.041
Maternal education												
Gender										<b>-.314</b>	.043	-.210
Age										<b>.050</b>	.025	.055
Maternal education	<b>.270</b>	.036	.212	<b>.203</b>	.033	.159	<b>.170</b>	.065	.133	<b>.176</b>	.064	.138
Externalizing problems				<b>-.105</b>	.006	-.428	<b>-.121</b>	.028	-.494	<b>-.119</b>	.028	-.487
Externalizing problems *							.006	.011	.069	.006	.011	.061
Maternal education												
Gender										<b>-.283</b>	.038	-.189
Age										.018	.023	.020

*Note.* **Bold** = p-value < 0.05<sup>a</sup> Model 4 = model 3, with control variables; age and gender

When adding depressive symptoms as measured by the SMFQ, the effect of maternal education persisted, but was somewhat attenuated (from  $B = .260$  to  $B = .240$ ). Model 2 revealed a small, but significant, negative association between depressive symptoms and GPA ( $B = .020$ ). The negative association indicates that youth with higher scores on the SMFQ on average receive lower GPAs. When adding the interaction between maternal education and the SMFQ in Model 3, the effect of depressive symptoms was no longer significant. The effect of maternal education was further attenuated ( $B = .232$ ). Adding the control variables age and gender in Model 4 resulted in a significant association between maternal education and GPA, and between gender and GPA, but no significant effect of depressive symptoms, nor a significant interaction effect. A negative association between gender and GPA implies that girls on average receive higher GPAs than their male peers. There was no significant association between age and GPA in this model.

When studying internalizing problems and maternal education, the significant association between maternal education and GPA found in Model 1, was marginally attenuated ( $B$  from  $.270$  to  $.265$ ) after having added internalizing problems in Model 2. This effect was consequently strengthened slightly in Model 3 (which includes the interaction effect between maternal education and internalizing problems), and further increased in Model 4 (see Table 2). However, no significant association between internalizing problems and GPA was found in any of the models. Consequently, there was no evidence of a significant association between internalizing problems and GPA nor an interaction effect between maternal education and internalizing problems. Model 4 showed significant associations between both control variables and GPA. In other words, both gender and age had a significant effect on an adolescent's GPA. While gender had a negative association with GPA, age had a positive one, indicating that older youth on average receive slightly higher grades than younger youth.

In a similar manner, the models investigating externalizing problems also found a significant association between maternal education and GPA throughout all four models. However, this effect was strongly attenuated from when externalizing problems were added in Model 2 ( $B$  reduced from .270 to .203), and further attenuated in Model 3 ( $B = .170$ ), when the interaction effect was included. No significant interaction effect was found. The effect of maternal education was slightly strengthened when age and gender were included in model 4. Models 2-4 show a significant, negative association between externalizing problems and GPA. This indicates that on average, youth experiencing externalizing problems receive lower GPAs than peers who do not experience these problems – also when controlling for age and gender (Model 4). There was also a significant, negative association between gender and GPA in model 4.

Investigating the association between paternal education and GPA yielded similar results to the analyses including maternal education, indicating that each increase in paternal education, is associated with an average increase in GPA of a fifth to a quarter of a grade ( $B = .260$  to  $.189$ ) (see Table 3). When adding depressive symptoms in Model 2, the association was attenuated; a decline that continued in the following models. Model 2 shows a significant, but weak, association between symptoms of depression and GPA. After adding the interaction effect between the SMFQ and paternal education in Model 3, this effect was slightly strengthened ( $B$  from  $-.021$  to  $-.026$ ), but no longer significant. However, in Model 4, with age and gender added as control variables, this effect was given additional strength and was significant once more. This indicates that depressive symptoms might have a small effect on youths' GPA. Furthermore, there was no significant interaction between paternal education levels and depressive symptoms. There was a significant negative association between gender and GPA in Model 4, while no significant association was observed between age and GPA.

**Table 3**

*Hierarchical regression of paternal education and mental health's impact on grade point average*

Independent variables	Model 1			Model 2			Model 3			Model 4 <sup>a</sup>		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Paternal education	<b>.248</b>	.034	.217	<b>.238</b>	.034	.208	<b>.226</b>	.048	.197	<b>.219</b>	.047	.191
Depressive symptoms				<b>-.021</b>	.004	-.157	-.026	.014	-.195	<b>-.030</b>	.014	-.231
Depressive symptoms *							.002	.006	.040	.001	.006	.010
Paternal education												
Gender										<b>-.341</b>	.044	-.233
Age										.031	.026	.034
Paternal education	<b>.260</b>	.034	.223	<b>.256</b>	.034	.220	<b>.214</b>	.058	.184	<b>.208</b>	.057	.179
Internalizing problems				-.012	.007	-.050	-.032	.025	-.140	-.038	.024	-.166
Internalizing problems *							.009	.010	.098	.006	.010	.098
Paternal education												
Gender										<b>-.303</b>	.044	-.204
Age										.037	.026	.041
Paternal education	<b>.260</b>	.034	.223	<b>.218</b>	.031	.187	<b>.219</b>	.060	.188	<b>.189</b>	.059	.162
Externalizing problems				<b>-.106</b>	.006	-.433	<b>-.106</b>	.025	-.430	<b>-.116</b>	.025	-.472
Externalizing problems *							.000	.010	-.003	.004	.010	.042
Paternal education												
Gender										<b>-.273</b>	.038	-.183
Age										.005	.024	.005

*Note.* **Bold** = p-value < 0.05

<sup>a</sup> Model 4 = model 3, with control variables; age and gender

In the models analyzing internalizing problems, paternal education was significantly associated with GPA. This effect was gradually attenuated from Model 1 to Model 4 (from  $B = .260$  to  $B = .208$ ). No significant association between internalizing problems and GPA was found (Model 2-4), nor any interaction effect of internalizing problems and paternal education (Model 3-4). Adding age and gender as control variables in Model 4, shows a significant, negative association between gender and GPA. No significant association between age and GPA was found.

When studying externalizing problems, there was a persistent and significant positive association between paternal education and GPA, which gradually attenuated from Model 1 to Model 4, as more independent variables were added. There was also a significant, negative association between externalizing problems and GPA in Model 2, 3, and 4 ( $B$  from  $-.106$  to  $-.116$ ), indicating that externalizing problems negatively affect grades in youth. No significant interaction effect between externalizing problems and paternal education was identified (Model 3). After adding age and gender in Model 4, a significant, negative association between gender and GPA was discovered. No significant association between age and GPA was found.

## Discussion

The aim of the current study was to investigate the association between parental education and youth's grade point average and whether this is influenced by different measures of mental health problems. We found positive, significant associations between parental education and GPA across all models in our analyses, indicating that both maternal and paternal education affect youth's GPA positively. Externalizing problems were found to have significant, negative associations with GPA, while no significant associations between internalizing problems and GPA were found. There were mixed findings regarding depressive symptoms: Some of the models showed negative, significant (albeit small) effects on GPA,

while in others this effect was strengthened, but no longer significant. We found that girls on average received higher GPAs than boys. No significant interaction effect was found between parental education and any of the mental health variables.

There were consistent, positive associations between parental education and GPA in the present study, which is in line with previous research (Assari, 2019; Causa & Johansson, 2010; Davis-Kean, 2005; Hortaçsu, 1995; Utdanningsdirektoratet, 2016; Véronneau et al., 2015; Wamala et al., 2013). A study that examined 18,072 undergraduate college students in the US, found that higher parental educational attainment was associated with a higher GPA (self-reported by students), independent of possible confounders such as ethnicity and financial distress (Assari, 2019). The effect sizes were similar to what we found. However, only the highest level of parental education was used in their analyses. Our findings indicate that even though the Norwegian government has stated that the schooling system is the most important arena for reducing social and economic inequalities (Kleppa & Øye, 2005), youth with parents who have higher education receive higher grades than youth whose parents have less education. This reduces social mobility by making education hereditary rather than a common good: A high GPA enables the youth to choose from more educational directions than a low GPA, and having parents with higher education increases the probability of the youth completing a degree in higher education (Holseter, 2021).

The effect sizes found in our study were similar for maternal and paternal education, indicating that both parents' education is similarly associated with GPA in youth. Many of the previous studies investigating parental education and academic achievement have chosen to include only one of the parents' education levels in analyses. Those who have included both have found somewhat diverging results regarding the independent effect of each of them. Wamala et al. (2013) found that while fathers only needed primary education to "boost" their children's grades, mothers required secondary or post-secondary to do the same. However, as

their study is conducted in a country where education is less available than in Norway, these results are not directly comparable. Similarly, Hortaçsu (1995) found that only mothers' education was directly associated with their children's academic achievement, while fathers' was not. As it is common in Norway for youth to live with both parents, and youth who experience parental divorce generally divide their time between two households, it is to be expected that paternal and maternal have somewhat similar effects on youth's GPA.

Our results do not give information as to how parental education affects the youth's GPA. The association between parental education and GPA might be due to mediators, such as genetic factors, parenting style, academic support, material resources, communication style, a combination of these, or a different mechanism (Eccles, 2005). For instance, one study looked at how reading achievement was influenced by parental education in Swedish third graders. The researchers found that about half of the effect of parental education is mediated through mechanisms such as early literacy activities (reading books or telling stories to the child before entering primary school), number of books at home, and emergent literacy abilities at the time of school start (Myrberg & Rosén, 2009). The researchers conclude that parents with higher education use their knowledge of the written language and books in general to create an environment for their children that emphasizes the importance of storytelling and reading aloud, which affects not only the emergent literacy when starting school, but continues to influence their reading achievement as third graders (Myrberg & Rosén, 2009). Reading proficiency is important for acquiring knowledge throughout school subjects, and might thus influence GPA.

Parental beliefs and educational expectations have also been identified as possible mechanisms behind the association between parental education and GPA. Turkish fourth-graders and their parents were studied to examine associations between parental educational levels, parents' beliefs about children, children's cognitions, and academic achievement

(Hortaçsu, 1995). Parental beliefs were examined through Concepts of Development Questionnaire (CDQ). While endorsing categorical items reflects that the parent in question views developmental outcomes as having one explanation (heredity or environment), a holder of perspectivistic beliefs see development as happening within a dynamic system of multiple influences. Parents with higher education were less likely to hold categorical beliefs than their less educated counterparts. Categorical beliefs held by mothers resulted in lower child efficacy, which in turn affected grade point average negatively. Perspectivistic beliefs in fathers, on the other hand, were found to directly affect the children's GPA positively (Hortaçsu, 1995). The children in this study were significantly younger than in our sample. However, research indicates that first graders' personal resources and social contexts are as strongly associated with academic attainment at 22 years of age, as similar resources measured in adolescence (Entwisle et al., 2005). Moreover, a study in the US found that for children in African American families, mechanisms behind the association between parental education and academic achievement were the parents' warmth towards the child, the amount of reading at home, and the parents' educational expectations (Davis-Kean, 2005).

Another possible explanation for the association between parental education and youths' GPA is that teachers generally consider highly educated parents as being more involved in the education of their children, and thus might evaluate children of these parents more favorably (Bakker et al., 2007). In other words: When parents with higher education seemingly are more involved in their children's' education, through measures observable to teachers such as participation in teacher-parent conferences, their children receive higher grades. The association found between parental education and GPA could also be in part due to genetic factors; parents may pass on certain genes or alleles that makes the youth more or less likely to achieve high grades. IQ has been shown to increase in heritability from childhood to young adulthood, reaching its peak around 18-20 years, where the heritability is

around 0.8 (Bouchard, 2013). Assuming that IQ predicts academic achievement, a notion research supports, this mechanism seems credible (Mayes et al., 2009). However, as the present study does not specifically investigate the manners in which parental education influence grade point average in youth, a definite answer to this question cannot be given without further research.

There was mixed support for an association between depressive symptoms measured by the SMFQ, and GPA in the current study. The negative association found between the depressive symptoms and GPA was statistically significant in some of the models, while not in others although the association ( $B$ ) was strengthened by each model. In other words, adding additional variables made the effect of depressive symptoms larger. This might indicate that there is in fact a small effect of depressive symptoms, but that our sample is not large enough, thus corroding our ability to determine significant effects.

Previous research indicates that depressive symptoms and depression is negatively associated with GPA (Blackdeer et al., 2021; Duncan et al., 2021; Eisenberg et al., 2009; Hishinuma et al., 2012; Hysenbegasi et al., 2005; Moè, 2015). Utilizing a sample of 117,430 American undergraduate students, Blackdeer et al. found that students reporting depression reported their mean grade average as being significantly lower than students who did not report depression. Furthermore, a study of Italian adolescents utilizing self-reported depressive symptoms, found that depressive symptoms had a significant, negative correlation with GPA ( $r = -.28$ ) (Moè, 2015). Researchers studying undergraduate students in the United States found that diagnosed depression was associated with a .49 point decrease in GPA (Hysenbegasi et al., 2005). There is also research that indicates not only an association, but a causal relationship between the two: That depressive symptoms cause lower GPAs (Hishinuma et al., 2012).

An important distinction between previously mentioned studies and ours is that while they studied the association between depressive symptoms and GPA directly, we only did so in models including parental education. Thus, our results regarding the strength and direction of the association between depressive symptoms and GPA is not directly comparable to studies that did not control for parental education in their analyses. A study that did, found that the negative association between self-reported depressive symptoms and academic achievement was no longer significant after controlling for maternal education (Pedersen et al., 2019). This indicates that controlling for parental education might have influenced the significance of our results.

While both a diagnosis of depression, and depressive symptoms, have been found to be negatively associated with GPA, a diagnosis will often yield stronger effect sizes. The International Classification of Diseases 10 (ICD-10) identifies three core symptoms of depression: experiencing low moods, increased fatigue and lack of interest/joy, as well as a range of other symptoms, such as trouble concentrating, reduced confidence, feelings of guilt and inferiority, self-harm, suicidality and disturbances in sleep and/or appetite (World Health Organization, 1993). At least four symptoms must be present to be diagnosed with a (mild) depressive episode. As such, youths with diagnosed depression will report more depressive symptoms than youths in the general population. The difference in effect sizes is clear from previous research (Hysenbegasi et al., 2005; Moè, 2015). Furthermore, the SMFQ focuses on cognitive and affective symptoms of depression – it does not include questions regarding suicidality, rumination, and certain physical aspects such as disturbances in appetite (Lundervold et al., 2013). While symptoms measured in the SMFQ undoubtedly can affect level of functioning, it might not fully capture the extent of youth who experience depressive symptoms.

There are several possible mechanisms behind the negative association between depression and academic achievement. Depression has shown to affect different cognitive domains negatively, including executive function, memory, attention, and psychomotor speed (Hammar & Årdal, 2009). In addition to research showing a potential causal relationship between depressive symptoms and GPA in high school students (Hishinuma et al., 2012), undergraduate students report productivity impairment as a result of depression (Hysenbegasi et al., 2005). However, research on how cognitive impairments experienced during depression affect academic performance, is scarce. One study found that the depressive symptom most strongly, negatively associated with GPA in college students was anhedonia (lack of joy and interest in activities that the person usually finds engaging), which in the SMFQ is measured by item two: “I didn’t enjoy anything at all” (Eisenberg et al., 2009).

In sum, our mixed results regarding the association between depressive symptoms and GPA might be due to insufficient sample size resulting in less statistical power, the association being weaker for depressive symptoms than for diagnosed depression, that the association is negligible when controlling for parental education, or simply that there is no significant association between the two in our sample. Seeing as the association increased in strength (*B*) with each model, the latter seems less plausible.

We found no significant association between internalizing problems and GPA. Several studies have found the same (Lv et al., 2015; Sæle et al., 2016). Another study found a significant association initially, but this disappeared when adjusting for maternal education and analyzing the anxiety and depression-scales separately (Pedersen et al., 2019). This is contrary to studies who found a significant negative association between internalizing problems and subsequent academic achievement (Agnafors et al., 2021), and between internalizing problems and the probability of receiving a high school degree (McLeod & Kaiser, 2004). As we controlled for parental education in all models, this might have

attenuated a possible, unadjusted effect size. Furthermore, our study is cross-sectional, meaning that GPA and internalizing problems were measured concurrently, whereas studies who have found a significant, negative association between internalizing problems and academic achievement are largely longitudinal: Collecting information on internalizing problems years before measuring academic achievement (Agnafors et al., 2021; McLeod & Kaiser, 2004).

We found differences in utilizing depressive symptoms vs internalizing problems in our analyses: While there was some evidence for a significant association between depressive symptoms and GPA, none were found for an association between internalizing problems and GPA. As we have examined both, it is important to address differences and similarities in the two measures. Internalizing problems, as a whole, includes both depression and anxiety symptoms. While some studies have found a significant, negative association between internalizing problems and academic achievement (Agnafors et al., 2021; McLeod & Kaiser, 2004), others have not (Lv et al., 2015; Owens et al., 2014; Sæle et al., 2016) Previous research suggests that depression and anxiety might influence GPA in different, and diverging, ways; while depression has been found to be significantly, negatively associated with GPA (Duncan et al., 2021; Hishinuma et al., 2012; Hysenbegasi et al., 2005; Moè, 2015), the association between anxiety and GPA is less clear. While some found no evidence that anxiety was significantly associated with academic achievement (Eisenberg et al., 2009; Pedersen et al., 2019), others found both state and trait anxiety in Chinese college students to be significantly, negatively correlated with self-reported GPA (Dong et al., 2021). Yet others have found that trait anxiety in itself is not associated with cognitive test scores in British youth, but that working memory capacity explained the variance (Owens et al., 2014). In sum, this might indicate that although internalizing problems is a validated and widely used construct, it might be imprecise when investigating possible associations with grade point

average, as it may obscure diagnosis specific effects. The fact that no association between internalizing problems and GPA was found, can be a result of different factors. However, based on existing research, it seems plausible that depressive symptoms are significantly associated with GPA, while anxiety is not, thus pulling in different directions and resulting in non-significant findings for internalizing problems as a whole. This further accentuates the importance of investigating mental health problems in a detailed manner when age appropriate. Moreover, our research adds to the evidence that it is imperative to include parental education in analyses when investigating mental health and academic achievement, as this may have contributed to rendering associations non-significant, as it has done in other studies (Agnafors et al., 2021; Pedersen et al., 2019).

We found a significant, negative association between externalizing problems and GPA. As previously described, the externalizing scale combines the behavioral and hyperactivity-items in the SDQ into one. This means that youth who experience difficulties such as restlessness, often being accused of cheating or lying, being easily distracted, and/or anger management issues, on average obtain lower GPAs than their peers without such challenges. This result echoes previous research on the topic, which indicates that externalizing problems cause poorer grades – not that poorer grades cause externalizing problems (Dohrenwend et al., 1992; McLeod et al., 2012). Galera et al. found that hyperactivity-inattention symptoms, as assessed by parents through CBCL, were associated with subsequent grade retention, failure to graduate from secondary school, and lower academic performance in four different school subjects (Galéra et al., 2009). In another longitudinal study researchers found that the probability of receiving a high school degree significantly declined with increasing levels of externalizing problems (McLeod & Kaiser, 2004). As the latter study did not control for parental education and did not use concurrent externalizing problems in the analyses, we cannot directly compare our findings to theirs.

However, significant, negative associations between externalizing problems and academic achievement have also been found when controlling for highest parental education (McLeod et al., 2012), and for maternal education (Kantomaa et al., 2010).

It is natural to assume that restlessness and weakened ability to focus creates hardships in a study situation; reading can be a challenge, as well as comprehending lengthy oral messages from a teacher. However, the reduction in GPA associated with externalizing problems may also be a result of favoritism. Youth experiencing hyperactivity and/or behavioral issues may be more inclined to behave in ways that challenge teachers or disrupt teaching situations in different ways, thus unconsciously leading teachers to grade them less favorably than their peers. Although research on this subject is limited, a study using a sample of 4490 French pupils followed from grade 6 to grade 11 (11-16-year-olds) found a significant gender bias in teachers when evaluating pupils in math: Girls were assessed more favorably than boys (Terrier, 2020). Although the study did not investigate possible mechanisms, we know that boys report more externalizing problems than girls (Rønning et al., 2004). A possible mechanism has been investigated by Gustavsen, who in her doctorate thesis found that teachers on average evaluate girls' social skills (including adherence to school norms) as better than boys' (Gustavsen, 2018). Moreover, she found a significant association between boys' and girls' social skills (as rated by teachers) and their academic achievement in Norwegian (students' first language) and mathematics. The pupils in this sample were attending 1.-10. grade, thus somewhat younger than in ours. As such, we cannot be sure that the differences are similar in an older adolescent population. However, the difference in self-reported externalizing problems is still present among older youth.

The present study adds to the evidence that both depression and externalizing problems is significantly, negatively associated with GPA – although the latter was found to be more consistently significant. While depression might reduce performance due to how

symptoms affect daily function, for instance through anhedonia (Eisenberg et al., 2009), the reduction in GPA associated with externalizing problems might, in part, be due to social factors – how others perceive the youth (Gustavsen, 2018; Terrier, 2020). It is further worth noting that we found externalizing problems to have an effect size four to five times larger than depressive symptoms, indicating that a youth with externalizing problems is more likely to receive a lower GPA than a youth with depressive symptoms. This is in accordance with previous research done on the topic. In a longitudinal study of UK residents from birth to 33 years of age, Anderson found that hyperactivity, conduct problems and emotional symptoms all reduced the predicted probability of achieving upward social mobility. This association was weaker for emotional symptoms than for conduct problems and hyperactivity (Anderson, 2018). In another study McLeod et al. (2012) found that depression was no longer significantly associated with GPA after adjusting for externalizing problems (delinquency, substance use and attention problems).

Our results also showed that girls on average receive higher GPAs than boys. This is to be expected from existing literature on youth in both Norway and other countries (Fortin et al., 2015; Gustavsen, 2018; Statistisk sentralbyrå, 2019). It is well documented that girls on average achieve higher grades than boys in Norwegian high school; however, this effect greatly attenuates when final exams are scored (Statistisk sentralbyrå, 2019). We investigated youths' grade point averages, not grades from final exams. Additionally, we did not include grades from physical education, which is the only subject where boys receive higher average grades than girls in Norway (Statistisk sentralbyrå, 2019). The gender differences in GPA may lead to greater gender disparity in higher education. In 2021, 60,1% of Norwegian students in higher education were female (Statistisk sentralbyrå, 2022).

It is worth noting that the effect sizes for gender are the largest in our study ( $B$  from  $-.274$  to  $-.341$ ). This suggests that gender is more strongly associated with GPA, than

internalizing problems, externalizing problems, depressive symptoms and parental education. Seeing as gender itself cannot be the target of an intervention, it is important to identify through which mechanisms gender affects GPA. As previously mentioned, some research has found evidence for a gender bias when evaluating math proficiency in French youth (Terrier, 2020), while Gustavsen identified perceived social skills as an important factor in gender bias among teachers in Norway (Gustavsen, 2018). More research is needed to examine why girls receive higher grades than boys, and possible solutions to this disparity.

We found one significant, positive association between age and GPA ( $B = .050$ ), in the model investigating associations between maternal education, internalizing problems and GPA. The other models did not yield statistically significant results for an association between the two. In other words, we did not find evidence for younger youth receiving higher grades than older youth, nor the opposite. Previous research has indicated that age is positively correlated with grades, among both children in elementary school, who are roughly the same age, and students in college, whose ages are more varied (Fenzel, 1992; Vella et al., 2016). In a longitudinal study, 10,370 15-year-olds in Australia were surveyed over 10 years. The researchers found that youth who were “old for their grade” had a significant self-concept advantage, which translated to a higher probability of enrolling in university (Parker et al., 2019). Our sample were distributed through three different grades, and our results are therefore not a reflection of being born late or early in the school year. At the same time, it is a very limited age range (16-19 years), with smaller deviations from a mean compared to college students, where a person can enroll at any age.

The effect sizes for all the interaction effects between parental education and the mental health measures were small, and none of them were significant. Although little research is done on this topic, this is divergent from what we expected. Our sample size not being larger might have influenced the level of statistical significance. However, the effect

sizes found indicate that a supposed interaction effect would be very small. As Norway has universal health care, and it is common to employ school nurses, it is credible that treatment and help for mental health issues is equally available for youth regardless of parental education. Research supports this notion. Using the sample of adolescents from the youth@hordaland study, Bøe et al. (2021) found that contact with child and adolescent mental health services was generally influenced by need (as opposed to by parental education), and largely equitable. In sum, even though our study did not find any significant interaction effects between parental education and mental health, more research is needed to examine these associations, and possible explanations, further.

### **Strengths and limitations**

Notable strengths of the current study are the relatively large sample, the use of validated questionnaires, as well as the use of three independent sources of information; youth, parents, and official registries. A large sample size is more likely to be representative of the population it studies; thus, it may provide more accurate mean values and provide smaller margin of errors. The results may be better able to predict outcomes, and as such, the researcher may be more justified in drawing generalized conclusions. Moreover, the independent sources ensure more reliable data. For example, parents are more likely to correctly answer questions about their own education level than their offspring. A meta-analysis studying literature on socioeconomic status and academic achievement found that studies that collect information on SES from students yield smaller correlations compared to studies that collect this information from parents (Sirin, 2005). This indicates that collecting data directly from parents when possible is an important factor in ensuring validity.

In our case, these two strengths are also a tradeoff. Although our sample is relatively large, it would have been even larger had we used youth's answers on parental educational levels, thus giving our analyses more statistical power. Conversely, results from this larger

sample might be less accurate. As such, we chose having a smaller sample with more correct data, as opposed to a larger sample with less reliable data. However, this limits the statistical strength in the study. As previously mentioned, some of the associations, such as associations between depressive symptoms and GPA, were statistically significant in some of the models, but not in others. For example, after adding the interaction effect between the SMFQ and paternal education in Model 3, the effect size for the association between depressive symptoms and GPA was slightly strengthened ( $B$  from  $-.021$  to  $-.026$ ) but was no longer significant. However, in Model 4, with age and gender added as control variables, this effect increased further and was significant once more, indicating that control variables strengthened the effect size. Our sample might be too small to be able to detect small associations, such as the estimates for depressive symptoms.

Seeing as gender was retrieved from the youth's personal identity number, which is assigned at birth, the adolescents were not given the option of reporting their own gender. As such, information on trans and gender non-conforming individuals may be lost. This may give less precise analyses when using gender as a main variable, and may obscure challenges that are specific to trans youth. Research indicates that trans youth are more prone to mental health issues such as depression, suicidality and self-harm compared to their cis-gender peers (Connolly et al., 2016). Additionally, recent Norwegian research shows that trans people report poorer living conditions than the general population (Anderssen et al., 2021). As research on this population's mental health is still scarce, we cannot be sure if this would have significantly altered the associations found between parental education, mental health and GPA. However, including more options raises privacy concerns. For instance, as trans people are a small minority in society, including an option for non-binary people may make responses recognizable when combined with other background variables such as age, location and ethnicity. Nevertheless, giving youth the opportunity to report their own gender will

indubitably lead to more precise and reliable results when stratifying analyses by gender. The present study only uses gender as a control variable; therefore, this limitation is less impactful.

The sample of parental respondents is highly educated. This may be the result of education in Norway being free, and living expenses during higher education partly funded by the government, making education a “common good”. However, descriptive statistics indicate that the parents in our sample report higher education than the general population in the same age group. This could be the result of social desirability bias, the tendency of respondents to answer in a manner that will be viewed favorably by others, or more likely; parents with higher education were more likely to complete the survey. Youth of highly educated parents are also more likely to consent to parents being sent the survey. This is a well-known challenge in research; children and adolescents from backgrounds with low SES have been found to be underrepresented in both medical studies in the US and Dutch cohort studies, respectively (Fakkel et al., 2020; Svensson et al., 2012). In addition to being highly educated, our sample is quite homogenous. The standard error (*SE*) seen in Table 2 and Table 3 is the average distance that observed values fall from the regression line, and is an indication of the spread of the data. The SE of maternal education range from .036 to .051. This implies that there are small differences in the education of mothers in our sample. This makes sense, both because education as a variable was recoded into just three possible outcomes, and because the sample is quite homogenous in terms of education level. This is not purely a limitation in our study, but rather a reflection of the population in Norway.

Another possible limitation to our study is the choice of variables in our analyses. For instance, ethnicity could have been included as a control variable in addition to age and gender. Research studying Finnish youth found that parental education had a comparably smaller effect on average grades in immigrant youth, compared to the majority (Kilpi-

Jakonen, 2012). This indicates that there might be differences in effect sizes based on ethnicity in Norway as well, and this is worth investigating.

It is also important to note that despite our sample being quite large, and seeking to include all high school-aged youths in Hordaland, caution must be used when generalizing our findings. The youth are living in a democratic society with an extensive welfare state which includes free education and economic support for people who are unemployed or unable to work. As such, their parents are generally highly educated, and few are poor. Therefore, it might not be fruitful to directly compare our results to results regarding youth in other countries.

### **Implications**

Our study adds to existing research on associations between parental education, mental health and academic achievement. Although it does not explicitly investigate possible mechanisms behind the associations, it contributes to public debate by elucidating said associations. In Norway, reducing social and economic inequalities in society is an explicit goal for the government, stating that the educational system is the most important area of focus for preventing such differences (Kleppa & Øye, 2005). It is with this in mind we propose possible implications of our study.

As expected, based on previous research, we found significant associations between parental education and youth's GPA. This could lead to a reproduction of social and economic inequality, and prevent social mobility. This accentuates the need for interventions that is effective in reducing the strength of the association between parental education and youth's GPA on a macro level, such as free high quality pre-school for all children (Barnett & Belfield, 2006). This assumes high attendance levels in marginalized communities. As previously mentioned, teacher's evaluation of parents (involvement) and youth (social skills)

can affect GPA (Bakker et al., 2007; Gustavsen, 2018). As such, teacher's attitudes and beliefs may mediate associations between both parental education and GPA, gender and GPA, and mental health and GPA. Further research is needed to examine this hypothesis.

We found no significant interaction effects between mental health problems and parental education. This indicates that while there is a significant association between parental education and the youth's GPA, this relationship is not significantly altered by the youth's mental health. If these findings are replicated, they could have implications for policy making. For instance, interventions targeting youth with externalizing problems might help reduce the negative association between externalizing problems and GPA. However, assuming that the intervention benefits every youth in the group equally, this would not promote social equality nor mobility – as mental health does not moderate the association between parental education and GPA. In other words, helping youth with externalizing problems might diminish the association between externalizing problems and GPA, but will not in itself change the association between parental education and GPA. Non the less, it is imperative that youth are given the health care needed to thrive and succeed, in school and elsewhere.

### **Conclusion**

The main aim of the present study was to investigate possible interaction effects between parental education and mental health problems. No significant interaction effects were found, indicating that mental health problems affect youth similarly in regards to GPA, regardless of parental education level. More research is needed to determine the validity of this hypothesis. Further, our study echoes previous research indicating that parental education is positively associated with grade point average in youth. The results also suggest that youth with externalizing problems receive lower grades than youth without, and that girls on average receive higher grades than boys. These associations might reduce social mobility, thus reproducing social and economic inequality. As such, it is important that research

investigates mechanisms behind the associations, and possible interventions that may support youth in reaching their full potential.

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