

Doctoral theses at NTNU, 2022:336

Marit Løtveit-Pedersen

# School functioning and internalizing problems among 8- to 12-year-old children:

Impact on academic achievement and school adaptation after participation in an indicated transdiagnostic prevention intervention

**NTNU**  
Norwegian University of Science and Technology  
Thesis for the Degree of  
Philosophiae Doctor  
Faculty of Medicine and Health Sciences  
Department of Mental Health



Norwegian University of  
Science and Technology



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ISBN 978-82-326-6356-9 (printed ver.)

ISBN 978-82-326-5993-7 (electronic ver.)

ISSN 1503-8181 (printed ver.)

ISSN 2703-8084 (online ver.)

Doctoral theses at NTNU, 2022:336

Printed by NTNU Grafisk senter

## Norsk sammendrag

### **Skolefungering og internaliserte problemer blant 8- til 12 år gamle barn: Effekt på faglig fungering og skoletilpasning av en indikert forebyggende intervensjon**

Forekomsten av de internaliserte vanskene angst og depresjon blant barn og ungdommer er økende. Det er et betydelig udekket behov for tidlig identifisering og effektive intervensjoner som kan forebygge vansker og dermed hindre mulige konsekvenser for individene selv og for samfunnet. Forskning viser at det er sammenhenger mellom psykiske problemer og dårlig skolefungering. Det er behov for gode måleinstrumenter som effektivt kan identifisere barns fungering, samt evaluering av psykisk helse intervensjoner som inkluderer utfallsmål relatert til skolefungering.

Det overordnede målet med denne avhandlingen var å øke kunnskapen om skolefungering hos barn mellom 8- til 12 år, som rapporterer forhøyede symptomnivå på angst og depresjon. Psykometriske egenskaper ved den norske versjonen av Brief Problem Monitor (BPM) – foreldre- og lærerversjon ble undersøkt. Videre ble sammenhengene mellom barnas selvrapporterte engstelse og tristhet og lærervurdert faglig fungering, skoletilpasning og internaliserte vansker, studert. I tillegg ble det undersøkt om det å ha deltatt i en forebyggende intervensjon rettet mot internaliserte vansker, også bedret skolefungeringen. Data i denne studien er fra den nasjonale randomiserte, kontrollerte studien kalt Tidlig Intervensjon Mestrende barn (TIM) som fant sted mellom 2014 og 2017. TIM-studien undersøkte effekten av *Mestrende barn*, som er et indikert, transdiagnostisk tiltak. Målet med *Mestrende barn* er å redusere symptomer på angst og depresjon hos barn som har forhøyet symptomnivå, men som ikke har en diagnostisert lidelse. Barn fra 3.- til 6. trinn fra 36 skoler i hele landet ble invitert. Inklusjonskriteriene var selvrapporterte symptomer på angst (MASC-C) og/eller depresjon (SMFQ), som var minst ett standardavvik over gjennomsnittet for barnepopulasjonen. I denne studien rapporterte 750 lærere barnas oppmerksomhets-, internaliserte- og eksterne vansker (BPM-T), samt faglig fungering og skoletilpasning (TRF). Faglig fungering og skoletilpasning ble også rapportert for 688 barn før intervensjonen, etter intervensjonen, og ved oppfølging ett år etter. I tillegg besvarte 596 foreldre på foreldreversjonen av BPM (BPM-P), og 472 mødre rapporterte utdanningsnivå.

Barna i denne studien representerte et utvalg barn som var noe mer engstelige eller triste enn andre barn på samme alder, og de hadde også en noe svakere faglig fungering enn i et populasjonsbasert norsk utvalg. Dette kan bety at de hadde større risiko både for å utvikle psykiske vansker og for vansker på skolen. Jentene i utvalget skåret høyere både på faglig fungering og på skoletilpasning enn guttene. De psykometriske egenskapene for BPM viste god reliabilitet både for lærer- og foreldreversjonen. Det var moderat samsvar mellom foreldrene og lærerne om eksterne- og oppmerksomhetsproblemer og lavt samsvar på internaliserte vansker. Trefaktorstrukturen i skalaen, dvs. (1) oppmerksomhetsproblemer, (2) eksterne problemer og (3) internaliserte problemer, fungerte utmerket for foreldreversjonen og godt for lærerversjonen. Videre viste undersøkelsene at både

lærerrapporterte internaliserte vansker hos barna og barnas egen rapportering av depressive symptomer hadde sammenheng med både faglig fungering og tilpasning i skolen, uavhengig av kjønn og alder. Når man la til mødrenes utdanningsnivå, forsvant sammenhengen mellom barnets egenrapporterte depresjonssymptomer og skolefungering. Barnas selvrappport på engstelse viste ingen sammenheng med lærervurdert faglig fungering, skoletilpasning eller internaliserte problemer. Lærervurderte internaliserte problemer var kun assosiert med barnas selvrapporterte depressive symptomer. Det var ingen signifikante forskjeller på faglig fungering eller skoletilpasning mellom intervensjons- og kontrollgruppene etter intervensjonen eller ved 12 måneders oppfølging. Det var heller ingen forskjeller for undergruppene av barn som kun hadde angstsymptomer, kun depresjonssymptomer eller både angst- og depresjonssymptomer.

BPM viser seg å være et valid og kort vurderingsverktøy for å måle oppmerksomhets-, eksterne- og internaliserte problemer hos barn i risiko for å utvikle angst og depresjon. Videre indikerer undersøkelsen av sammenhengen mellom internaliserte symptomer vurdert av lærerne og barnas selvrapportering, at lærere kanskje ikke oppdager disse barna, spesielt ikke de med angst. Men når lærerne rapporterte at barna hadde internaliserte vansker, vurderte de også at barnet hadde vansker med skolefungering. At man fant sammenheng mellom skolefungering og internaliserte symptomer, vurdert av både lærere og barn, styrker gyldigheten av disse sammenhengene. Denne undersøkelsen viser også at angstsymptomene ikke nødvendigvis påvirker skolefungering i denne alderen, men det gjør depresjonssymptomer. Etersom disse barna ikke er så lette å identifisere på dette alderstrinnet, kan økt fokus på sammenhengen mellom internaliserte problemer og skolefungering, hjelpe til å bedre se utfordringer og dermed kunne støtte disse barna. Barns skolefungering har stor betydning for hvordan det går med dem i et livsløpsperspektiv. Forebygging av internaliserte vansker hos barn har potensiale til å bedre skolefungeringen på sikt. Da de fleste effektstudier av forebyggende intervensjoner for internaliserte vansker fokuserer kun på symptomreduksjon, er det viktig å inkludere skolerelaterte utfallsmål i forskningen. Manglende positive funn relatert til skolefungering i denne intervensjonsstudien kan indikere at tiltaket *Mestrende barn* bør videreutvikles. Et sterkere søkelys på skolerelaterte utfordringer i dette tiltaket, samt å inkludere lærere i gjennomføringen av tiltaket, kan være lovende tilpasninger.

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Finansieringskilder: Stiftelsen DAM via Rådet for Psykisk helse  
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## **Abstract**

The prevalence of internalizing problems among children and adolescents is increasing. There is a substantial unmet need for early identification and satisfactory interventions for preventing potential individual and societal consequences. Furthermore, there is substantial evidence for reciprocal associations between mental health problems and poor school functioning. There is a need for reliable and valid assessments to effectively identify children's functioning and how it develops. There is also scarce research on school-related outcomes of mental health interventions.

The overall aim of this dissertation was to increase knowledge on school functioning in 8- to 12-year-old children with elevated symptom levels of anxiety and depression. More specifically, the psychometric properties of the Norwegian version of the Brief Problem Monitor – parent and teacher version, which measures attention problems, externalizing problems, and internalizing problems, were examined. Associations between children's self-report on internalizing symptoms and teacher-rated academic achievement, school adaptation, and internalizing problems were also investigated. In addition, the impact of participation in an indicated preventive intervention aimed at internalizing difficulties on academic achievement and school adaptation was also examined. Data were collected from a national cluster randomized controlled trial in Norway of the intervention EMOTION: "Coping Kids" Managing Anxiety and Depression Program from 2014 to 2017. The aim of the EMOTION program is to reduce symptoms of anxiety and depression in children who have elevated symptom levels but do not have a disorder. Children in grades 3 to 6 with self-reported symptoms of anxiety (MASC-C) and/or depression (SMFQ) at least one standard deviation above the population mean, from 36 schools, were included. N=750 children with teacher reports on the Brief Problem Monitor (BPM-T), academic achievement, and school adaptation (TRF) were examined in this study. Academic achievement and school adaptation at baseline, after intervention, and follow-up one year after were also reported for N= 688 children. N=596 parents reported using the parent version of the BPM (BPM-P), and N=472 mothers reported level of education.

The psychometric properties of the BPM showed good internal consistency for both the teacher and the parent versions. There was moderate informant agreement on externalizing and attentional problems and low agreement on internalizing problems between parents and

teachers. The model fit for the three-factor structure was excellent for the parent version and good for the teacher version. Children's self-report of symptoms of depression and teacher-rated internalizing problems were negatively associated with academic achievement and school adaptation, independent of age and gender. In addition, teacher-rated internalizing problems were associated with children's self-report on depressive symptoms. Self-report on symptoms of anxiety were not associated with teacher-rated internalizing problems, academic achievement, or school adaptation. There were no significant differences in academic achievement and school adaptation between the intervention and control groups post-intervention or at 12-month follow-up. When examining the subgroups of anxiety-only, depression-only, or combined (anxiety and depression), there were also no significant differences between the intervention and the control groups on academic achievement and school adaptation at the three time-points.

The findings of the examination of the parent and teacher versions of the BPM indicate that it may be a valid short assessment tool for measuring attentional, behavioral, and internalizing problems in children at risk for internalizing problems. The associations between internalizing symptoms rated by the teachers and the children's self-report indicate that teachers may have difficulties recognizing children with internalizing symptoms, especially children with symptoms of anxiety. However, when the teachers assessed the presence of internalizing problems, they also assessed difficulties in school functioning. The dual findings of negative associations between school functioning and internalizing symptoms as assessed by teachers and the children's self-report on depressive symptoms strengthens the validity of these relationships. The present findings suggests that the anxiety symptoms children report did not affect academic achievement and school adaptation at this age. This indicates the need for awareness of the association between mental health problems and school functioning, and that internalizing symptoms not always are observable for teachers. It is important to include outcomes of school-related functioning in research of mental health interventions. Prevention of depressive and anxiety symptoms in children may lead to positive changes in school-related domains in the years ahead. Based on the lack of positive findings when it comes to school outcomes in the present intervention study, a stronger focus on school-related challenges and including teachers in implementing the intervention could be promising intervention adaptations.



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## Acknowledgments

This work is the result of my doctoral project, which was carried out at The Regional Centre for Child and Youth Mental Health and Child Welfare in Central Norway (RKBU Mid-Norway), Department of Mental Health, Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology (NTNU). The present study was financed by [the DAM Foundation through the Norwegian Council of Mental Health #1] and [the Liaison Committee for Education, Research, and Innovation in Central Norway and the Central Norway Regional Health Authority #2]. The Norwegian Research Council funded the national randomized controlled intervention study from which the data in the present study are derived.

First and foremost, I would like to express gratitude to the children, teachers, and parents who participated in the main Coping Kids study (TIM-study). By investing your time and sharing your personal perspectives you have contributed to important research and future practice. In addition, I would like to express my gratitude for the invaluable work from the group leaders, school personnel, and others who contributed to completing the main study.

Many people have supported my doctoral project and must be mentioned. My sincere gratitude to my supervisors, Professor Stian Lydersen, Professor Emerita Anne Mari Sund and Researcher Solveig Holen, who have been a huge part of my PhD-journey. Thank you all for important discussions in all the stages. Stian, my main supervisor, I appreciate that you have been available at short notice, always cheerful, and solution oriented. You exude calmness and have a unique ability to lift people up when they are feeling down and helpless. Furthermore, I could come to you with the "stupidest" statistical questions and leave feeling much better and smarter. My co-supervisor Anne Mari, you took a chance on hiring me as a local project coordinator in the TIM-study back in 2014 and encouraged and helped me write an application for a PhD. It was so rewarding learning from all your expertise in the field of mental health and in research in general in the years we have worked together. I am blessed that we could work together to make the theoretical and practical subject "Kat i gruppe" at NTNU possible. The work that you did gave people who work with children and adolescents a tool to help many children and youths to a better future. I am passionate about making evidence-based interventions available for children and adolescents, and it was so satisfying to be part of this. My co-supervisor Solveig, I am so grateful for your kind spirit and competence in the field of education and in research. You have always taken time for

meetings, read my work, and given me valuable feedback. Furthermore, you have been genuinely supportive of me on a personal level.

A tremendous thanks to the TIM-study team from R-BUP South-East, RKBU North, and RKBU Mid-Norway; Simon-Peter Neumer, Solveig Holen, Kristin Martinsen, Anne Liv Askeland, Lene-Mari Rasmussen, Frode Adolfsen, Joshua Patras and Anne Mari Sund for making me realize how much fun a national research-project could be. It has been an amazing experience to be part of such an incredible, lively, and engaged bunch of researchers. Your knowledge and fantastic personalities made these years so enriching and motivating. You have all been so supportive in the progress of my PhD. I really hope I will be able to collaborate with you all in the future.

To my co-authors from the TIM-study team, and Thomas Jozefiak, and Mona Elisabeth Løvaas; thank you for contributing, giving critical reviews and meaningful discussions, and making the papers suitable for publication. In addition, thank you to those who read my papers in early stages and gave critical and valuable feedback.

A sincere thank you to all my former colleagues at RKBU Mid-Norway for your warm support and encouragement. It has been rewarding to be in a work environment filled with so many positive people. And on top of that, many colleagues were psychologists and psychiatrists. All doctoral students should be assigned a psychologist/psychiatrist to keep their sanity throughout the PhD-years. I would like to thank Bernhard Weidle for providing wonderful mental support when needed.

I would also like to praise my PhD-fellows for sharing all the ups and downs and making me feel we were in this together. The inspiration and encouragement from all of you through the various stages of the doctoral degree has been invaluable. It will be enriching to maintain our friendship in the future as well.

I would also like to thank the University Library, the Medicine and Health Library at NTNU, and especially Senior Research Librarians Jan Ove Rein and Sindre Pedersen for the quick response when I needed user support in literature search and reference management.

To my friends and extended family, a special thank you for the support and genuine belief in me. I look forward to more social gatherings with all of you. There is a lot to catch up on.

Last, but not least, my deepest gratitude and love for my closest family, Tormod and our children Benjamin and Erika. You have been my biggest cheerleaders and you make my life so rich and meaningful. This PhD could never have happened without your tremendous support and patience. Tormod, you have given me opportunities to work at the cabin

whenever I wanted, always been patient and encouraging, and have been so generous throughout the years. This has been crucial for me, and I am forever thankful. The past year, where I had a full-time job in addition to writing this dissertation, has led to many sacrifices and time away from my family. I hope by finishing this PhD I have shown my children that hard work, sacrifices, and never giving up will provide rewards in the long run. Ultimately, I hope this will make them confident in pursuing and achieving whatever goals they set in their lives. I believe in you!

**It is said that it takes a village to raise a child; it certainly takes a village to complete a PhD-degree. Thank you all for making this journey such a positive experience!**



**“Never give up!”** by Aina Flatjord-Nilsen



## List of Papers

### Paper I

Pedersen, M. L., Jozefiak, T., Sund, A. M., Holen, S., Neumer, S. P., Martinsen, K. D., Rasmussen, L.M.P., Patras, J. & S. Lydersen (2021). Psychometric properties of the Brief Problem Monitor (BPM) in children with internalizing symptoms: Examining baseline data from a national randomized controlled intervention study. *BMC Psychology*, 9(1), 1-12. <https://doi.org/10.1186/s40359-021-00689-1>

### Paper II

Pedersen, M. L., Holen, S., Lydersen, S., Martinsen, K., Neumer, S. P., Adolfsen, F., & A.M. Sund (2019). School functioning and internalizing problems in young schoolchildren. *BMC Psychology*, 7(1), 1-13. <https://doi.org/10.1186/s40359-019-0365-1>

### Paper III

Pedersen, M. L., S. Holen, A. M. Sund, F. Adolfsen, M. E. Løvaas, K. D. Martinsen, S-P. Neumer, J. Patras, L-M. Rasmussen, and S. Lydersen (2022). Targeting Internalizing Symptoms in Children: What is the Impact on School Functioning? *Scandinavian Journal of Educational Research*, 1-16. <https://doi.org/10.1080/00313831.2022.2042849>

## Scientific Environment

The dissertation is presented at the Norwegian University of Science and Technology (NTNU).

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Co-supervisors: Professor Emerita Anne Mari Sund, Department of Mental Health, Faculty of Medicine and Health Sciences, NTNU

Researcher Solveig Holen, Regional Center for Child and Adolescent Mental Health East-South

Funding: The DAM Foundation through the Norwegian Council of Mental Health

The Liaison Committee for Education, Research and Innovation in Central Norway and the Central Norway Regional Health Authority

## Abbreviations and Acronyms

ADHD:	Attention Deficit Hyperactivity Disorder
ASEBA:	Achenbach System of Empirically Based Assessment
ATT:	Attention problems
BPM-T:	Brief Problem Monitor – Teacher form
BPM-P:	Brief Problem Monitor – Parent form
BPM-Y:	Brief Problem Monitor – Youth form
CAS-CBT:	Competence and Adherence Scale for Cognitive Behavioral Therapy
CBT:	Cognitive Behavioral Therapy
CBCL:	Children’s Behavior Checklist
CFA:	Confirmatory Factor Analyses
CFI:	Comparative Fit Index
CI:	Confidence Interval
cRCT:	Cluster Randomized Controlled Trial
DEFF:	Design effect
DSM-V:	Diagnostic and Statistical Manual of Mental Disorders, fifth version
EFPA:	The European Federation of Psychologist Association
EXT:	Externalizing problems
GPA:	Grade-Point Average
ICC:	Intraclass Correlation Coefficient
INT:	Internalizing problems
MASC-C:	Multidimensional Anxiety Scale for Children
MTSS:	Multi-Tiered System of Support
RCT:	Randomized Controlled Trial
RMSEA:	Root Mean Square Error of Approximation
SAT:	Scholastic Assessment Test
SD:	Standard Deviation
SEL:	Social and Emotional program
SES:	Socio-Economic Status
SMFQ:	Mood and Feelings Questionnaire-short version
TLI:	Tucker and Lewis Index
TRF:	Teacher’s Report Form
WLSMV:	Weighted Least Square estimator with robust standard errors and Mean- and Variance-adjusted chi-square test statistics
YSR:	Youth Self Report



# 1 Introduction

## 1.1 Rationale for this study

The overall aim of the present study was to increase knowledge regarding school functioning in children aged 8-12 with elevated symptom levels of anxiety and depression. Good school functioning, both academically and socially, is important to promote good quality of life and prevent subsequent school drop-out (Durlak et al., 2011; Gustafsson et al., 2010; Ingul et al., 2012; O'Connor et al., 2018; Sagatun et al., 2014). Children's academic achievement, which is one of the most essential parts of school functioning, predicts school completion, which in turn predicts well-being and protects against marginalization in adulthood (Vinnerljung et al., 2010). Furthermore, good mental health is important at every stage of life, from childhood and adolescence through adulthood, and there is substantial evidence that mental health problems are bidirectionally associated with school functioning both in cross-sectional and longitudinal studies (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). Anxiety and depression are some of the most prevalent mental health disorders among children and adolescents, and often occur in school age (Egger & Angold, 2006; Essau et al., 2012; Heiervang et al., 2007; Sund et al., 2011). However, these children may go undetected, given that their symptoms may not be visible to others (Heiervang et al., 2007). The consequences of mental health problems can lead to several problems for the individual, such as problems at school and school drop-out, and for society, such as unemployment and increased social security expenses (Bania et al., 2016; Battin-Pearson et al., 2000; Brännlund et al., 2017; Kearney & Albano, 2004; Reneflot et al., 2018). It is essential to detect problems early and to prevent them from further developing and possibly having a negative impact in different life domains.

Assessment of reliable and short instruments to disclose attentional, behavioral, and internalizing problems, are important in populations of at-risk children. One of the aims in the present study was to evaluate an instrument designed for this purpose – the Brief Problem Monitor (BPM). Despite the known association between mental health problems and school functioning, research on mental health interventions with outcomes related to school functioning are scarce (Hoagwood et al., 2007; Sanchez et al., 2018; Swan & Kendall, 2016). Thus, there is a need to investigate this issue. The indicated intervention, EMOTION, “Coping Kids” Managing Anxiety and Depression Program (Kendall et al., 2013; Martinsen et al., 2014), aims to reduce symptoms of anxiety and/ or depression. Another goal of the

present study was to investigate whether the intervention affects school functioning for children aged 8 to 12 years. The data are derived from a cluster randomized controlled trial (cRCT) (Patras et al., 2016), and the intervention was delivered in school settings. Previous results from evaluating the intervention have shown a significant reduction in anxious and depressive symptoms (Løvaas et al., 2020; Martinsen et al., 2019), improvement of children's emotional regulation skills (Loevaas et al., 2019), and self-reported quality of life and self-esteem (Martinsen et al., 2021). These improvements have the potential to improve children's school functioning.

In the first chapter of this dissertation, school functioning and factors that can have positive and negative influences on successful achievement will be presented (1.2). Mental health problems with prevalence, risk factors, and consequences are then described (1.3). Different theories of the association between mental health problems and school functioning are then discussed (1.4). Following, school-based mental health interventions describing different levels of interventions, outcomes of anxiety and depression, and school outcomes of interventions are presented (1.5). In addition, the need for reliable and valid instruments to detect internalizing problems is presented (1.6). The research questions of three papers in this dissertation are introduced in Chapter 2. Chapter 3 presents the method section with study procedures, including recruitment and participants, inclusion and exclusion criteria, participants' demographic information, research ethics, funding, attrition, instruments used, and description of the intervention EMOTION: "Coping Kids" Managing Anxiety and/or Depression. Finally, the statistical analyses used in the present study are described. Chapter 4 presents a summary of findings of three papers, while Chapter 5 addresses the discussion, methodological considerations, and future directions. Finally, the conclusion is presented in Chapter 6.

## Theoretical background

### 1.2 The concept of school functioning

School functioning refers to a wide range of aspects such as academic achievement or performance, attendance, learning capacities, behavior, engagement in school activities, adaptation, attitudes toward school and social relationships (Achenbach & Rescorla, 2001; Gustafsson et al., 2010). Academic achievement is considered one of the most important parts of school functioning, and represents knowledge, understanding, and performance in multiple subjects (Steinmayr et al., 2014). It is often measured by grade-point average (GPA) or standardized tests. However, several researchers claim that school functioning is not merely achievement in standardized tests in different subjects but also includes positive development in children's social and emotional health (Durlak et al., 2011; Gustafsson et al., 2010; Sagatun et al., 2014). Good mental health and social competence have been found to be positively associated with academic achievement in elementary school (O'Connor et al., 2018; Welsh et al., 2001). Emotions influence learning, as positive emotions enhance achievement in grades and test scores, and negative emotions hinder it (Pekrun, 2017). Emotions include interrelated psychological processes of subjective feelings, cognitions, motivation, and expressed behavior (Scherer, 2009). Thus, school functioning includes cognitive factors (intelligence, memory, and problem-solving skills), but also emotions and social competence.

#### 1.2.1 How to succeed in school - risk factors and protective factors

There are several individual and contextual factors associated with the experience of school success or positive school functioning. In this overview, some core factors are presented. School functioning appears to be affected by *individual factors* such as intelligence (Bodas, 2003), cognitive skills (Duncan et al., 2007), gender (Backe-Hansen et al., 2014; Bakken et al., 2008), self-esteem/emotional health (Carlson et al., 1999), mental health (Brännlund et al., 2017; Kearney & Albano, 2004), social competence (O'Connor et al., 2018; Welsh et al., 2001), attitudes and beliefs about the future (Li et al., 2010), and pro-socialness (e.g., cooperativeness, helpfulness, empathy) (Caprara et al., 2000). In addition, emotional engagement in school is significantly associated with academic achievement in adolescence (Wang & Holcombe, 2010). However, disengagement from school has been found to increase with number of years in school (Fredricks et al., 2004).

Of *contextual factors*, supportive relationships with peers and teachers are important (Esch et al., 2014; Hughes et al., 2008). The relationship with the teachers also plays a significant role in children's social, emotional, and academic development, especially in early childhood (Birch & Ladd, 1997; Hamre & Pianta, 2001; Pianta & Stuhlman, 2004). Significant associations have also been found between children's school achievements and socio-economic (SES) background and the parents' level of education (Bakken et al., 2008; Esch et al., 2014; Sirin, 2005). Children of highly educated parents and high economic status have been shown to adapt better (e.g., have control over behavior, cope with peers and teachers, and deal with new situations such as taking turns and understanding school routines) in their first year of elementary school (Akçınar, 2013). In Norway, children of parents with higher education do better in school compared to children of less-educated parents (Revold, 2016). Parental involvement in school-related tasks has also shown to be a predictor of successful school functioning (Westerlund et al., 2013). The presence or lack of these individual and contextual factors has an impact on the child's developmental trajectory.

### **1.2.2 Gender differences in school functioning**

Significant gender differences in several factors that may be associated with school functioning have been found, including differences in development, areas of interest or motivation, and how parents, teachers, and classmates assess and treat the child based on gender (NOU, 2019). From early school age, there seem to be no gender difference in general intelligence; however, several individual studies have found that girls develop general cognitive skills earlier than boys in preschool age, on average (NOU, 2019). This may have an impact on how much knowledge and skills boys and girls have when they enter school. Studies have also indicated that girls show more developed skills in self-regulation, especially self-regulation of attention, activity, and impulses, from early childhood (NOU, 2019). These are skills that might affect the school day for the individual and for the class, in terms of being attentive to school-related tasks.

Among 34 European countries, Norway is among the countries with the highest gender differences, in disfavor of boys, especially in reading in both primary and secondary school (Borgonovi et al., 2018). Boys are also more likely to be low achievers in all subjects. A recent study from 65 primary schools in Norway revealed that girls have increased academic performance from fourth to seventh grade compared to boys (Ogden et al., 2021). In addition, boys were rated higher on externalizing behavior and girls higher on social skills; however, the differences leveled out with increased age. A representative Norwegian study



among children in grades 1-7 came to the opposite conclusion, as it did not identify any gender- or age-group differences on teacher-reported average academic performance (Larsson & Drugli, 2011). However, the study reported that girls scored significantly higher than boys in characteristics like working hard, appropriate behavior, learning (ability, effort), and total adaptive functioning domains. Another study showed that these characteristics also were associated with low levels of conflict in school and higher closeness with the teacher (Drugli, 2013). It has been suggested that teachers have lower expectations of boys (Wollscheid et al., 2018), which may lead to poorer academic functioning and thus may support gender differences. Girls in grades 1-3 in Norwegian schools have also been shown to have more positive relationships with their teachers than girls in grades 4-7 and boys in both groups (Drugli, 2013). Teacher support seems to be more important for girls than boys in adolescence; that is, the girls are more vulnerable to the quality of relationships with teachers than the boys (Undheim & Sund, 2005). In addition, boys have a higher drop-out rate from school than girls (Borgonovi et al., 2018). This trend is not increasing, but rather a stable phenomenon that has existed for decades (Voyer & Voyer, 2014). These findings are important when assessing gender differences in overall school functioning. Summed up, boys are more likely to have lower academic performance, show more externalizing behavior, and might be met with lower expectations from the teacher. The teacher might give girls more positive feedback on the qualities or skills that are more satisfactory in a classroom, which might impact both boys' and girls' school functioning in the future.

### **1.2.3 Attendance and completion of education in Norway**

Education in Norway is compulsory and free for children and adolescents aged 6-16 years (grades 1-10), and most children (96%) attend public schools. About 98 percent of adolescents start free upper secondary school the year they turn 16. Recent figures for completion of upper secondary school within 6 years after commencement show that approximately 80% complete school (Statistics-Norway, 2021). The number of non-completers has been reduced from approximately 30% to 20% in the last decades. There have been political efforts focused on completion, although the reason for the decrease has not been systematically investigated. However, poor academic achievement is a strong predictor for school drop-out (Battin-Pearson et al., 2000). Several studies have also found a relationship between poor mental health and the risk of not completing education (Bania et al., 2016; Brännlund et al., 2017). Furthermore, a reduction in mental health problems is

suggested to reduce later drop-out (Esch et al., 2014; Quiroga et al., 2013; Sagatun et al., 2014).

### **1.3 Mental health problems – externalizing and internalizing problems**

There is substantial evidence for reciprocal associations between mental health problems and school functioning (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). Mental health is defined as a person's "subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence, and recognition of the ability to realize one's intellectual and emotional potential" (WHO, 2004). In other words, mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act, and determines how we handle demands, relate to others, and make choices.

Mental health problems usually manifest as behavioral, emotional, and/ or social problems, and the terms externalizing (EXT) and internalizing (INT) are concepts that have been used to categorize these problems (Achenbach et al., 2016). Externalizing problems are behaviors directed at the environment, representing behaviors that are impulsive, oppositional, aggressive, and hyperactive. Internalizing problems are characterized by internal processes representing anxiety, depression, somatic complaints, and social withdrawal (Achenbach et al., 2016). Externalizing problems can also be understood as poor self-regulation or lack of control in behavior and emotional expressions, while internalizing problems can be seen as over-controlled symptoms where the individual tries to maintain control of their emotions and cognitions (Merrell, 2008). The former is easy for others to observe, and the latter has been described as a secret illness. The terms EXT and INT were introduced for the first time in 1966 (Achenbach, 1966), and are known and used worldwide. This classification is also used both regarding clinical disorders (APA, 2013), and significant sub-clinical problems (Achenbach et al., 2016).

Mental health problems are, for instance, symptoms of depression that include depressed mood and loss of interest in activities, while symptoms of anxiety can be negative thoughts or fear of specific situations. Having several symptoms can distress the individual, but not necessarily enough to qualify as a disorder. Disorders are a collection of symptoms above a certain level and include a standardized list of criteria, necessary for diagnosis (e.g., depression, anxiety, conduct). The Diagnostic and Statistical Manual of Mental Disorders

(DSM-V) is a classification system used to diagnose different mental health disorders (APA, 2013). To qualify for a disorder, specific symptoms above a certain level must have lasted for a certain length of time and impaired functioning must have occurred. Subthreshold symptoms are below the clinical threshold and often cause individuals substantial functional impairment, but still do not meet diagnostic criteria. However, there is no specific definition of this concept (Balázs et al., 2013).

### **1.3.1 Risk factors for developing mental health problems**

There are several individual and contextual risk factors for developing mental health problems and/or disorders, such as anxiety and depression. Genetics such as temperament and vulnerability in the child (Essex et al., 2006) and comorbidity with other diagnoses (e.g., ADHD, autism, Tourette syndrome) are examples of *individual factors* (Franke et al., 2018; Hansen et al., 2018; Reale et al., 2017). Examples of *contextual factors* linking to mental health problems in children and adolescents are parents' age, socio-economic status, parental education, parental employment, and parental psychopathology, as well as single-parent households (Costa et al., 2020; Husky et al., 2018; Kovess-Masfety et al., 2017; Morales et al., 2021; Philipp et al., 2018; Reiss, 2013; Sund et al., 2003). Low socio-economic status over time, including less-educated parents, is strongly related to mental health problems among children and adolescents (Costa et al., 2020; Reiss, 2013; Wichstrøm et al., 2012). These risk factors can be detected at a very early age (Wichstrøm et al., 2012).

### **1.3.2 Onset and prevalence - disorders, and subthreshold level of internalizing and externalizing problems**

The mean age at onset of any anxiety disorder is typically around 8 years (Costello, 2011). For major depression, the mean onset is approximately 14 years (Lewinsohn et al., 1994); however, the onset of less-severe depression symptoms can be observed as early as age 7-8 (Garaigordobil et al., 2017). Anxiety and depression that first appear in the early school years tends to persist over time (Costello et al., 2003; Sanchez et al., 2018). The two disorders often co-occur, and anxiety often precedes depression (Angold et al., 1999; Costello et al., 2005); both may show a chronic course if left untreated (Ialongo et al., 2001; Lamers et al., 2011).

The prevalence of mental health disorders is high worldwide. A meta-analysis including 41 studies from 27 countries revealed a prevalence of mental health disorders in children and adolescents from 6-18 years of age of 13.4% (95% CI 11.3 to 15.9); 6.5% for any anxiety disorder and 2.6% for depressive disorders (Polanczyk et al., 2015). Other

international studies have reported varying prevalence, ranging from 3% to 23% for anxiety disorders (Angold et al., 2002; Cartwright-Hatton et al., 2006; Costello et al., 2003; Ford et al., 2003; Kessler et al., 2012; Kroes et al., 2001; Merikangas et al., 2010), and from 0.1% to 1.6% for children and 2.2% to 3.2 % in adolescents with depressive disorders (Angold et al., 2002; Costello et al., 2003; Ford et al., 2003; Heiervang et al., 2007; Kessler et al., 2012; Kroes et al., 2001; Merikangas et al., 2010; Wichstrøm et al., 2012). Population-based studies from Norway indicate a more conservative 7 percent of children aged 4 years (Wichstrøm et al., 2012) and 8-10 years (Heiervang et al., 2007) who had symptoms that were compatible with a mental disorder at the time of the examination. Anxiety and depression were the most common disorders in both studies.

The prevalence of *self-reported problems* in 6,245 children 6-12 years of age across eight European countries, was reported to be 18.4 % for internalizing disorders and 7.8% for externalizing disorders (Husky et al., 2018). In other words, one in five children reported to have internalizing disorders and 1 in 12 children reported externalizing disorders. In addition, a study including 12,395 adolescents between 14-16 years (mean age 14.8) old from 11 European countries revealed a self-reported prevalence for subthreshold-anxious symptoms to be 32% (5.8% anxious disorders), and 29.2% were subthreshold-depressed (10.5% depression disorders) (Balázs et al., 2013). This indicates that many children and adolescents experience internalizing symptoms that may affect their emotional, psychological, and social well-being.

### **1.3.3 Consequences of internalizing problems and the need for available resources**

The presence of problems may be a precursor for other difficulties that can affect daily life negatively, such as increased risk of later disorders (Swan et al., 2018), low self-esteem and substance abuse (Costello et al., 2003), impaired psychosocial functioning (Mychailyszyn et al., 2010; Spencer et al., 2003; Swan & Kendall, 2016), peer and family problems (Birmaher et al., 1996; Fergusson & Woodward, 2002), poorer working memory (Murphy et al., 2018), impairment in school functioning, or school non-completion (Bania et al., 2016; Battin-Pearson et al., 2000; Brännlund et al., 2017; Kearney & Albano, 2004). This suggests that prevention in childhood is essential for preventing symptoms from becoming disorders and affecting their lives negatively.

Many children who experience internalizing symptoms but do not qualify for a diagnosis also may experience some degree of impairment in functioning (Balázs et al., 2013). A report on mental health problems in Norway indicated that 15-20 percent of

children and adolescent have mental health problems that clearly reduce their daily functioning, even though they do not qualify for a diagnosis (Mykletun, 2009). Subthreshold symptoms are found to be significantly predictive for functional impairment and for later disorders (Balázs et al., 2013). One of the areas of impairment might be related to school; effective prevention and early intervention are critical (Polanczyk et al., 2015; Sanchez et al., 2018).

A study on available resources for mental health services for children across Europe showed that there is a substantial unmet need for mental health care (Kovess-Masfety et al., 2017). Studies in Norway have shown that children aged 8-10 years and adolescents with internalizing problems (anxiety and/or depression) seldom receive professional care (Heiervang et al., 2007; Sund et al., 2011). Lack of resources in schools and society may be why children and young people do not seek help or that it is difficult for adults to identify internalizing difficulties (Egger & Angold, 2006; Essau et al., 2012). The lack of mental health care might have serious consequences both for individuals, in terms of the negative impact on their lives, and for society and public health, in terms of unemployment and increased social security expenses (Reneflot et al., 2018).

### **1.3.4 Gender differences in internalizing and externalizing problems**

International studies from several countries have found that girls score higher on internalizing problems and boys score higher on externalizing problems, as rated by multiple informants (Husky et al., 2018; L. Rescorla et al., 2007; Rescorla et al., 2012). Generally, girls report more anxious symptoms than boys do (Costello, 2011); however, after the ages of 11-13, boys are twice as likely to be depressed and anxious as they were prior to puberty. In addition, subthreshold symptoms increase in both boys and girls (Balázs et al., 2013). Until the age of six, the prevalence of mental health problems in Norway is similar for girls and boys (Surén et al., 2018). From the ages of 6-12, boys account for two-thirds of those who are diagnosed with externalizing problems such as concentration difficulties and behavior disorders. Two-thirds of those diagnosed with internalizing problems (e.g., anxiety or depression) when entering adolescence are girls (Surén et al., 2018). The prevalence of symptoms of depression and anxiety in youth, especially girls, are also increasing (Surén et al., 2018). This indicates the need to focus on early prevention and identification for at-risk children.

## **1.4 Mental health and school functioning – problems in one domain affect the other**

Developmental relationships between mental health problems and poor school functioning are often referred to as *cascade effects* or *chain effects* (Masten et al., 2005). This suggests that problems in one domain at one time predict and cause problems in other domains later, through direct or indirect effects culminating over time (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). There are three models or perspectives that are often used to describe cascade effects. One perspective is the *adjustment-erosion model* (Moilanen et al., 2010), which suggests that there are longitudinal associations, which implies that internalizing and externalizing difficulties may lead to later academic difficulties. The second perspective is the *academic-incompetence model* claiming that academic problems can cause internalizing or externalizing problems to emerge or worsen (Moilanen et al., 2010). A third perspective is called *shared-risk* or common cause, meaning that other variables contribute to the association between mental health and problems at school in the two models (Deighton et al., 2018; Masten et al., 2005; Moilanen et al., 2010). The three models will be examined more closely below.

### **1.4.1 The adjustment-erosion model – Mental problems lead to academic problems**

The adjustment-erosion model claims that mental health problems lead to academic problems (Moilanen et al., 2010). The model proposes that internalizing problems lead to emotional distress that negatively interferes with attention, leading the child to passivity and lack of engagement in classroom activity, which again may lead to poorer school performance. Studies have shown that mental health problems are associated with a) lower levels of achievement, attainment, and school functioning (Duchesne et al., 2008; Fergusson & Woodward, 2002; Mychailyszyn et al., 2012); b) difficulties with learning and social skills (Bernstein et al., 2008); c) increased difficulties in the classroom (e.g., negative learning attitudes, poor relationships with teachers and peers, and lower self-esteem) (Muris & Meesters, 2002); and d) decrease in general intellectual functioning, resulting in reduced learning capacities and poor academic performance (Lundy et al., 2010) and feeling less belonging to school (Johnson et al., 2006). A review of the literature from 1961-2000 indicates that students with emotional and behavioral disorders often are underachievers (Gustafsson et al., 2010).

Studies of cascade effects show that anxious first graders are three times more likely to have low scores on a standardized reading achievement test in third grade and on a math achievement test in the eighth grade compared to non-anxious peers (Grover et al., 2007). A recent longitudinal cohort study showing that internalizing problems at the age of three were associated with academic performance at the age of 12 and increased the risk for incomplete grades at the age of 15 (Agnafors et al., 2021). Longitudinal studies have found that symptoms of anxiety or depression at the beginning of elementary school have predicted lower academic achievement and higher internalizing problems in high school (Grover et al., 2007; Ialongo et al., 2001). This makes it important to focus on identifying anxiety and depression in children early.

A meta-analysis found that the associations between internalizing problems and school functioning were more consistent for depression than anxiety, and stronger in late adolescence (Riglin et al., 2014). Depressive symptoms in seventh graders have also been found to predict lower self-reported academic competence across adolescence and a higher likelihood for drop-out (Quiroga et al., 2013). The mediation of self-perception of academic competence in the latter study suggests that negative self-beliefs might be related to less engagement in school, which has implications for academic success. Lower expectations of oneself may contribute to lower performance in school. Children who reported symptoms of depression at the ages of 7-10 were found to be more likely to have negative attitudes toward school, lower academic performance, and more childhood stress (Garaigordobil et al., 2017).

One study found that increasing symptom trajectories over time had a significant negative impact on young adolescents' academic performance compared students who did not experience an increase in symptoms (Patalay et al., 2015). The cumulative effects over time may be of greater importance when measuring whether mental health problems are leading to poorer school functioning. For example, in cross-sectional studies, research subjects with internalizing problems may not show current academic problems; however, struggling with internalizing problems over time, and perhaps with increasing symptoms, can have a more negative effect on school functioning.

According to a retrospective longitudinal study including 800 children from the ages of 6-18, externalizing problems predicted poor academic performance, but internalizing problems did not (Van der Ende et al., 2016). Other studies have reported finding no evidence that internalizing problems interfered with academic competence (Panayiotou & Humphrey, 2018; Weeks et al., 2016). A study of six longitudinal data sets found no links between either internalizing or externalizing problems and academic achievement (Duncan et al., 2007).

Considering that most of these studies were performed with population samples, there might be different results for children at risk for developing mental health disorders.

Studies of cascade effects indicate that externalizing problems lead to later academic problems to a greater extent than internalizing problems (Moilanen et al., 2010; Obradović et al., 2009). However, internalizing problems may be a direct or indirect effect of externalizing problems. An example of an indirect effect is that aggressive behavior (externalizing problems) can lead to less peer acceptance (social problems) and worsened relationships with teachers (social problems), which in turn lead to learning difficulties (academic problems) and an increased risk for internalizing problems later (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). An example of a direct effect is that aggressive behavior may lead to internalizing problems, which can alter cognitions negatively and thereby lead to less engagement in school (Moilanen et al., 2010; Weidman et al., 2015). In addition, externalizing difficulties could negatively impact school performance to a higher degree than internalizing difficulties because it may intervene more disruptively in learning activities, which also affects the teacher and other students (NOU, 2019). Studies of cascade effects have also suggested that internalizing problems may have a shorter window of influence, indicating that the time the assessments were conducted in the studies may not be the right one to capture potential academic challenges (Masten et al., 2005). It has also been pointed out that many studies were performed in the general population, and it might be conceivable that children or adolescents in the clinical range of internalizing symptoms may have more negative development in relation to school functioning.

#### **1.4.2 Academic-incompetence model – Academic problems lead to mental problems**

There is evidence for the relation between early academic failure and later mental health problems as suggested by the *academic-incompetence model* (Moilanen et al., 2010). This model claims that academic problems initiate or exacerbate lower self-worth and frustration because of negative feedback from peers and teachers. This may in turn trigger internalizing problems (e.g., social withdrawal) or externalizing problems (e.g., acting out, aggression) and impair social relationships. Maladjustment undermines subsequent academic performance by inhibiting cognitive functions and reducing and eliminating the motivation for success.

A meta-analysis indicates that early reading competence is crucial for school outcomes and can affect later internalizing problems (Gustafsson et al., 2010). Furthermore, early reading problems can lead to school drop-out or low GPA in any school year from 6<sup>th</sup> to 10<sup>th</sup> grade and predict higher symptoms of depression and anxiety at the beginning of each



subsequent school year (Weidman et al., 2015). Learning difficulties in childhood also appear to have negative long-term consequences related to internalizing problems in early adulthood (Masten et al., 2005).

Several studies have shown that academic problems and lower competence are associated with the development of depressive symptoms (McCarty et al., 2008; Undheim & Sund, 2005; Wang et al., 2016; Weeks et al., 2016; Zhang et al., 2019). A meta-analysis of 43 longitudinal studies showed that prior academic performance had a significant effect on depression in children, even when controlling for prior depression and academic performance (Huang, 2015). A recent study found effects of depressive symptoms in elementary school children (3<sup>rd</sup> to 6<sup>th</sup> grade) only for subjective assessments of academic achievement, and not objective measures (Chen et al., 2021). A prospective longitudinal study of American youths from the ages of 10-21 found that poor academic performance was associated with later depressive symptoms for girls, but not for boys (McCarty et al., 2008).

Children's age might be important when measuring academic performance and internalizing problems. One study found that lower academic capacity in children at 6-12 years of age predicted higher internalizing symptoms in middle childhood, but not in early adolescence (Moilanen et al., 2010); however, this study only included boys. Another study with children in the same age range reported that low academic attainment in primary school predicted increased internalizing and externalizing problems in middle childhood, but not for adolescents (Deighton et al., 2018).

The findings in the academic-incompetence model seem to be stronger in relation to internalizing problems than the adjustment-erosion model. However, the timing of the assessment of internalizing problems and school functioning seems to be important. Different transition points, such as school start, transition from elementary school to middle school, and transition from childhood to adolescence, represent developmental changes such as hormonal changes, different academic demands, and social expectations, and seem to be important considerations in studies of the relationship between internalizing problems and school functioning. For example, an increase in academic demands and transitioning into puberty might increase self-awareness on how they are doing in school and might lead to lower self-esteem and internalizing problems, which may increase the cascade effect. In addition, a focus on research including different populations such as the general population, at-risk children, or a clinical population seems important.

### **1.4.3 Shared-risk or common cause model**

The *shared-risk model* suggests that the effects observed in the academic-incompetence and adjustment-erosion models can be explained by a third variable interacting in the development across time (Masten et al., 2005; Moilanen et al., 2010). Third variables or risk factors used in the cascade models often include intelligence, temperament, parenting quality, parental deprivation, and socio-economic status, which can increase the risk of reduced functioning across domains and contribute to the association between mental health problems and problems at school. However, even if the variables (e.g., intelligence, supportive parenting, neighborhood adversity) have an impact, results from studies of the cascade pathways seem to be limited or generally unaffected (Deighton et al., 2018; Masten et al., 2005; Moilanen et al., 2010; Panayiotou & Humphrey, 2018). Nevertheless, the significant impact of these shared-risk variables on both mental health problems and on school functioning makes them important considerations when testing the cascade models (academic-incompetence and adjustment-erosion).

## **1.5 Health promoting and preventive interventions in school**

Based on the increased prevalence of mental health problems among children and adolescents, it is important to prevent problems and promote good mental health. Interventions that support and promote good school functioning are also important. Health promotion often includes strengthening positive factors (e.g., robustness, well-being) rather than reducing symptoms and illnesses. Prevention aims to reduce the possibility of developing problems and may be introduced at different levels, often referred to as universal, selected, or indicated prevention (Mrazek & Haggerty, 1994) (see Figure 1). However, the challenge may be how to reach vulnerable children before any diagnosis has occurred, whether the aim is to reach an entire population, groups with known levels of risk factors, or individuals with high levels of internalizing symptoms. Other factors to consider are which type of intervention is best suited to be implemented and who might benefit from it, together with the available resources and the cost for society. The different levels of prevention could also be implemented in schools in a more holistic framework called the multi-tiered system of support (MTSS) (Marsh & Mathur, 2020; Sanchez et al., 2018). The levels of support in MTSS are tier 1, tier 2, and tier 3 which are equivalent with the universal, selected, and indicated levels, respectively. The MTSS model was first implemented due to academic

difficulties and externalizing problems in schools, and as awareness of internalizing problems has grown, this has also been included in the support system (Doll, 2019). The MTSS is supposed to provide adequately targeted support based on students' academic, behavioral, emotional, and social needs (Marsh & Mathur, 2020; Sanchez et al., 2018).

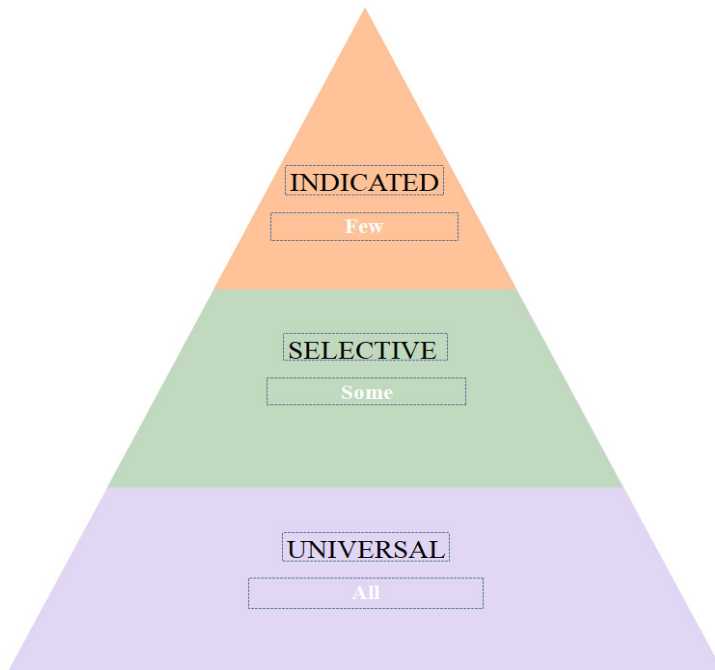
*Universal prevention* aims at entire population groups without identifying individuals or at-risk groups, for example, whole classes or schools (Mrazek & Haggerty, 1994). The advantage of universal programs is that all children receive the benefit of the intervention, including children with mental health problems who may otherwise go without help. Universal programs can generally improve the school environment, help children develop social support networks, and encourage them to help one another (Greenberg, 2010). This could be both health promotion and prevention. Typical universal interventions are Social and Emotional learning approaches (SEL) (Durlak et al., 2011) and interventions aiming at externalizing behavior (Paulus et al., 2016).

*Selective prevention* is often aimed at groups of children who have known and increased levels of risk factors such as low family income, parents with mental health problems, substance abuse, and/or traumatic experiences (Mrazek & Haggerty, 1994). Risk can be assessed based on both environment, such as poverty and parents with mental health problems, and individual health risk.

*Indicated prevention* aims at individuals or groups of individuals with high risk or elevated symptoms of mental health problems, but who do not meet the criteria for a diagnosis (Mrazek & Haggerty, 1994). Interventions like this can be carried out in groups of several individuals with similar challenges.

## Figure 1

### *Different Levels of Prevention*



Universal prevention programs are often less effective when it comes to effect sizes but have a wide reach as they target an entire population regardless of known risk factors (Spilt et al., 2013), and have the potential to reduce future illness and suffering. Geoffrey Rose's "prevention paradox" states that universal preventive health measures may offer small effect sizes to each participating individual, however this may bring large benefits to the community because of the large reach (Rose, 1985). Others have raised concerns about the universal approach's modest effect and that it may not be tailored to meet the needs of subpopulations with more difficulties. However, these groups might benefit from more intensive support, such as selective or indicated preventions (Hoagwood et al., 2007). Additionally, universal approaches may be cost- and labor-intensive to implement. Selective and indicated interventions are proposed to have larger effect sizes than universal (Paulus et

al., 2016). However, indicated and selective interventions reach fewer individuals and can potentially lead to social stigma (Barrett & Turner, 2001). Nevertheless, those who strive more may need a targeted and adapted approach. Effective indicated interventions are suggested to have positive effects on individuals and to prevent later onset of mental illness (Greenberg, 2010).

### **1.5.1 School-based mental health programs**

School-based mental health programs can be defined as interventions or approaches conducted in school settings to influence emotional, behavioral, or social functioning (Rones & Hoagwood, 2000). They often aim to reduce behavioral problems, promote social competence, well-being, and quality of life, and prevent mental illness or disorders (Durlak et al., 2011; Suldo et al., 2014). Most of the programs implemented in schools are universal approaches and involve school personnel.

A recent meta-analysis of the effectiveness of school-based mental health programs for elementary school children (N= 49,941) showed an overall small-to-medium effect in decreasing mental health problems (Sanchez et al., 2018). Specifically, the effect sizes were small for internalizing problems. All intervention levels were significant; however, the largest effect sizes were found in targeted interventions, followed by selective and universal interventions. The larger effect sizes for targeted and selective interventions are suggested to be related to the intervention being more integrated into academic instruction and that it was implemented several times per week. In addition, most interventions were aimed at externalizing problems and were delivered by school personnel.

An overview of research on school-based mental health interventions, including anxiety and/or depression as an outcome, showed that preventive school interventions can have a positive effect on both anxiety and depression (symptoms and incidence) (Skogen et al., 2018). However, the interventions showed small positive effects in reducing anxiety and/or depression and the effects were only statistically significant up to 12 months post-intervention (Hetrick et al., 2016; Moreno-Peral et al., 2017; Stockings et al., 2016; Werner-Seidler et al., 2017). In contrast, a recent review of 137 school-based intervention studies with children and adolescents revealed a lack of evidence supporting any type of intervention being effective for preventing depression in universal or targeted settings (Caldwell et al., 2019). For anxiety, only universal settings (e.g., mindfulness and relaxation-based interventions) showed a reduction in anxious symptoms. This review included studies that aimed to prevent anxiety and/or depression and excluded studies that focused on health

promotion, in addition to those where more than 40% of participants had an identifiable mental health disorder. The authors emphasized that future preventive interventions should not merely focus on the children's emotions and cognitions without including the wider structural and familial context where the intervention is being implemented.

Although the findings are mixed, pursuing research on interventions for prevention of anxiety and depression is important because the evidence base is still insufficient to support implementation of preventive programs for depression (Arora et al., 2019; Hetrick et al., 2016). Most evaluated interventions are based on cognitive-behavioral therapy (CBT) (Paulus et al., 2016), and the method has robust empirical support (Heiervang et al., 2018). Several meta-analyses on prevention state that CBT interventions and principles have shown positive effects on anxiety and depression for children and adolescents in school settings (Hetrick et al., 2016; Kavanagh et al., 2009; Kreuze et al., 2018; Werner-Seidler et al., 2017).

### **1.5.2 School outcomes of mental health interventions**

Research on the effects of mental health interventions has mainly focused on symptom reduction as the primary outcome measure; however, Swan and Kendall (2016) highlighted the importance of examining changes in functioning in other domains, such as at school. Other significant outcomes might show improvements beyond reducing symptom level impairment; therefore, it is important to include them when interventions are being evaluated.

The scarce examination of mental health in relation to academic outcomes in research has been consistent for years (Hoagwood et al., 2007; Sanchez et al., 2018). A meta-analysis evaluating 43 studies of the effectiveness of school mental health services from 1989 to 2015 (including 49,941 children) points out that only a minority of studies (25%) included outcomes of school functioning (Sanchez et al., 2018). The results showed a small-to-medium effect in decreasing mental health problems, with the largest effects found for targeted interventions, interventions integrated into academic instruction, and for those targeting externalizing problems. However, the academic outcomes were not described in the meta-analysis. An earlier review of 64 school-based mental health interventions (1990 to 2006) found that approximately 37% of the studies examined measures of academic outcomes (mostly academic scores and school attendance) (Hoagwood et al., 2007). The majority focused on behavioral problems, and most of them were universal approaches with a modest effect on academic outcomes and not sustainable over time. There was a lack of randomized, controlled (RCT) studies including pre – post data. The lack of addressing children with internalizing problems (anxiety and depression) in these studies was also

referred to as a concern. Research's lack of inclusion of academic outcomes in mental health interventions is somewhat surprising given the extensive research on the associations and cascade effects between mental health and academic achievement. Better alignment of the goals in research on school-based mental health interventions and inclusion of greater breadth of outcomes, also in relation to school functioning, are necessary.

The school-based SEL approach aims to promote wellness and prevent mental health issues. This approach is associated with better school achievement and improved social competence and well-being (Elias et al., 2003; Zins et al., 2007). A meta-analysis of 213 studies on SEL programs indicates that they are effective up to a minimum of six months follow-up when it comes to prosocial behavior, reduced internalizing- and conduct problems, and academic achievement (e.g., tests and grades) (Durlak et al., 2011). However, only 16% of the studies included academic outcomes, and it did not include studies with children who had preexisting emotional or academic problems. The meta-analysis also emphasized that the improvements could be partially caused by the support and positive relationship with the teacher contributing to a better school environment. This suggests that the impact on academic achievement might have been mediated by the improvements in academic-related behavior. Longitudinal research has pointed out that social- and emotional competencies might be predictive of mediators like self-concept, engagement and motivation, and social relationships with teachers and peers (Duncan et al., 2007), which can be predictive of school success.

Two studies that included academic outcomes in 9-10-year-old children (Skryabina et al., 2016) found no impact on school functioning with respect to standardized tests in reading, writing, and math after participation in a universal program (FRIENDS). Likewise, no effect on school adjustment (task orientation, behavior control, assertiveness, peer social skills) was found for children aged 12-13 years from low socio-economic backgrounds (selective approach) participating in a CBT group program (FRIENDS for life) (Rodgers & Dunsmuir, 2015). The first study did not include assessments of attitudes and school attendance that have been suggested as more sensitive to change than Scholastic Assessment Tests (SAT) (Skryabina et al., 2016). In the second study, the authors emphasized that addressing anxiety symptoms by using relevant CBT components, such as coping step plans, relaxation, self-talk, and problem-solving on school-related issues could have produced different results (Rodgers & Dunsmuir, 2015). Other school-based interventions have examined anxiety reduction's impact on academic achievement after participating in CBT-based interventions. A meta-analysis found improved general functioning as a secondary outcome following CBT

interventions in children and adolescents under the age of 19 with anxiety disorders (Kreuze et al., 2018). General functioning touches on multiple areas, including school, family, and peers. However, the meta-analyses focused on disorders and clinical studies, and none of the studies have examined the long-term effects of anxiety interventions on academic achievement. Other studies on CBT interventions have showed improvements in GPA in youth 13-16 years of age (Weems et al., 2009) and on SAT for adolescents participating in a stress management intervention (Keogh et al., 2006). The first study was mediated by changes in school motivation, suggesting that an increase or a decrease in motivation has implications for academic achievement. It could also be that a reduction in symptom level made the students more receptive and motivated for schoolwork. For younger children, parent-rated school functioning such as improved school performance in children 6-13 years of age (Suveg et al., 2009; Wood, 2006), improved overall school functioning for children aged 7-17 (completing assignments, concentrating on work, doing homework, getting good grades, giving oral reports, taking tests/exams, writing in class) (Nail et al., 2015), after participation in CBT interventions have been found.

In sum, many school-based interventions are universal, aiming at behavioral problems. Research on targeted CBT interventions are mostly clinical studies. In addition, school functioning is often assessed by parents in studies that include younger children. The lack of studies on indicated interventions including participants with subthreshold symptoms on both anxiety and depression and a lack of focus on school-related outcomes indicates that more research is needed. A targeted intervention has the potential to interrupt negative development, which in turn can counteract the negative cascade effect (Masten & Cicchetti, 2010). The EMOTION intervention and its relation to school functioning examined in this study is targeted at symptoms of both anxiety and depression (Kendall et al., 2013; Martinsen et al., 2014). Research on the effects of this intervention indicates that symptoms of both were reduced after the intervention and one year later (Løvaas et al., 2020; Martinsen et al., 2019). In addition, there have also been published secondary outcomes such as improvement of self-reported quality of life, self-esteem (Martinsen et al., 2021), and emotional regulation skills (Loevaas et al., 2019). Such improvements may have positive consequences for school functioning and need to be further investigated.

### **1.5.3 The gap between research and practice**

Current research tends to determine school success on grades, standardized test scores, and attendance (Hoagwood et al., 2007). Research on school reforms shows that schools are most



concerned with and under pressure to improve achievement in tests and grades (curriculum goals), possibly at the expenses of social and emotional development (Elias et al., 2003; Zins et al., 2004). Schools are mainly focused on education; however, social, and emotional competencies are part of children's development and should be nurtured (Caprara et al., 2000; Durlak et al., 2011; Elias et al., 2003). Over 20 years ago, Roeser, Eccles, and Sameroff (2000) proposed that mental health and academic skills are related to school functioning as two interconnected domains. Children suffering from internalizing or externalizing problems may not have the capacity to learn effectively (Elias et al., 2003). Optimal functioning (academic, social, emotional, and psychological) is consistent with high competence and few difficulties (Suldo et al., 2008), indicating that managing unforeseen situations helps children to strive less in different areas. Greater skills in behavior and social relationships may allow children to learn more effectively and to access significant others supporting their progress (Zins et al., 2007). The level of social competence in third grade has been shown to predict academic achievement in eighth grade (Caprara et al., 2000). Including competence skills (e.g., positive mental health, social skills) in interventions for children with internalizing problems may provide better opportunity for their learning potential. Low competence has shown to have significant associations with higher difficulties, which in turn makes children's school functioning vulnerable (O'Connor et al., 2018). Promoting good mental health and social competencies in children, where they can enact and develop positive roles in their life, may in turn enhance their emotional and academic skills and is proven to be effective (Elias et al., 2003). Thus, school-based mental health interventions might be more effective if they aim to increase both academic and social competence (Welsh et al., 2001). The fact that most children are in school makes schools suitable for mental health interventions that might also improve their school functioning.

## **1.6 Identification of internalizing problems**

The increased risk of impairment in several areas in life due to internalizing problems requires early identification of incipient problems to prevent negative development (Balázs et al., 2013). Having reliable and valid instruments that are easy to use and to interpret, and are sensitive enough to identify these children before the problems become pathological, is therefore important (Martinsen et al., 2017). Both in research and in clinical care, there is a need for quick and easily-administered assessments that can adequately assess progress and

outcomes and accommodate comorbidity (e.g., anxiety, depression, conduct problems). Such instruments must have satisfactory psychometric properties.

### 1.6.1 Psychometric properties of assessments

Psychometrics deals with the use and application of measures. Certain procedures are used to measure an assessment instrument's psychometric properties. The quality of assessment instruments depends on *norms*, *reliability*, and *validity* (De Vet et al., 2011).

When a measure is used to say something about an individual, it is important that the assessment is well-documented and has been validated in the population that the individual belongs to. Being assessed using assessment tools has consequences. For example, the results of the assessment could determine whether the individual should be offered an intervention or not. The measure may also give information on whether an intervention has had the intended effect (e.g., before and after an intervention). *Norms* can differ in different populations and can provide information on whether an individual's score is high or low compared to the population the individual comes from. Therefore, it is important to perform empirical examinations with the translated versions of an assessment tool in different populations.

#### 1.6.1.1 Reliability

Reliability is an expression of stability and consistency in measures' results (EFPA, 2013). Usually, the methods used to determine reliability are *internal consistency*, *test-retest*, and *inter-rater reliability*.

*Internal consistency* shows agreement between, for example, the degree of interrelationship or homogeneity among the items in an instrument's scale, such that items are consistent with one another and measuring the same thing (EFPA, 2013). The degree of consistency is often expressed by Cronbach's alpha. According to the European Federation of Psychologists Association (EFPA), internal consistency is considered inadequate when Cronbach's alpha is <0.70, adequate between 0.70 and 0.79, good between 0.80 and 0.90, and excellent if Cronbach's alpha is >0.90.

*Test-retest reliability* can be measured by the correlation between repeated tests under the same conditions. The time interval between the tests depends on how stable the properties being measured are (e.g., symptoms of anxiety or stress may have a shorter stability than personality traits) (EFPA, 2013). *Inter-rater reliability* is the degree of agreement when the same subjects are measured by different raters. Cohen's kappa is a much-used measure of

reliability for dichotomous outcomes, and the intraclass correlation coefficient (ICC) is much used for scale outcomes. The EFPA considers the test-retest reliability and inter-rater reliability to be inadequate when  $<0.60$ , adequate between  $0.60$  and  $0.69$ , good between  $0.70$  and  $0.79$ , and excellent at  $>0.80$ .

*Cross-informant reliability* between different informants (e.g., parents and teachers or parents and child) can be assessed by comparing the correspondent measures. Spearman's correlation coefficient can be used for this purpose. According to Cohen (1988), correspondence between informants can be considered low between  $0.10$  and  $0.29$ , moderate between  $0.30$  and  $0.49$ , and high at  $0.50$ .

### 1.6.1.2 Validity

Validity refers to the extent to which an assessment measures what is intended to measure.

*Concept*, *criterion*, and *construct* are three types of validity (EFPA, 2013).

*Concept validity* refers to how the test is related to the underlying phenomenon (EFPA, 2013). This can be assessed by measuring two tests that are supposed to measure the same phenomenon. The correlation coefficient gives the following guidelines suggesting that the concept validity is inadequate when  $<0.55$ , adequate between  $0.55$  and  $0.64$ , good between  $0.65$  and  $0.74$ , and excellent at  $>0.75$ . *Criterion validity* (concurrent and predictive) refers to how the measure is compared to a criterion in the real world. An example could be when predicting performance in school with school grades.

*Construct validity* refers to whether the test measures the intended construct or factor or theoretical trait (EFPA, 2013). One common method for investigating this is to use confirmatory factor analysis (CFA). CFA is used to verify the factor structure of a set of observed variables. This statistical method examines whether the observed data fit a hypothesized theoretical measurement model. In other words, it examines whether there is a relationship between the observed variables and their underlying latent constructs, as hypothesized by the researcher. A latent construct (factor) is a theoretical concept that is not visible (e.g., internalizing problems and self-confidence). Observable variables refer to single items in a subscale in an assessment. How well the model captures the covariance between all the items or how fit the factor structure is between prediction and reality can be expressed by model-fit indices. Examples of indices of measures of model fit include the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker and Lewis Index (TLI). An acceptable model fit is when RMSEA is  $<0.08$ , CFI and TLI are

>0.90, and an excellent model fit is when RMSEA is <0.06 and CFI and TLI are >0.95 (Brown, 2015). A satisfactory fit shows good adaptation of the model to the data. To ensure that the items within a subscale are related to the subscale, one can measure the factor loadings and correlations between the subscales and the items within the subscales. According to Tabachnick and Fidell (2019), the ratings are considered excellent when the correlations are 0.71, very good at 0.63, good at 0.55, fair at 0.45, and poor <0.32.

Instruments can provide reliable and valid information that can be used to select the best-suited evidence-based intervention. They can also be useful when evaluating children's development during and after an intervention; the BPM instrument is designed for this purpose (Achenbach et al., 2011). The measure is derived from the well-known long forms of the Achenbach System of Empirically Based Assessment (ASEBA). The long forms have shown good psychometric properties from studies conducted in different countries (Achenbach & Rescorla, 2001; L. A. Rescorla et al., 2007). These observed cultural differences and norms between countries support the importance of evaluating the psychometric properties of translated versions. Previous studies of the BPM have been conducted in clinical or population samples; however, psychometric properties in an at-risk sample of children with self-reported symptoms of anxiety and depression have not been studied (Penelo et al., 2017; Piper et al., 2014; Richter, 2015; Rodenacker et al., 2015).

## 2 Aims of the present study

The overall aim of the present study was to increase knowledge about school functioning in children aged 8-12 years with elevated symptoms levels of anxiety and/or depression. School functioning in this study is understood as academic achievement in different subjects (such as Norwegian, mathematics, English, and social studies), as well as how hard the child works, how the child is behaving and learning, and how happy the child appears to be, which is labeled here as school adaptation. Furthermore, an evaluation of the psychometric properties of the parent and teacher versions of the BPM in this at-risk group of children was investigated. Finally, the possible effects of the indicated intervention EMOTION, “Coping Kids” Managing Anxiety and Depression Program (Kendall et al., 2013; Martinsen et al., 2014) on school functioning were examined. This has been elucidated through the research questions of three papers presented below:

**Paper I      Psychometric properties of the Brief Problem Monitor (BPM) in children with internalizing symptoms: Examining baseline data from a national randomized controlled intervention study**

Evaluation of the psychometric properties of the Norwegian version of the BPM in young children (aged 8–12 years) at risk of developing anxiety and depression, based on reports from both parents and teachers.

**Paper II      School functioning and internalizing problems in young schoolchildren**

1. Are teacher-rated internalizing symptoms among school children associated with academic achievement and school adaptation?
2. Are school children’s self-reported symptoms of anxiety and depression associated with academic achievement and school adaptation?
3. Are teacher-rated internalizing symptoms associated with school children’s self-reported symptoms of anxiety and depression?

**Paper III Targeting internalizing symptoms in children: What is the impact on school functioning?**

1. Does the EMOTION intervention, which targets symptoms of anxiety and depression among children 8-12 years old, improve academic achievement and school adaptation post-intervention and at 12-month follow-up?
2. Are there any differences among the subgroups of children with (a) anxiety symptoms only, (b) depressive symptoms only, and (c) combined symptoms (both anxiety and depression) for the intervention effects on academic achievement and school adaptation post-intervention and at 12-month follow-up?

## **3 Methods**

### **3.1 Procedures**

The data in all three papers of the present dissertation was derived from a cluster randomized controlled trial (cRCT) called Coping Kids: Early Intervention for Anxiety and Depression (Patras et al., 2016), delivered in school settings. The aim of the Coping Kids study was to investigate the effects of the indicated EMOTION intervention for children, which targets children aged 8-12 years with elevated levels of anxious and/or depressive symptoms. The EMOTION intervention aims to reduce symptoms of anxiety and depression and the likelihood of developing later disorders. For details regarding the RCT study, see the protocol by Patras et al (2016).

Schools volunteered to participate in the project. Cluster randomization was performed at the school level in the first semester of data collection. The schools were matched for size and geographic location and randomly assigned to either the control or intervention condition. The schools were kept in the same intervention or control condition throughout the inclusion waves, due to feasibility and to avoid contamination between the participants within the same school.

Both the control and intervention schools were given half-day seminars during compulsory working hours for the teachers, focusing on increasing the knowledge of internalizing symptoms in children and how teachers could support these children. Each school had a school contact who coordinated different tasks like giving information to the parents, children, and teachers and helping when the children had to be screened and when the intervention groups were held. The school contact collaborated closely with a project coordinator.

The data were collected electronically pre-intervention (T1), directly post-intervention (T2), and at 12-month follow-up (T3) from 2014 until 2017. New children entered every semester. Children, teachers, and parents answered questionnaires at all three time-points. The sample size was calculated for in the main RCT study. A sample size of 560 children from 23 schools was sufficient and was based on power calculations for anxiety and depression, as described in the study protocol (Patras et al., 2016). The power calculations considered both between-cluster and within-cluster variation and was adjusted using ICC design effect (DEFF) to account for a multilevel approach.

### **3.1.1 Recruitment and participants**

Children from third to sixth grade in 36 public schools from rural, suburban, and urban areas in Norway participated in the study, with 18 schools in each condition. The children (8-12 years of age; N=7,322) in the eligible grades and their parents were informed about the study and how to participate, in writing and by oral information in class and in parental meetings. Participation required expressed interest from the child and a written parental consent form. Children who considered themselves more anxious or sad than their peers and with parental consent (n=1692) were screened electronically for self-reported symptoms of anxiety and depression using the Multidimensional Anxiety Scale for Children (MASC-C; (March et al., 1997)) and the Mood and Feelings Questionnaire-short version (SMFQ; (Angold et al., 1995)). The screening took place in the schools, with teachers available to answer questions.

### **3.1.2 Inclusion and exclusion**

Children who scored one standard deviation (SD) or more above the population mean on self-reported anxiety and/or depression measures were invited to participate in the study (N= 873). The cut-offs were based on results from Nordic and international studies for the relevant age group (Angold et al., 2002; Ólason et al., 2004; Rhew et al., 2010). Of the 873 invited children, seven who were not expected to benefit from the intervention (e.g., developmental delays, autism, severe behavioral disturbance) were excluded from the study. Due to lack of resources (i.e., lack of group leaders to implement the intervention), 71 children were excluded randomly from the study.

After inclusion, parents and teachers were invited to answer web-based questionnaires about the children, providing baseline measurements of the child's symptoms and problems. Parents also gave demographic data. Both parents were encouraged to participate, however parental non-participation did not exclude the child from the study. The teacher who was supposed to know the child best answered questionnaires on school functioning, including academic performance, school adaptation, and problems at all three time-points.

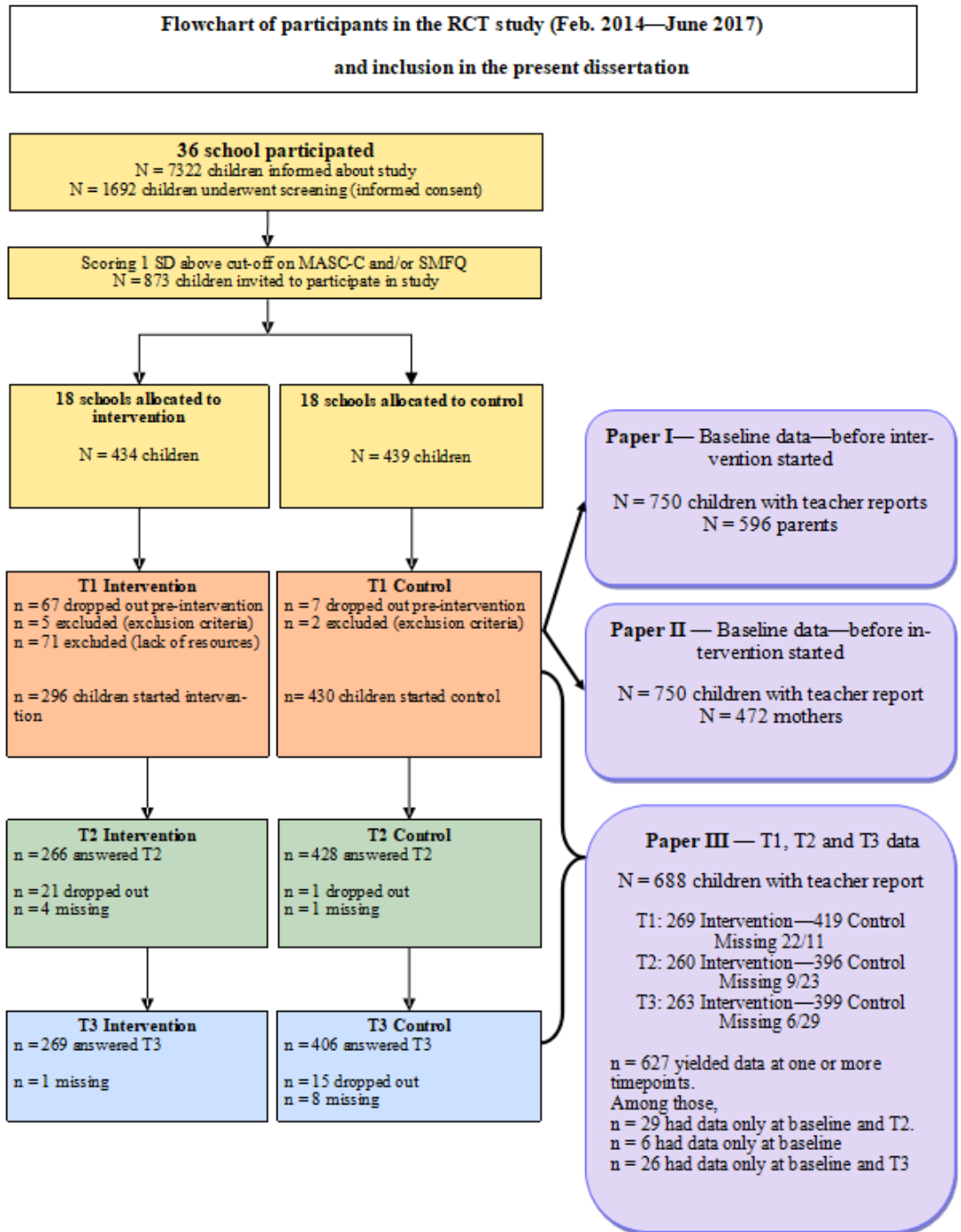
A flowchart for participants is shown in Figure 2. Of the included children, N=750 (58% girls) had a teacher response, and thus were included in Papers I and II (baseline data). Parents (N= 596; 80.6% mothers) and teachers rated the children using the BPM-P and BPM-T (Paper I). For the children who had teacher reports, 154 did not have any parental answers (Paper I). Mothers (N=472) answered questions about SES (Paper II). The children's main teacher completed questionnaires about the children's internalizing symptoms, academic achievement, and school adaptation (Paper II). For the participating parents and the teachers,



there were no missing items. Additionally, 74 children withdrew prior to the intervention. A total of N=688 children (58% girls) participated, of which n=269 children received the intervention and n=419 constituted the control group (Paper III). For further details, see Figure 2.

**Figure 2**

*Flowchart of Participants in the RCT study and Inclusion in the Present Study*



### **3.1.3 Demographic information and age**

Because month and year of birth only were available for N=472 of the children (Paper II), grade level was used as a proxy for age: third to sixth grade represented 8–12 years of age. For the children included in the three papers in this dissertation, 4% were in the third grade, 36% to 38% in the fourth grade, 46% in the fifth grade, and 12% to 14% in the sixth grade.

Most of the children lived with both parents (71%). More mothers than fathers answered the questionnaires (N = 472 versus N = 91 in Paper II); therefore, we chose to use demographic data reported from the mothers. The mothers' education level was used as a socio-economic status (SES) variable due to the relatively low level of social inequality in Norway and the importance of parents' education level on both the children's mental health and school functioning (Bøe, 2015; Revold, 2016). Mothers' reported education levels were higher (i.e., 67% with a college or university education) than the national average in Norway (i.e., 33%) (Statistics-Norway, 2019a). Mothers' education level was treated as an ordinal variable in the analyses. Most families had median to above-median income levels (i.e., 82%) (Statistics-Norway, 2019b). Regarding place of birth, most of the children (97%), mothers, (93%) and fathers (89%) were born in Norway (N=472). Because of the low numbers of non-Norwegians, we did not include country of birth as a control variable in this study.

## **3.2 Attrition**

The data were collected electronically, and since each question was compulsory there were no single items missing from the data. If the children were absent from school on the day questionnaires were collected, they were given a chance to answer when they returned. This option was also given post-intervention and at 12 months follow-up.

The school contact persons reminded the teachers to answer, and a reminder was sent to the parents via email. A member of the project group called the parents as a last reminder if the response were not present. A drawing of gift cards (with a value of 1000 NOK for an optional cultural arrangement) was given to increase parents' response rates for completing the questionnaires.

### **3.3 Ethics**

The main study was approved by the Data Inspectorate and The Regional Committee for Medical and Health Research Ethics of Norway (REC), South-East [2013/1909/REK South-East], and is registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) [Identifier: NCT02340637]. Parents provided written informed consent regarding their children's participation in the study. The children were given a unique confidential identifier, and the data were collected electronically. The participants could withdraw from the study without giving any reason at any time.

### **3.4 Funding**

The Norwegian Research Council (NFR) [number: 228846] funded the Coping Kids study. The present study was made possible by [the DAM Foundation through the Norwegian Council of Mental Health #1] under Grant [number: 2017/FO144706] and [the Liaison Committee for Education, Research and Innovation in Central Norway and the Central Norway Regional Health Authority #2] under Grant [number: 90168800]. The funders had no role in the study, the papers, or this dissertation.

### **3.5 Measures**

The measures used in the present study are shown in Table 1, and detailed descriptions follow below. For an overview of the psychometric properties of the main measures and variables in the present study and for other Norwegian studies, see Supplementary Material; S1.

**Table 1***Overview of Measures, Scales, and Time-points used in Papers I, II and III*

Measure	Scale in measure	Informants	Time-point in RCT	Paper
MASC-C	Total scale	Children	Screening/Inclusion	I, II, III
SMFQ	Total scale	Children	Screening/Inclusion	I, II, III
Demographic information	Education level of the mothers	Mothers	T1	II
TRF	Academic achievement	Teachers	T1 T2 T3	II, III III III
TRF	School adaptation	Teachers	T1 T2 T3	II, III III III
BPM-T	INT EXT ATT TOT	Teachers	T1 T1 T1 T1	I, II I I I
BPM-P	INT EXT ATT TOT	Parents	T1	I I I I

Note: MASC-C: Multidimensional Anxiety Scale for Children–Child; SMFQ: Mood and Feelings Questionnaire-short version; TRF: Teachers Report Form; BPM-T/P: Brief Problem Monitor-Teacher and Parent form. ATT=Attention problems, INT=Internalizing problems, EXT=Externalizing problems, TOT= Total problems

### **3.5.1 Multidimensional Anxiety Scale for Children (MASC-C)**

Children reported symptoms of anxiety on the MASC-C, a 39-item self-report questionnaire that assesses anxiety symptoms in children and adolescents aged 8–19 years based on the past two weeks. The children rated each question on a scale from 0 to 3 (0 = never true about me, 1 = rarely true about me, 2 = sometimes true about me, 3 = often true about me). The scale comprises four subscales: physical symptoms, harm avoidance, social anxiety, and separation/panic; in this study only the total score of the scale was used.

The MASC-C has showed high retest reliability (March et al., 1997; March et al., 1999) and favorable psychometric properties in a Norwegian sample of 7-13-year-old treatment-seeking children (Villabø et al., 2012). It has been validated in a recent study in Norway for children 8-12 years of age (Martinsen et al., 2017) and internationally (March et al., 1997). The internal consistency of self-reported symptoms of anxiety at baseline in the present study was good, with Cronbach's alpha = 0.84.

### **3.5.2 Mood and Feelings Questionnaire – short version (SMFQ)**

Children reported symptoms of depression using the SMFQ, which assesses cognitive, affective, and behavioral-related symptoms of depression on a 13-items questionnaire during the last two weeks. The symptoms were rated on a three-point scale ranging from 0 to 2 (0 = not true, 1 = sometimes true, 2 = true). In addition, there was an added question from the long version of the MFQ (Angold et al., 1987) covering suicidal ideation.

Previous studies have indicated good psychometric properties for the Norwegian version of the SMFQ (Larsson et al., 2016; Olsen, 2015; Richter & Sund, 2013). A study on prevalence, stability, and predictors of depressive symptoms among a Norwegian sample of children aged 10-19 years using the SMFQ concluded that the instrument was feasible (Larsson et al., 2016). In this study, the internal consistency of the scale was good, with a Cronbach's alpha = 0.80 at baseline.

### **3.5.3 Teacher Report Form (TRF)**

Teacher-rated academic achievement and school adaptation were assessed using an adapted version of two factors from the TRF, which is a component of the ASEBA system (Achenbach & Rescorla, 2001). The TRF is used to investigate students' problem areas, as well as academic performance and adaptive functioning at school. In Papers II and III, performance in the subjects Norwegian, English, mathematics, and social studies (academic achievement) and the four characteristics of (1) how hard he/she is working, (2) how

appropriately he/she is behaving, (3) how much he/she is learning and (4) how happy he/she seems to be (school adaptation) are considered important for school functioning and were used. Teachers were asked to compare the child's academic achievement in the four subjects and the four characteristics of school adaptation with those of other children the same age on a scale ranging from 1 to 5 (1 = far below average; 5 = far above average). A mean score was calculated based on the teachers' answers for academic achievement and school adaptation.

The ASEBA system has showed good psychometric properties and has been supported by research for decades (Achenbach & Rescorla, 2001; L. Rescorla et al., 2007; L. A. Rescorla et al., 2007). The Norwegian version of the TRF has showed good to excellent internal consistency in studies; however, test-retest reliability and inter-rater reliability have not been documented (Kornør & Jozefiak, 2012). The internal consistency at baseline in the present study was excellent for the academic achievement scale (Cronbach's alpha = 0.90) and satisfactory for the school adaptation scale (Cronbach's alpha = 0.72).

### **3.5.4 Brief Problem Monitor (BPM) – Teacher and Parent form**

The Brief Problem Monitor (Achenbach et al., 2011) is a short version of the TRF, Children's Behavior Checklist (CBCL), and Youth Self Report (YSR) from the ASEBA system (Achenbach & Rescorla, 2001). BPM provides a uniform problem scale to assess attentional, behavioral, and internalizing symptoms of children and adolescents. The Norwegian versions of the CBCL, TRF, and YSR were translated and published in 1986/88, 1993, and 2002, respectively (Kornør & Jozefiak, 2012). The Norwegian version of the BPM was established based on these translations.

The BPM-Parents (BPM-P; 19 items) and BPM-Teacher (BPM-T; 18 items) include three six-item subscales: Attention problems (ATT), internalizing problems (INT), and externalizing problems (EXT). The parent form has an additional question on disobedient behavior at home on the externalizing scale. The items are rated over user-selected rating periods (e.g., 5, 7, 14, 30, and 45 days), and are supposed to describe the child on a scale ranging from 0 to 2 (0 = *not true*, 1 = *somewhat true*, or 2 = *very true*).

A systematic review of Scandinavian studies reported the reliability of the BPM-T total score to be satisfactory (Backer-Grøndahl & Martinussen, 2018). All scales, including the total scale of BPM-T and BPM-P, were analyzed in Paper I. In Paper II, the sum score of the internalizing problems scale (from BPM-T) was used to represent internalizing symptoms as reported by teachers. The rating periods were selected to be the last two weeks. The internal consistency in both studies was good, assessed by Cronbach's alpha for the total

scale and both the BPM-P and BPM-T, and the subscales generally showed good estimates (Alpha ranging from .76 to .88).

### **3.6 The EMOTION intervention**

The EMOTION intervention is an indicated prevention program developed to reduce anxious and depressive symptoms (transdiagnostic) in children 8-13 years of age (Kendall et al., 2013; Martinsen et al., 2014). The intervention is manual-based and delivered in groups over approximately 10 weeks. It is based on CBT principles and integrates core components of empirically supported treatments for anxiety (the Coping Cat program; (Kendall et al., 2006)) and depression (Action; (Stark et al., 2007)) for children.

The EMOTION intervention is implemented in a school setting and includes 20 group meetings that target common underlying processes of anxiety and depression. It focuses on teaching the children coping skills and strategies to deal with difficult thoughts, feelings, and situations. Sessions 1-10 focus on psychoeducation including practicing strategies to regulate mood, learning problem-solving skills, and working with different coping skills and strategies. The next 10 sessions focus on building a positive self-schema, cognitive restructuring, graded exposure to fear-inducing situations for anxious children, and working with behavioral activation targeting depressive symptoms (e.g., making activity plans, talking with peers).

During the 10-week intervention period, parents meet in groups seven times, four of which their child also participates in. The sessions follow the progression of the children's sessions; the corresponding parent meetings aim to increase support for their children. In the first joint meeting with the children and their parents, individual aims related to the child's daily life at school, at home, and during leisure activities, are decided for each child. The parents and children continually revise the aims throughout the intervention period. Between sessions, children and parents were encouraged to fulfill homework assignments.

In the Coping Kids study, two trained group leaders from primary or secondary health services delivered the EMOTION program in groups of 3-7 children, twice a week for 10 weeks. Each group session lasted for 45-60 minutes. The same group leaders also led the parent groups. The group leaders participated in a three-day training seminar covering basic CBT principles and the EMOTION manual. Additionally, the group leaders were provided with weekly supervision by trained CBT therapists during the intervention period.



Fidelity to the EMOTION intervention was assessed by scoring 17% of the session (239 observations) using the Competence and Adherence Scale for Cognitive Behavioral Therapy (CAS-CBT; Bjaastad JF et al., 2015). CAS-CBT is an 11-item observation measure, which was used to assess both group leaders' adherence and competence on a seven-point scale from 0 (none/poor skills) to 6 (thorough/excellent skills). Group leaders' adherence (Mean = 3.53, SD = 1.25) and competence (Mean = 3.59, SD = 1.26) indicated an overall good fidelity to the intervention (Rasmussen et al., 2021). In addition to the video rankings of the sessions, group leaders filled out checklists for each session when completed. Manuals were used in all groups, and each participant had their own workbook.

### **3.7 Statistics**

The statistical methods used in Papers I, II and III are presented below. In all three papers, two-sided p-values < .05 were regarded as significant, and we reported 95% confidence intervals (CI) where relevant. The statistical analyses were conducted using SPSS 25/25 (IBM, Armonk, NY, USA). In Paper I, we also used Mplus 8.

The data structure in the RCT study was hierarchical. Students were nested within schools, and students in the same school are generally more similar to each other than students from different schools with regard to variables such as school performance (Ukoumunne et al., 1999). If the hierarchical structure of the data is not accounted for in the analysis, the estimated effects will still be unbiased, but the associated standard error can be underestimated (Thoresen, 2012). However, the ICC was only 0.00, 0.00, and 0.05, respectively, for academic achievement, school adaptation, and the total scale of the Brief Problem Monitor in our study. Values of ICC under 0.05 indicate that there is no need for hierarchical modeling (Muthén & Satorra, 1995; Peugh, 2010); the variability between the schools was negligible. The statistical methods are summarized in Table 2 and described further below.

**Table 2***Statistical Methods per Paper*

Statistics	Variables	Adjusted for	Paper I <sup>12</sup>	Paper II <sup>1</sup>	Paper III <sup>1</sup>
Descriptive statistics – Mean and standard deviation	<ul style="list-style-type: none"> <li>Academic achievement</li> <li>School adaptation</li> <li>Teacher-rated internalizing symptoms</li> <li>Self-reported anxiety</li> <li>Self-reported depression</li> </ul>			Total sample and Gender	
Students t-test				Gender	x
Linear-by-linear test for association					x
Chi-square test				Gender	x
Pearson's correlation	<ul style="list-style-type: none"> <li>Academic achievement</li> <li>School adaptation</li> <li>Teacher-rated internalizing symptoms</li> <li>Self-report anxiety</li> <li>Self-report depression</li> </ul>			x	
Spearman's correlation	<ul style="list-style-type: none"> <li>Subscales BPM P/T</li> <li>Total scale BPM P/T</li> </ul>		x		
Linear regression	<ul style="list-style-type: none"> <li>Teacher-rated academic achievement</li> <li>School adaptation</li> <li>Teacher-rated internalizing symptoms</li> <li>Self-report anxiety</li> <li>Self-report depression</li> </ul>	<ul style="list-style-type: none"> <li>Gender</li> <li>Grade level</li> <li>Mother's education</li> </ul>		x	
Linear mixed model	<ul style="list-style-type: none"> <li>Academic achievement</li> <li>School adaptation</li> <li>Symptom profile – only anxiety, only depression, both anxiety and depression</li> </ul>	<ul style="list-style-type: none"> <li>Gender</li> <li>Grade level</li> </ul>			x
Cronbach's alpha	<ul style="list-style-type: none"> <li>Subscales BPM P/T</li> <li>Total scale BPM P/T</li> </ul>		x		
Confirmatory factor analysis (CFA)	<ul style="list-style-type: none"> <li>Subscales BPM P/T</li> </ul>		x		

Note: Variables and instruments: academic achievement and school adaptation: TRF; teacher-rated internalizing symptoms: BPM-T; self-reported anxiety: MASC-C; self-reported depression: SMFQ; symptom profile: MASC-C and SMFQ. <sup>1</sup>= SPSS, <sup>2</sup>= Mplus.

In Paper I, evaluations of the psychometric properties of the Norwegian versions of the BPM - parent and teacher versions were performed. Reliability of the subscales – attention problems, externalizing problems, internalizing problems, and the total problem scale of BPM-P and BPM-T was measured by internal consistency (Cronbach's alpha). The items on BPM-P and BPM-T have only three ordinal response categories (not true, somewhat true, very true). The responses were not normally distributed. Spearman's correlation coefficient was used to assess cross-informant reliability between the subscales on BPM-P and BPM-T. According to Cohen (1988), correlation coefficients can be considered low between 0.10 and 0.29, moderate between 0.30 and 0.49, and high for 0.50 and above. Regarding construct validity, CFA for ordinal categorical variables were conducted to confirm the conceptual three-factor model with the three subscales of the BPM-P and BPM-T. Weighted least square estimator with robust standard errors and mean- and variance-adjusted chi-square test statistics (WLSMV) were used as estimator, owing to the ordinal structure of the data. The WLSMV estimator with Delta parameterization is recommended for analysis of skewed categorical data (Muthén, 1984). In this method, the items are interpreted as observable indicators of the non-observable (latent) factor to which they belong (Li, 2016). The following goodness-of-fit indices were used: RMSEA, CFI, and TLI. The indices were recommended by Brown (2015): RMSEA < .08 and CFI and TLI > .90 were considered acceptable fit, and RMSEA < .06 and CFI and TLI > .95 indicate excellent fit. The factor loadings for each item on the associated subscale were considered excellent with a rating of 0.71, very good at 0.63, good at 0.55, fair at 0.45, and poor at 0.32 and lower, in accordance with Tabachnick and Fidell's (2019) suggestions.

In Paper II, association between both teacher-reported and the children's self-report on internalizing symptoms and academic achievement and school adaptation were investigated. In addition, associations between internalizing symptoms reported by the teachers and the children's self-report on symptoms of anxiety and/or depression were also investigated. A comparison between genders on the main independent variables was performed using Student's t-test, and the chi-square test was used for nominal variables. Analyses using Pearson correlations were performed between the main variables —academic achievement, school adaptation, teacher-rated internalizing symptoms, and children's self-report on symptoms of anxiety and symptoms of depression. Linear regression models with teacher-rated academic achievement and school adaptation, entered one at a time, as dependent variables were used. One set of analyses with teacher-rated internalizing symptoms as main independent variables, and one set of analyses with self-reported anxiety

symptoms and self-reported depression symptoms as main independent variables were then carried out. Linear regression models with teacher-rated internalizing symptoms as dependent variables and children's self-reported anxiety symptoms and self-reported depression symptoms as main independent variables were also conducted. All analyses were adjusted for gender and grade level. Lastly, replications of all the analyses were then performed, adjusting for mothers' education level. The adjustment for mothers' education level was done separately because it was reported for only 472 of the 750 participants.

In Paper III, whether the EMOTION intervention influenced academic achievement and school adaptation post-intervention and at 12 months follow-up were investigated. In addition, differences among subgroups with a) anxiety symptoms only, b) depressive symptoms only, and c) combined symptoms (both anxiety and depression) for the intervention effects on school functioning were also investigated. A comparison between the intervention and control groups at baseline was performed regarding the variables, teacher-reported academic achievement and school adaptation, in addition to child-rated symptoms of anxiety and/or depression. A comparison was also done by grouping the children based on symptom presentation: anxiety symptoms only, depressive symptoms only, or combined symptoms (anxiety and depression). Possible differences based on grade level (age) and gender were also examined using Student's t-test, linear-by-linear test for association, or Pearson's Chi-squared test, as appropriate. Linear mixed model analyses with academic achievement and school adaptation as dependent variables at three time-points; baseline (T1), post-intervention (T2), and the 12-month follow-up (T3) were conducted. We included child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusting for gender and grade level. The analyses were also performed separately for the subgroups defined by the symptom profile: anxiety symptoms only, depressive symptoms only, and combined symptoms.

## 4 Results

The main findings from Papers I, II, and III are summarized below.

**Paper I: Psychometric properties of the Brief Problem Monitor (BPM) in children with internalizing symptoms: Examining baseline data from a national randomized controlled intervention study**

The main findings of the psychometric properties of the Norwegian version of the Brief Problem Monitor showed that the internal consistency for both parent (BPM-P) and the teacher (BPM-T) versions was good (Pedersen et al., 2021). Cross-informant reliability was as expected, moderate on attention problems and externalizing problems and low on internalizing problems. The three-factor structure of the BPM was confirmed with excellent fit for the BPM-P and good fit for the BPM-T. All items on each subscale on both versions contributed significantly to the three latent constructs of externalizing, attention, and internalizing problems, and showed satisfactory factor loadings.

**Paper II: School functioning and internalizing problems in young schoolchildren**

More girls (58%) than boys participated in the study (Pedersen et al., 2019). Girls reported higher levels of symptoms of both anxiety and depression, in addition to higher teacher-reported scores on academic achievement and school adaptation, than the boys did. Teachers reported no gender differences on internalizing symptoms.

Further, the analyses of the association between the children's internalizing symptoms and school functioning, assessed separately by the children and the teachers, indicated consistently that both teacher-reported internalizing symptoms and children's self-report of depressive symptoms were negatively associated with academic achievement and school adaptation independent of age and gender. Children's self-reported anxiety symptoms were associated with neither teacher-rated academic achievement nor school adaptation. Furthermore, self-reported symptoms of depression were associated with teacher-rated internalizing symptoms, while self-reported symptoms of anxiety were not.

**Paper III: Targeting internalizing symptoms in children: What is the impact on school functioning?**

Descriptive data showed that there were no group differences between the intervention and the control group on the dependent variables of academic achievement and school adaptation at baseline (Pedersen et al., 2022). Group differences were found for school adaptation when divided by subgroups (only anxiety symptoms, only depressive symptoms, combined group both anxiety and depressive symptoms). The anxiety-only participants in the intervention group scored lower than the control group. In addition, the depressive-only participants in the intervention group scored higher on school adaptation than the control group.

The main results indicated no significant differences from baseline to post-intervention or from baseline to 12-month follow-up in either academic achievement or school adaptation between the intervention and the control groups. Furthermore, when examining the subgroups (anxiety-only, depression-only, and combined group), the results showed no significant differences between the intervention and the control groups in academic achievement or school adaptation post-intervention or at 12-month follow-up.

## **5 Discussion**

The overall aim of the present study was to study school functioning in an at-risk group of children (aged 8-12 years) reporting elevated symptom levels of anxiety and/or depression. School functioning was evaluated by assessing academic achievement and school adaptation reported by the teachers. The high prevalence of mental health problems worldwide (Balázs et al., 2013; Husky et al., 2018; Polanczyk et al., 2015) and the fact that children and adolescents with internalizing problems seldom receive mental health care (Heiervang et al., 2007; Kovess-Masfety et al., 2017; Sund et al., 2011) are concerning. Seventy percent of mental health problems start before the age of 14 (Costello, 2011; Garaigordobil et al., 2017), and early intervention is crucial to prevent internalizing problems from developing. The children examined in the papers presented in this dissertation reported significant internalizing symptoms and represent an at-risk population. This population is studied less than universal population or clinical samples, and secondary outcomes such as school functioning are rarely reported. The inclusion of children with both symptoms of anxiety and depression is also uncommon in intervention studies at this age level. Hence, in the current study, we focus on important domains for youth mental health where research is scarce. Examining how internalizing symptoms are expressed at school may also improve and broaden our understanding of at-risk school children both in relation to internalizing problems and school functioning. First, the main findings from the three papers will be discussed. Further, a critical review of methodological issues in the main study and specific for the present study will be presented. Perspectives for future research and practice will follow before the conclusion is presented.

### **5.1 Identification of children with internalizing problems**

Most children are in the compulsory school system from 1<sup>st</sup> to 10<sup>th</sup> grade in Norway, and they spend a lot of their life in school. Because of the possibility of reaching most children, schools might be a suitable arena for identifying mental health problems and implementing preventive interventions.

Many children struggling with internalizing difficulties go undetected (Heiervang et al., 2007). Often, parents or teachers refer the children to the school nurse or social worker or to a health care worker, which in turn could lead to an individual conversation with the child. This

requires that the adult at school asks questions to capture the possible challenges the child might have. A reliable and valid measure assessing different problem behavior may add valuable information to the conversation between the adult and the child. Such an assessment potentially could help the adult determine the extent and severity of problems. However, children's mood can vary, which means that it is important to assess the stability of the measure used. Assessments from different informants, such as parents and teachers, which take little time, are easy to administer, and are suitable for children with comorbid conditions (e.g., anxiety, depression, or conduct), are desirable (Chorpita et al., 2010). The BPM contains a total problem scale and three subscales (ATT, EXT, INT) (Achenbach et al., 2011), which could be used for this purpose.

To our knowledge, this is the only study to present the psychometric properties of the BPM concerning both reliability and a CFA in a sample of at-risk children and including two types of informants (parents and teachers) (Paper I). The original three-factor solution for the attentional, externalizing, and internalizing problems scales was confirmed in this study, and thus it displayed strong construct validity in both parent and teacher forms.

The results of the examination of the reliability of both parent and teacher versions showed overall satisfactory internal consistency regarding attention, internalizing, and externalizing problems and the total scale. The teachers and the parents reported higher values of attention problems than internalizing problems, in line with previous studies (Penelo et al., 2017; Piper et al., 2014; Richter, 2015; Rodenacker et al., 2015). Other research also indicates that it is more common to report on externalizing and attention problems, which might be more observable for others (Achenbach et al., 1987; Achenbach & Rescorla, 2001; Achenbach & Rescorla, 2007; De Los Reyes et al., 2015). However, it is important to include multiple informant perspectives, as the problems might be perceived differently in different contexts. Including the children's self-report might have created a better impression of the problems from their perspectives; however, the children in our study were too young, as the self-report form (BPM-Y) is validated for adolescents aged over 12 years.

The children's age range or gender differences could have been an interesting exploration to add. However, most children were in fourth or fifth grade (9 -10 years of age; 82%), and therefore the age range was too narrow to focus on prevalence differences. In addition, it is not expected that prepubertal girls have higher prevalence figures on depression than prepubertal boys (Surén et al., 2018). Therefore, there was no expectation of significant gender differences in our sample with a limited age range.



Nevertheless, our results showed promising psychometric properties for the BPM being a valid, quick assessment tool for measuring problems in children from teachers and parents' perspectives. This also implies that the BPM fits well for use at school or community services where one suspects such problems. It could also be a starting point for further referral to treatment in specialized health services.

## **5.2 Association between internalizing problems and school functioning**

Overall, findings from the second paper indicated that depressive symptoms seem to be related to school functioning and that teacher-reported internalizing problems were associated, although weakly, with child-reported depressive symptoms, but not with anxious symptoms.

The children in our sample had somewhat higher symptom levels of both anxiety and depression compared to both population and clinical studies (Larsson et al., 2016; Villabø et al., 2013; Villabø et al., 2012). Depression often occurs in adolescence (Lewinsohn et al., 1994; Sund et al., 2011), which shows that our sample was high-risk. Academic achievement and school adaptation in our total sample of children was slightly lower than in a national population-based study of children with a comparable age range (Larsson & Drugli, 2011). It is possible that having internalizing symptoms might have reduced the children's ability to achieve in the different subjects and their ability to work hard, behave appropriately, learn, and appear happy from the teacher's perspective. This implies that these children are more vulnerable than children of the same age who do not have internalizing problems or difficulties in school performance.

### **5.2.1 Depressive children struggle in school**

The children with depressive symptoms in our study struggled in school, as reported by the teachers. Emotions, whether positive or negative, may influence learning (Pekrun, 2017). Experiencing depressive emotions might also lead children to have more negative attitudes toward school, experience more stress (Garaigordobil et al., 2017), and feeling less cohesion of the school (Johnson et al., 2006). Emotional disengagement with school has a negative association with school functioning and has been found to increase with the number of years in school (Fredricks et al., 2004; Wang & Holcombe, 2010). The negative attitudes may appear more observable to the teacher, for example through the child being more negative to

school-related tasks or that the child shows less interest in activities that are suggested in class. Children at this age who exhibit symptoms of depression may also have negative perception and beliefs about themselves, which might contribute to lower school performance (Quiroga et al., 2013). Symptoms of depression and children's subjective assessment of their own achievement (not the objective assessment) have also been found to be associated (Chen et al., 2021). This suggests that children's depressive symptoms might trigger less engagement or effort in school because they might believe their contribution does not matter. Therefore, school functioning might be influenced over time even though objective measures do not reveal this at the time. Poor academic achievement is also associated with development of depressive symptoms (McCarty et al., 2008; Undheim & Sund, 2005; Wang et al., 2016; Weeks et al., 2016; Zhang et al., 2019); however, the present study was a cross-sectional study and cannot determine causality.

Unsurprisingly, when mothers' education level was taken into account, there were no significant associations between academic achievement and children's self-report of depression. This suggests that having an educated mother might reduce depression's negative effect on academic achievement. Parents' education and income are among the factors that are known to contribute to school functioning (Akçinar, 2013; Revold, 2016). In addition, these factors may also contribute to the risk of developing mental health problems (Costa et al., 2020; Reiss, 2013; Wichstrøm et al., 2012). These contextual factors can be detected early in the children's life, and awareness of this influence might facilitate intervening in possible negative development in both domains.

School functioning in the group of anxious children does not appear to be affected; thus, symptoms of anxiety may not affect school functioning at this young age. This suggests the school demands are low at this age and that the anxious children in this study are not struggling at school. On the other hand, the anxious children could be overly concerned about how others perceive them, and therefore make an effort for a better appearance at school. Thus, they might work hard at school despite their fears of failure. Furthermore, the anxiety symptoms might be related to other situations than at school, such as separation anxiety from the parents. Several individual (e.g., cognitive skills, self-esteem, social competence, positive beliefs about the future) and contextual factors (e.g., social- economic status) (Carlson et al., 1999; Duncan et al., 2007; Esch et al., 2014; Hughes et al., 2008; Li et al., 2010; O'Connor et al., 2018; Reiss, 2013) might also have influenced the relationship between the children's internalizing symptoms and school functioning. The children might also have satisfactory support from peers, teachers, and parents, which are shown to be important for positive

school functioning (Esch et al., 2014; Hughes et al., 2008). Thus, these factors could have protected them from poorer school functioning. Nevertheless, there is chance for these children to develop more internalizing symptoms as they grow older and the demands from school increases. However, at this age, their symptoms did not have a recognizable impact on school functioning.

There is a need for more emphasis on discovering internalizing symptoms among young school children. Teachers may need more training in recognizing children with symptoms of anxiety and depression and how best to support those with internalizing problems. In addition, schools should put more focus on the reciprocal relationship between mental health problems and school functioning, and that problems in one domain may affect the other in later school years.

### **5.2.2 Association between children's self-report and teacher-rated internalizing problems**

The children's self-reported symptoms of depression were associated with teacher-rated internalizing symptoms, while self-reported symptoms of anxiety were not. In general, the teacher discovered the depressed children but not the anxious children. This aligns with Riglin's meta-analysis, which found that depression was more consistent than anxiety for how children functioned in school (Riglin et al., 2014). This suggests the need for more attention of anxiety symptoms in children, given that their anxiety is not always observable in the school setting. However, according to our findings, anxious children may function better in school than those with depressive symptoms. Thus, it may be more important that teachers identify children with depressive symptoms to provide an opportunity to help them in school.

Internalizing problems are not easily observed by others and might be underreported (De Los Reyes et al., 2019). The teachers in our study knew that the children had been included based on their symptom levels on internalizing symptoms, which could cause judgment bias. However, the teachers considered fewer children to have internalizing symptoms than the children reported themselves. In addition, the teachers reported no gender differences on internalizing symptoms in the children; however, the girls scored higher on self-reported symptoms of both anxiety and depression. This is not surprising as internalizing symptoms might come across as a silent illness (Heiervang et al., 2007; Kolko & Kazdin, 1993; Sund et al., 2011; Van der Ende et al., 2012). These informant discrepancies on internalizing symptoms seem to be consistent across samples and studies over years (De Los Reyes et al., 2015; De Los Reyes et al., 2019; Van der Ende et al., 2012). However, the

differences can reflect meaningful information showing how a child is perceived by different informants across different contexts (De Los Reyes et al., 2015; Van der Ende et al., 2012). Parents and teachers might be good informants for anxiety symptoms associated with overt behavior (e.g., panic, separation anxiety, performance anxiety), whereas children might be more reliable on covert symptoms (e.g., pondering, worries). This emphasizes the importance of including both the teacher and children's perspective when assessing internalizing problems. By comparing the teacher-rated internalizing symptoms and children's self-report on anxiety and depression, we probably obtained a more complete picture of the different perspectives of the children in school. Our findings also show that teachers might not always be aware of what the children experience. The fact that the teachers may not perceive internalizing difficulties in children could lead them not consider potential special needs the children may have when facilitating everyday school life, which could lead to poorer school functioning.

### **5.2.3 Gender differences in academic achievement and school adaptation**

Academic achievement and school adaptation were higher for the girls in our sample than for the boys. This is in accordance with other studies stating that girls do better academically and adapt better to the school system (Backe-Hansen et al., 2014; Borgonovi et al., 2018). This suggests that the girls manage to uphold a certain academic standard despite their internalizing difficulties. From early childhood, girls have more developed skills in self-regulation of attention, activity, and impulses (NOU, 2019). A recent Norwegian study from 65 primary schools (4<sup>th</sup> to 7<sup>th</sup> grade) showed that girls also exhibited higher social skills than the boys (Ogden et al., 2021). Both social skills and skills in self-regulation can be advantages in a classroom for the individual themselves, for the teacher, and for classmates. Characteristics such as working hard, age-appropriate behavior, and effort in learning are found to be higher in girls (Larsson & Drugli, 2011), as is the case for our sample. These characteristics are also associated with less conflict in school and closer relationships with the teacher (Drugli, 2013). Teachers might appreciate these children being more positive (Wollscheid et al., 2018) and might give feedback on the skills which are more satisfactory in the classroom. This might lead the children to continue the behavior and receive more positive feedback. In addition, academic performance and higher social skills have also been shown to increase with the age in favor of the girls (Ogden et al., 2021). How the children's emotions and behavior are met might predict how they function in school in the future. Boys in Norwegian schools (1<sup>st</sup> to 7<sup>th</sup> grade) are not only more likely to be low achievers in all

subjects (Borgonovi et al., 2018), but also less likely to have a positive relationship with their teachers than girls are (Drugli, 2013). In addition, boys are also more likely to be met with lower expectation in school (Wollscheid et al., 2018). This finding is noticeable in our sample of children, as boys with internalizing problems, especially depressive symptoms, might be more affected when it comes to school functioning.

### **5.3 Intervention effects on school functioning**

Given the previous associations found between school functioning and mental health problems (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009), assessing how mental health interventions affect outcomes, such as academic achievement and school adaptation is also important. There is scarce research on secondary outcomes of mental health intervention, like school functioning (Hoagwood et al., 2007; Sanchez et al., 2018; Swan & Kendall, 2016). To our knowledge, this is the first RCT to investigate the possible effects of a preventive intervention aiming to reduce symptoms of both anxiety and depression among 8-12-year-old children on school functioning.

Findings from Paper III did not indicate any significant effects on school functioning after participating in the EMOTION intervention, either at post-intervention or at follow-up one year after. Likewise, when examining the subgroups (anxiety-only, depression-only, and combined group), the results remained the same. These findings are in contrast with several studies and a meta-analysis (Keogh et al., 2006; Kreuze et al., 2018; Nail et al., 2015; Weems et al., 2009) claiming that CBT interventions have significant effects on school functioning. However, those studies mainly included older children or clinical samples. Another study found that a small reduction in anxiety had no effect on school functioning (Skryabina et al., 2016); however, that intervention was universal. Universal interventions might not be tailored enough for those children who need more intensive support, such as selective or indicated prevention (Hoagwood et al., 2007).

The lack of improvement on school functioning in the present study can be due to several factors. The EMOTION intervention examined in this study aims at children from 8-12 years of age with elevated levels of anxiety and/or depressive symptoms (Kendall et al., 2013; Martinsen et al., 2014). Previously results from the evaluation of the intervention indicated that both anxiety and depressive symptoms were reduced after the intervention and one year after (Løvaas et al., 2020; Martinsen et al., 2019). Improvements of secondary

outcomes such as self-reported quality of life, self-esteem (Martinsen et al., 2021), and emotional regulation skills (Loevaas et al., 2019) were also reported. However, the significant findings were small, which could make it less likely to identify significant findings related to school functioning.

Children in our study were young. The level of symptoms for these children does not need to affect their general functioning. Hence, their internalizing symptoms might not have been related to school functioning. In addition, school demands and expectations might not be so prominent at this age. Norwegian children at this age do not have many academic tests and do not receive grades. National standardized tests in Norwegian, English, and mathematics are conducted in fifth, eighth, and ninth grades; therefore, such tests were not an option to use for our sample. Furthermore, the measure used to assess academic achievement in this study might not be sensitive enough. The teacher's subjective assessment of children's performance might not capture all the potential issues in the different subjects at this age. In addition, working hard, behaving appropriately, and showing effort in learning are characteristics that might not be easily noticed by the teacher unless the child stands out verbally in the classroom or delivers written submissions that attracts the attention of the teacher, making them problematic for assessing school adaptation. Nevertheless, when the teacher reported that children had internalizing symptoms, they were also more likely to report poorer school functioning. However, they did not disclose all the children who reported internalizing problems, despite knowing the inclusion criteria for the study.

The children were not given the opportunity to present their own perspective of how they experienced the school day. Children's self-perception of academic performance can predict future school functioning and drop-out (Quiroga et al., 2013), suggesting that the result could have been different if their perspective were included. In addition, negative self-perception on academic competence might also indicate depression (Quiroga et al., 2013). The parents reported improvements in the children's self-regulation skills (Loevaas et al., 2019) after the intervention; however, they were not asked to evaluate school functioning.

The EMOTION intervention's main goal is to reduce anxious and depressive symptoms, not to improve school functioning. The intervention took place in the children's school, and schools are considered a suitable arena for prevention at different levels. However, the teachers were only included in the intervention by giving the group leaders three positive characteristics of the child as a student, as part of the intervention manual. The result could have been different if the teachers had a larger role in the implementation or that the intervention had a more targeted school-related focus. Nevertheless, the intervention still

could have given the children strategies to cope with difficult situations, which could be positive for other domains, including school functioning, in the long run.

### **5.3.1 Cascade models – problems in one domain affect the other**

Cascade models have been used to describe the relationship between school functioning and internalizing problems over time. The models suggest a snowball effect, claiming that a problem in one area might cause problems in another area later. For example, internalizing problems might cause problems in school (adjustment-erosion model), or academic problems might lead to internalizing problems (academic-incompetence model) (Masten et al., 2005; Moilanen et al., 2010). Cascade studies of the relationship between school functioning and internalizing problems seem to be stronger for the academic-incompetence model (Deighton et al., 2018; Gustafsson et al., 2010; Huang, 2015; Masten et al., 2005; Weidman et al., 2015). The children in our study exhibited elevated levels of internalizing symptoms compared to clinical and population studies (Larsson et al., 2016; Villabø et al., 2013; Villabø et al., 2012). In addition, they also had lower school functioning than a comparable national sample (Larsson & Drugli, 2011). This implies that they are at risk of more internalizing symptoms and poorer school functioning as they grow older, as suggested by the cascade models. The possible negative trajectory implies the importance of focusing on both school functioning and internalizing symptoms at an early age. This age, i.e., 8-12 years, is a good starting point to capture both internalizing difficulties and poorer school functioning.

Many cascade studies indicated that the association and timing of the examination might be of relevance (Deighton et al., 2018; Moilanen et al., 2010; Patalay et al., 2015). In studies with children and adolescents, it is important to consider developmental changes (e.g., hormonal changes, more demands, and greater expectations socially and at school) and transition points (e.g., from elementary school to middle school, from middle school to high school) occurring in their life at the time of the assessment (Deighton et al., 2018; Moilanen et al., 2010). These transition points and developmental changes may influence the relationship between internalizing problems and school functioning as children enter different stages. The children in our study were in 3<sup>rd</sup> to 6<sup>th</sup> grade at the time of the intervention and will enter junior high school in 8<sup>th</sup> grade. In addition to the children beginning puberty, the school system will expect more from them academically and they will be given grades for the first time. This represents a transition point that can affect both mental health and school functioning.

Internalizing problems have also been suggested to have a shorter window of influence, and the timing of an assessment might not capture all the possible academic struggles (Masten et al., 2005). However, experiencing internalizing problems over years and possibly having increased symptom levels can have a negative effect on school functioning later in time (Patalay et al., 2015). Participating in the EMOTION intervention led to persistent reduction of symptom levels of anxiety and depression one year after, which could have a positive impact on school domains when the demands increase in later schooling.

## **5.4 Methodological considerations**

The main RCT study and the associated studies reported in this dissertation have several strengths. The present studies were part of an indicated preventive intervention trial. The cRCT design and a large sample size are this study's strengths. In addition, the multi-site effectiveness study was conducted in a real-world setting, with children from rural, urban, and suburban areas from different part of the country. Healthcare workers facilitated groups as part of their ordinary work. The inclusion of children with elevated levels of symptom of anxiety and depression represents a sub-clinical population sample more seldom studied than general population samples or clinical samples. The sample was diverse, as there were few exclusion criteria. The children in 3<sup>rd</sup> to 6<sup>th</sup> grade and their parents were invited to participate, which may have led to more children coming forward with their internalizing problems. The study had a multi-informant approach, with a high response rate from both children and teachers. Although they used different measures for reporting internalizing symptoms, multiple informants may indicate cross-methodological validity of the results. They have also demonstrated that results can differ by informant. Well-established measures were also used to assess school functioning and internalizing symptoms. Further, some methodological considerations and limitations are addressed.

### **5.4.1 Reliability and validity of the study**

Reliability and validity are important to consider when evaluating study results. Reliability refers to the stability and consistency in the results of the study, and validity refers to the extent one measures what is intended to measure (EFPA, 2013).



*Psychometric properties of BPM:* The RCT study was not initially designed to investigate the psychometric properties of the BPM, which explained the lack of other aspects of reliability (e.g., test-retest) and validity (e.g., convergent and divergent validity). The few previous studies of BPM (Penelo et al., 2017; Piper et al., 2014; Richter, 2015; Rodenacker et al., 2015) and the inclusion of an at-risk population of children were the rationale for studying the measure's psychometric properties (Paper I). The large sample size made this evaluation of factor analysis and the initial investigation of internal consistency and factor structure a useful contribution.

*Different questionnaires:* Using different questionnaires for children and teachers to assess internalizing symptoms is a possible source of bias (Paper II). The recruitment in the RCT study used the self-report measures MASC-C and SMFQ. These measures do not have a teacher-report version; therefore, the teachers used the BPM-T. Self-report in BPM (BPM-Y) has been validated from the age of 11-12. As the children in this study were 8-12 years of age, the BPM-Y was not considered appropriate to use.

*The teachers knew the inclusion criteria:* Teachers who reported on the children already knew that the children had been included in the present study based on self-reported internalizing symptoms. This may have caused a possible bias in their judgment of severity. Nevertheless, the teachers reported fewer internalizing symptoms than the children themselves did (Paper II). All the subscales and the total scale of the BPM-T, not just the internalizing subscale, could have been included when evaluating the association between the children's self-report of anxiety and depression and the teacher-report. This could have provided a more multifaceted picture of the teachers' overall impression of the children.

*Same informant on two measures:* The association between the teachers' assessment of internalizing problems and school functioning can be biased due to the same informant using both measures (Paper II). However, by adding the association between the children's self-report of internalizing symptoms and the teachers report on school functioning, both perspectives were accounted for.

*Teachers' assessment of school functioning:* The individual teacher's assessment of the children regarding academic achievement has uncertain validity if the teachers only compared to other children in the class (Papers II and III). It may also be difficult to

differentiate actual academic deficits (cannot do) from resistance (will not do). In addition, the Norwegian school system may also be less concerned with academic performance in primary school, so potential effects of the intervention may not be apparent (Paper III). Objective tests (like exams) are not conducted in school until the age of 13 in Norway, and the national norm tests only applied to a small portion of the sample (children in fifth grade). The research team could have administered academic tests, which could have allowed for a more objective assessment of the children's academic performance. However, only the subscale of TRF was available, and the one to five ratings for different subjects from are not unlike the grades for older children. Additional information about school and general functioning from children and parents could have added important information to the study and yielded different results. For example, school attendance or other aspects of school success and the children's experience of family or teacher support might represent information that is related to both emotional symptoms and school functioning. However, significant school absenteeism or high levels of conflict probably would have shown on the teachers' report of school functioning.

*Fidelity to the intervention:* It is important that fidelity to the intervention is maintained when it comes to interpreting the results (Paper III). Optimally, every session in the EMOTION intervention should have been recorded to ensure fidelity over all sessions. However, due to practical reasons for the group leaders (e.g., setting up a camera before each session, sensitivity of content, storage, time pressure), security reasons (transport of the camera), the dimension of the study (18 intervention schools), and the cost of the study, only 20% of the sessions were recorded. These sessions were randomly selected between the groups and sessions, and it was impossible for the group leaders to influence this process. Due to low video quality or missing parts of some sessions, only 17% could be used for evaluation. This was equivalent to a total of 239 observations in this study. Fidelity to the intervention was considered to be good overall (Rasmussen et al., 2021).

*Restrictions on other treatments:* There were no restrictions on what treatment, if any, the children in the control group could receive during the intervention period. Being informed about the results of the children's screening, parents and teachers were encouraged to seek help if they considered it necessary. This may have affected the lack of results on school functioning.

*Children missed out on classes:* The children in the intervention groups were taken out of classes to participate in EMOTION intervention groups, which probably led them to miss out on subjects. This might have contributed to why academic achievement did not improve in the intervention group.

*Possible effects in the control group:* Half-day seminars were held at both intervention and control schools to increase personnel's awareness about internalizing symptoms and how to support children with internalizing symptoms. Although ethically appropriate, this may have potentially reduced the intervention's effect compared to the control group. Some "placebo effect" such as this is not uncommon in clinical trials.

#### 5.4.1.1 External validity

External validity refers to whether the inferences drawn from the study can also be drawn in wider or different contexts, that is, whether results can be generalized (Cook et al., 2002).

*Self-selection:* While the main study wanted to recruit at-risk children, children who considered themselves more anxious or depressed than their peers were invited to participate, which represents a bias in the sample selection. The main RCT study originally wanted to screen all the children in the eligible grades; however, the Regional Committee for Medical and Health Research Ethics of Norway did not allow it. In addition, the ethical committee did not allow project administrators to contact school counselors, psychologists, or school nurses to reach possible children for the study. Still, information about and invitation to the study were accessible for all parents and children in the relevant age groups. Based on available resources and the ethical restrictions, the children who expressed an interest in participating and had parental consent were screened. However, this procedure ensured that an indicated sample was recruited and that participating children were motivated. By recruiting children by self-report, children who may have found it difficult to participate in studies like this (e.g., socially anxious, and withdrawn children) might have been missed. As the RCT study examined the effectiveness of an intervention for anxious and sad children, children who scored below the cut-off were not eligible.

*Skewed SES:* Our sample had a skewed distribution of SES toward mothers with higher education and income levels compared with the general population (Statistics-Norway,

2019a, 2019b). This might limit the generalizability of the results. Parental education level is a strong predictor of successful learning and academic achievement (Bøe, 2015; Revold, 2016) and might have contributed to the absence of association between internalizing symptoms and school functioning in the present sample. Families with low SES or a non-Norwegian background might have been underrepresented among parents who participated. Therefore, the results may not necessarily apply to children with internalizing symptoms from a non-Norwegian background.

## **5.5 Implication for future practice and research**

### **5.5.1 Implication for pedagogical practice**

Schools are mainly concerned with academic achievement (Elias et al., 2003; Hoagwood et al., 2007; Zins et al., 2004). However, recognizing children's social and emotional development and its possible impact on learning seems necessary for a more profound understanding. This may be especially true for children with depressive symptoms. Struggling with internalizing problems might have a negative impact on school functioning (Elias et al., 2003), and having academic difficulties could lead to internalizing problems (Moilanen et al., 2010). Mental health and school functioning might not be seen as interconnected domains yet, as suggested by Roeser, Eccles, and Sameroff (2000). However, there is growing awareness on this matter in Norway. The Directorate of Education has newly launched an interdisciplinary theme called "Health and Life Skills" in the new curriculum for primary and secondary school from the 2020/21 school year (Udir, 2020). The purpose is to provide children and adolescents with skills to promote good mental health and to make responsible life choices. According to the intention, the topics are supposed to be addressed where appropriate across all subjects. However, the guidelines for topics and methods for the integration are not very clear, which can potentially lead to unwanted variations across schools. Since this theme is recently launched, no scientific research on the effects has been conducted yet. However, it is promising that the focus includes development of good mental health and how to master life events to come. This is also an opportunity to teach children and adolescents about mental health, nurturing positive mental health, and learning suitable problem-solving skills. It is important that schools and communities are prepared to implement this new interdisciplinary theme. A stronger emphasis should be placed on

competence about mental health problems in children and adolescents, especially when it comes to teachers' competence.

Multi-tiered systems of support are an interesting approach for future practice in schools (Sanchez et al., 2018). This is a holistic model with different levels of support, with universal, selective, and indicated levels, referred to as tier 1, tier 2, and tier 3. This holistic framework includes all levels of support and can be structurally implemented within each school, and evidence-based interventions at all levels must be available. MTSS is supposed to identify and provide additional help if children have not adequately responded to the previous level or tier of support. The advantage of a system like this is early intervention in possible academic or emotional problems. It is important that a system like MTSS is integrated in the school's curriculum. Schools must monitor the progress of the support on each level to possibly provide additional help, if needed. This requires a team collaborating on these matters. A team could include trained school staff, counselors, and health care staff in the different interventions. Some interventions may also include collaboration with psychologists or health care workers from the municipal services.

Implementing an MTSS in Norwegian schools would require political decisions. However, an example for potential future practice may be as follows. At the first tier, one could target the entire classroom environment and focus on supporting the students. To achieve a successful result, the teachers may need competence on mental health problems in the children, how they can affect school functioning, and how poor school functioning may lead to internalizing difficulties. Including the teacher could have several benefits. It is shown that a supportive relationship with the teacher seems to have a significant impact on children's social, emotional, and academic development (Birch & Ladd, 1997; Esch et al., 2014; Hamre & Pianta, 2001; Hughes et al., 2008; Pianta & Stuhlman, 2004). If known risk factors such as traumatic experiences, low family income, or parents with mental health problems are identified, intervention for those who need help at the selective level (tier 2) could be implemented. This may require collaboration with health care workers in the communities. At tier 3, the indicated EMOTION intervention for those struggling with internalizing difficulties could be one possible evidence-based intervention. The intervention may be strengthened with targeted school-related focus. In addition, including the teacher in the implementation may also be preferred.

### **5.5.2 Implication for future intervention programs**

School-based mental health interventions might be more effective if they aim to increase both academic- and mental health and social competence (Welsh et al., 2001). Providing children with skills to handle challenges may provide a better opportunity for positive development in both mental health and school functioning (Elias et al., 2003). The EMOTION intervention can be tailored to include more school-related issues (Rodgers & Dunsmuir, 2015). The intervention teaches the children about mental health, how it affects the body, thoughts, and feelings (psychoeducation), and teaches them strategies to cope with different situations. Improving children's self-esteem is also central in the intervention. An additional school-related focus could help children think realistically when addressing self-perceived school pressure, failure in tasks, or rejection or criticism from friends. Another school-related focus could be to teach children skills in problem-solving and coping with issues they find difficult in school. Teachers could also help with planned exposure activities in class, such as how to approach a classmate, or speaking up in class, or have presentations, aside from giving children frequent positive feedback when they work with issues they find difficult. Including the teachers in weekly meetings with group leaders implementing the intervention, or by being one of the group leaders, will help ensure school-related issues are addressed. Including a more school-related focus in the EMOTION intervention could have positive benefits, as mental health interventions have shown to be more effective if both academic learning and positive mental health were included (Weare & Nind, 2011). Some of the children in our study might have chosen to raise school-related issues in the groups; however, a school-related focus was not structurally implemented.

### **5.5.3 Implication for future research**

As the children in the present study enter high school, there may be more school demands and they will receive grades. This could cause more distress for the children. An interesting direction for future research is a follow-up beyond the 12 months, to determine whether participating in the EMOTION intervention will have a later impact on academic achievement and school adaptation for the children who participated in the study. Even though there were no positive effects on school functioning in the current study, the positive effects on internalizing difficulties and self-esteem may lead to positive long-term effects on school functioning. Furthermore, an adapted version of the EMOTION intervention that also include a stronger school-related focus and including teachers in intervention implementation are also potential aspects to investigate further.

There is also a need for more well-controlled longitudinal design studies to reveal whether elevated levels of anxiety and depression in young school children can predict later disorders and poorer school functioning, in addition to whether poorer school functioning can lead to internalizing problems. In research on school-based mental health interventions at the universal, selective and indicated levels of prevention, it is essential to include changes in functioning in other domains beyond the reduction of symptom level impairment, such as general functioning and school functioning. If improving academic achievement leads to better mental health, an RCT that also emphasizes academic competence needs to be carried out. Both mental health problems and academic achievement must be measured before and after the intervention.

The relationship between mental health problems and school functioning among boys and girls is another field to explore. Boys are more likely to be low achievers in all academic subjects and have a higher school drop-out rate than girls (Borgonovi et al., 2018). Boys are also twice as likely to be depressed and anxious after the ages of 11-13 as they were prior to puberty. In elementary school, boys might be rated higher on externalizing behavior (Ogden et al., 2021) and might be met with lower expectations, which could lead to more social problems, learning difficulties, and internalizing problems (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). A tailored intervention on both mental health problems and school functioning that considers gender differences is also important. Internalizing difficulties can manifest themselves as externalized behavior (Moilanen et al., 2010; Oland & Shaw, 2005). In addition, externalizing problems could also lead to social, academic, and internalizing problems (Burt & Roisman, 2010; Masten et al., 2005; Moilanen et al., 2010; Obradović et al., 2009). Thus, including boys with externalizing problems in research where the purpose is to improve internalizing difficulties may be of importance and possibly counteract the trajectory.

The interdisciplinary theme "Health and Life Skills"(Udir, 2020) in Norwegian schools is also an interesting field to investigate. The guidelines for topics and methods for integration should be structurally implemented at all levels (universal, selective, and indicated) within schools. Research on the effects of the implementation should focus on outcomes related to both mental health and school functioning, and should preferably be subject to an RCT.





## 6 Conclusion

The findings of the examination of the BPM parent and teacher questionnaire indicate that it may be a valid short assessment tool for measuring attentional, behavioral, and internalizing problems in children at risk for internalizing problems. Furthermore, both teacher-rated internalizing symptoms and children's self-report of depressive symptoms were negatively associated with school functioning, independent of age and gender, whereas self-report on anxiety were not. In addition, only children's self-report of depressive symptoms was associated with teacher-rated internalizing symptoms. Results from the present study show that the indicated EMOTION intervention, which aims to reduce symptoms of anxiety and depression, appeared not to have an impact on academic achievement and school adaptation after the intervention and at follow-up one year after, as reported by teachers.

Academic achievement and general school functioning are important for many aspects of a child's life. Emotions are important for learning and are often underestimated in performance-oriented schools. Recognizing the reciprocal associations between children's social and emotional development and school functioning seems necessary for more profound understanding. Focus on identifying children who struggle is essential, and reliable and valid measures are also important. In relation to children experiencing increased levels of anxious and/or depressive symptoms, focusing on how mental health interventions influence school functioning is also vital. Adapting mental health interventions to be more focused on challenges at school, as well as greater teacher inclusion, may provide broader results beyond symptom reduction.



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## **Supplementary Material**

**Table S1** Summary of Main Instruments and Variables of This Study

Measure	Description	Age	Use	Scores	Psychometric properties in present dissertation	Psychometric properties in Norwegian studies	Reference
MASC-C	Symptoms of anxiety	8-19	Self-report for children in research, clinical and community settings Parent-report	Total score of symptoms of anxiety  Subscales: physical symptoms, harm avoidance, social anxiety, separation/panic	<b>Reliability</b> Cronbach's $\alpha=0.84$	<b>Reliability &amp; Validity</b> (At-risk population, 8-12 yoa) Cronbach's $\alpha=0.91$ RMSEA=0.047/CFI=0.93/TLI=0.93  (Clinical population, 7-13 yoa) Cronbach's $\alpha=0.90$	(Martinsen et al., 2017)  (Villabø et al., 2012)
SMFQ	Symptoms of mood and feelings	9-20	Self-report for children in research, clinical and community settings Parent-report	Total score of cognitive, affective, behavioural-rated symptoms of depression	<b>Reliability</b> Cronbach's $\alpha=0.80$	<b>Reliability &amp; Validity</b> (Community sample, 12-13 yoa) Cronbach's $\alpha=.84$ RMSEA =.043/CFI=.98/TLI=.98  MFQ- long-version (General population, 13-14 yoa) Cronbach's $\alpha=0.91$ Test-retest (3 weeks) $r=0.84$ Test-retest (3 months) $r=0.80$	(Olsen, 2015)  (Richter & Sund, 2013)
TRF	Students' problems, academic achievement, school adaptation	6-18	Teacher report	Total problems (TOT)  Subscales: academic achievement, school adaptation	<b>Reliability</b> Academic achievement: Cronbach's $\alpha=0.90$ ICC=0.00  School adaptation: Cronbach's $\alpha=0.72$ ICC=0.00	<b>Reliability</b> (General population, 6-13 yoa) Cronbach's $\alpha=TOT=0.97$	(Larsson & Drugli, 2011)

BPM T/P	Behavioural, attention and internalizing symptoms	6- 18	Teacher report  Parent report	Total score  Subscales: attention problems externalizing problems internalizing problems	<p><b>Reliability</b> BPM-T: Cronbach's <math>\alpha</math>=TOT=0.871 ATT=0.878 EXT=0.805 INT=0.763</p> <p>ICC: ATT=0.02 EXT=0.01 INT=0.04 TOT=0.04</p> <p>BPM-P Cronbach's <math>\alpha</math>=TOT=0.877 ATT=0.834 EXT=0.805 INT=0.818</p> <p><b>Validity</b> BPM-T: RMSEA=0.087/CFI=0.947/TLI=0.938</p> <p>BPM-P: RMSEA=0.053/CFI=0.966/TLI=0.961</p>	<p><b>Reliability</b> (General population, 6-13 yoa) BPM-T Cronbach's <math>\alpha</math>=TOT=0.96 ATT=0.88 EXT=0.87 INT=0.71</p> <p>(General population, 6-16 yoa) BPM-P Cronbach's <math>\alpha</math>=TOT=0.93 ATT=0.77 EXT=0.76 INT=0.70</p> <p>Long version vs short version R &gt;0.80 (Total score)</p>	(Richter, 2015)
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*Note:* MASC-C: Multidimensional Anxiety Scale for Children-Child; SMFQ: Mood and Feelings Questionnaire-short version; TRF: Teachers Report Form; BPM-T/P: Brief Problem Monitor- Teacher and Parent form. ATT=Attention problems, INT=Internalizing problems, EXT=Externalizing problems, TOT= Total problems; ICC=Intraclass Correlation Coefficient; CFI=Comparative Fit Index; RMSEA= Root Mean Square Error of Approximation; TLI= Tucker and Lewis Index



## Papers I-III





# Paper I



RESEARCH ARTICLE

Open Access



# Psychometric properties of the Brief Problem Monitor (BPM) in children with internalizing symptoms: examining baseline data from a national randomized controlled intervention study

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## Abstract

**Background:** Prevention is essential to reduce the development of symptomology among children and adolescents into disorders, thereby improving public health and reducing costs. Therefore, easily administered screening and early assessment methods with good reliability and validity are necessary to effectively identify children's functioning and how these develop. The Brief Problem Monitor (BPM) is an instrument designed for this purpose. This study examined the psychometric properties of the Norwegian version of the BPM parent (BPM-P) and teacher (BPM-T) versions, including internal reliability and construct validity at assessing children with internalizing problems.

**Methods:** Baseline data were collected from a national randomized controlled intervention study. Children aged 8–12 years with self-reported symptoms of anxiety and/or depression with one standard deviation above a chosen population's mean were included in this study. Teachers ( $n = 750$ ) and parents ( $n = 596$ ) rated children using the BPM-T and BPM-P, respectively. Internal consistency was measured using Cronbach's alpha, and multi-informant agreement between the BPM-P and BPM-T was measured using Spearman's correlations. Construct validity was assessed via confirmatory factor analysis.

**Results:** Internal consistency was good throughout all domains for both the BPM-P and BPM-T, with a Cronbach's alpha ranging from .763 to .878. Multi-informant agreement between the parents and the teacher was moderate on the externalizing, attention, and total scales and low on the internalizing scale. The model fit for the three-factor structure of the BPM was excellent for the BPM-P and good for the BPM-T.

**Conclusions:** Internal consistency was good, and the original three-factor solution of the BPM-P and BPM-T was confirmed based on our sample of school children at-risk for emotional problems. These promising results indicate that the BPM may be a valid short assessment tool for measuring attentional, behavioral, and internalizing problems in children.

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Trial registration in ClinicalTrials: NCT02340637; June 12, 2014.

**Keywords:** Brief Problem Monitor, BPM-P, BPM-T, Internalizing problems, Anxiety, Depression, Children, Psychometric properties, Confirmatory factor analysis

## Background

Symptoms of anxiety and depression [internalizing problems] are among the most common psychological difficulties diagnosed in children and adolescents. Approximately seven percent of children from population-based samples in Norway present symptoms that are compatible with a mental disorder [1, 2]. Similarly, international studies have found a prevalence rate of mental health disorders from 7 to 23% [3–6]. Anxiety and depression often co-occur, and anxiety often precedes depression [7, 8]. Depressive problems affect youth negatively in different life domains (e.g., lower academic achievement, more peer and family problems) [4, 9, 10], and anxious youth are at greater risk for absenteeism, academic underachievement, low social acceptance, and impaired psychosocial functioning [11–13]. Previous research also indicates that children with symptoms of anxiety and/or depression clearly experience a reduction in their daily functioning, even though they do not qualify for a full diagnosis [14, 15]. Such negative outcomes can cause serious health consequences and costs, for the youth, his or her family, and the society at large [16]. Thus, it is important to prevent the development of anxiety and depression in children and adolescents. Having valid and reliable instruments to identify these children is, therefore, of utmost importance.

Both in research and clinical care, assessments of intervention progress and outcome that are quick, easily administered, valid, and reliable are needed [17] so that response to the intervention and possible adjustments to the intervention processes can be applied. Advantageously, the assessment method is suitable for children with comorbid conditions (e.g., anxiety, depression, conduct problems) and various informants. To be useful, a short survey should adequately assess progress and outcomes, accommodate comorbidity, take little time to administer, and show satisfactory psychometric properties. The *Brief Problem Monitor* (BPM) instrument is designed for this purpose [18]. This measure provides a uniform problem scale to assess attentional, behavioral, and internalizing problems in children and adolescents aged from 6 to 18 years. The BPM forms are developed from the longer corresponding versions of the *ASEBA Child Behavior Checklist for those aged 6–18 years* (CBCL/6–18), *Teachers' Report Form for children those aged 6–18* (TRF), and *Youth Self-report for those aged 11–18 years* (YSR) [19]. The ASEBA long forms are

widely used instruments for clinical and research psychopathology. They have for decades provided information from various informants and shown good psychometric properties in studies conducted in different countries [19, 20]. To date, the literature supporting the psychometric properties of the Brief Problem Monitor (BPM) measures is scarce. In the present study, we examined the psychometric properties of the Norwegian versions of the BPM for parents (BPM-P) and teachers (BPM-T).

## Development of the BPM survey

The development of the BPM started with Chorpita and colleagues' Brief Problem Checklist interview (BPC), a brief 12-item index derived from YSR and CBCL, meant to be an easily administered, time-saving, and clinically relevant measure [17]. The index included internalizing (INT) and externalizing problems (EXT). Despite the reduced number of items in the subscales, internal consistency, test–retest reliability, and convergent and discriminant validity were considered good [17].

Achenbach et al. [18] expanded the index further and added an additional third scale in the BPM, assessing attention and hyperactive symptoms (ATT). Achenbach also developed an assessment for teachers based on the TRF. The final version of the BPM consists of one form for parents (BPM-P; 19 items), one form for adolescents (BPM-Y; 19 items), and one form for teachers (BPM-T; 18 items) [18]. The items are distributed on three subscales: attention/hyperactivity problems (6 items), externalizing problems (6 items in BPM-T and 7 items in BPM-P and BPM-Y), and internalizing problems (6 items).

## Psychometric properties of BPM

Studies of the 2001 version of the ASEBA long forms were used to analyze the psychometric properties of the American versions of the BPM [18, 19]. In a US sample of youths, the CBCL- and TRF-forms showed excellent internal consistency [19]. Test–retest (8–16 days apart) yielded similar results. They also reported good criterion-related validity to differentiate between children with and without a diagnosis.

Apart from Achenbach and colleagues [19], there are, to our knowledge, four published studies evaluating the psychometric properties of the BPM forms, see Table 1 [21–24].

According to a systematic review of Scandinavian studies on the psychometric properties of the BPM [25], only

**Table 1** Psychometric characteristics of BPM reported in four studies

Study (country)	BPM-P			BPM-T		
	ATT	INT	Total	ATT	INT	Total
Richter [21] (Norway)	Type of population	General population		Stratified random subsample		
	Age range (mean)	6–16 (10.6)		6–13 (9.4)		
	Reliability	.77	.70	.88	.71	.87
Piper et al. [23] (USA/Canada)	Type of population	Convenience sample				
	Age range	6–18 (mean age 11.5)				
	Reliability	.87	.79	.86	BPM-T not conducted	
Penelo et al. [22] (Spain)	Type of population	General population				
	Age range	6–8				
	Reliability	.92	.83	.89	BPM-T not conducted	
Rodenacker et al. [24] (Germany)	Validity	.040 <sup>a</sup> /.052 <sup>b</sup> /.057 <sup>c</sup>				
	Internal consistency (Cronbach's alpha)	.968 <sup>a</sup> /.930 <sup>b</sup> /.919 <sup>c</sup>				
	Internal consistency (McDonald's Omega)	.963 <sup>a</sup> /.920 <sup>b</sup> /.907 <sup>c</sup>				
	Construct RMSEA	Clinical/general population		Clinical/general population		
	CFI	Mean age 11.5/12.3		Mean age 11.5/12.3		
Rodenacker et al. [24] (Germany)	Internal consistency (Cronbach's alpha)	.83/.81	.72/.66	.81/.73	.76/.85	.86/.87
	Construct RMSEA	.077/.045		.119/.102		
	CFI	.920/.950		.890/.929		
	TLI	.906/.941		.872/.918		
	Validity	Internal consistency (Cronbach's alpha)		Internal consistency (Cronbach's alpha)		

BPM-P = Brief Problem Monitor-Parents; BPM-T = Brief Problem Monitor-Teacher; ATT = attention; EXT = externalizing problems; INT = internalizing problems; Total = total problems (ATT + EXT + INT). Validity: Robust weighted least squares estimator; RMSEA = root mean square error of approximation, CFI = comparative fit index, TLI = Tucker Lewis index. Age of the sample: <sup>a</sup> = 6-year-old, <sup>b</sup> = 7-year-old, <sup>c</sup> = 8-year-old  
References: Richter [21], Piper et al. [23], Penelo et al. [22], Rodenacker et al. [24]

one study was found [21]. This study by Richter [21] included BPM-P, BPM-T, and BPM-Y in a Norwegian population sample of children ranging in age from 6 to 16 years. The study reported excellent internal consistency for the total scale for all versions according to the European Federation of Psychologists' Association's guidelines (EPPA) [26]. The internal consistency of the internalizing subscale was reported to be adequate for BPM-P and BPM-T. For the remaining two subscales, attention and externalizing problems, the internal consistency was adequate on BPM-P and good on BPM-T. The study also reported good construct and content (convergent) validity.

The second study was performed with an American/Canadian sample; caregivers of children/youths aged 6–18 years completed the CBCL/6–18 online [23]. The 19 items of the BPM-P were analyzed. The internal consistency for the BPM-P total scale was excellent, the attention and externalizing subscales were good, and the internalizing subscale was adequate. The correlation between the full-length CBCL/6–18 and the shorter BPM-P was considered high for the total score and the subscales. BPM-P was sensitive and could identify behavioral and emotional problems among children whose parents reported a psychiatric diagnosis (ADHD, depression, anxiety, autism spectrum disorders, etc.) when compared to the group that had not been diagnosed. However, the study was limited to caregivers, and the findings supported that additional information from other sources, for example, teachers, should be obtained.

The third study was conducted in a community sample of Spanish children aged from 6 to 8 years, where parents answered the CBCL/6–18. Nineteen items of the BPM-P were examined [22]. Internal consistency was good. The subscales showed higher values for attention problems and lower for internalizing problems. The concurrent validity was high with a significant correlation between BPM-P and CBCL/6–18. Construct validity, investigated by confirmatory factor analysis (CFA), showed that the 3-factor model (attention, externalizing, internalizing) was adequate.

The fourth study was conducted in a clinical and a general population-based sample from Germany. Children, parents, and teachers answered the BPM based on the long version of ASEBA from 1991 [24]. Two items on the attention scale were not present (“fails to finish things he/she starts” and “inattentive or easily distracted”), leaving 17 items. The internal consistency was considered adequate-to-good for most of the subscales and the total scale regarding BPM-P and BPM-T in both samples. The subscale of internalizing problems showed inadequate consistency in the general population sample of parents. BPM-P indicated an acceptable three-factor model fit

in the clinical sample and an excellent model fit in the general population sample. Regarding the BPM-T, the teacher-version did not have a satisfactory model fit in the clinical or the general population sample.

#### Multiple informant differences

A meta-analysis that evaluated the validity of multiple informants assessing child and adolescent mental health problems in 341 studies from 1989 to 2014 reported low-to-moderate cross-informant correspondence (mean internalizing: correlation 0.25; externalizing 0.30; mean overall 0.28) [27]. The meta-analysis indicated higher levels of correspondence when problems were easy to observe (externalizing behavior vs. internalizing problems), and informants came from the same setting (mother and father vs. parent and teacher). This is similar to studies evaluating BPC/BPM/ASEBA long forms, where the cross-informant agreement was low (0.22, 0.31, and 0.19 for the internalizing, externalizing, and total scales, respectively) between *child and parent* [17]. Achenbach [28] found a parent–child correlation of 0.25 and a higher cross-informant correlation for externalizing than internalizing problems across diverse types of cross-informant pairs.

Correlations between *parents and teachers* are somewhat higher in these studies—ranging from 0.38 to 0.44 for the attention scale, 0.32–0.35 for the externalizing scale, 0.21 for the internalizing scale, and 0.33 for the total scale [19, 29]. All these findings are in accordance with Achenbach's multi-informant assessment approach, i.e., that high cross-informant agreement regarding psychological problems/mental health symptoms is not expected because mental health problems are perceived differently from different perspectives. Furthermore, the problems may only be present in certain settings.

To summarize, studies of the BPM are scarce and previous studies have been performed in clinical or population samples. Children with self-reported symptoms of anxiety and depression are an understudied at-risk population, and there is a call for valid, reliable, and easily administered instruments to assess these symptoms as early as possible. Moreover, the psychometric properties of translated versions of the BPM should be evaluated. The cultural norms and differences between countries are important and could influence the results and usefulness of the scale. The only study from Scandinavia [21] was population-based and did not include any factor analysis of the BPM. Furthermore, the only study including two types of informants and a confirmatory factor analysis did not contain all the BPM's items [24]. This study aimed to evaluate the psychometric properties of the Norwegian version of the BPM in young children (aged

8–12 years) at-risk of developing anxiety and depression, based on reports from both parents and teachers.

## Methods

### Procedure

The current study used baseline data from a national randomized controlled intervention study [30] investigating the effectiveness of the intervention *EMOTION, Coping Kids Managing Anxiety and Depression* [31] for children aged 8–12 years. The EMOTION intervention aims to reduce symptoms of anxiety and depression and the likelihood of developing later disorders.

Primary schools from rural, suburban, and urban areas in Norway volunteered to participate in the study. The children in the eligible grades (8–12 years of age) and their parents were informed through age-appropriate information in class and at parental meetings about the study both in writing and orally. Children who considered themselves more anxious or sadder than their peers were invited to participate in the screening procedure. Participation required expressed interest from the child and written parental consent; teachers were also informed about the study. Data were collected electronically from 2014 until 2017 with new children entering every semester. For further information about the randomized controlled trial, see Patras and colleagues [30].

### Participants

Children ( $n=1692$ ) from 36 primary schools were screened using web-based questionnaires for self-reported symptoms of anxiety and depression, using the Multidimensional Anxiety Scale for Children—MASC-C [32] and the Mood and Feelings Questionnaire-Short Version—SMFQ [33].

Children who reported symptom levels of at least one standard deviation above the population-based mean on measures of anxiety and/or depression were invited to participate in the study ( $n=873$ ). These cut-offs were based on national and international studies in the relevant age group [34–36]. Seven of the invited children, who were not expected to benefit from the intervention (having developmental delays, autism, severe behavioral disturbance), were excluded from the study. Due to a lack of resources (i.e., lack of group leaders to implement the intervention), 71 children were also randomly excluded.

Web-based questionnaires were sent to the participating children's parents and teachers approximately two weeks after their screening. Although both parents were encouraged to participate, participation was voluntary; however, the children were invited regardless of whether their parents had answered the questionnaires. The child's primary teacher answered questionnaires about the child. The parents and teachers rated the children on

matters concerning attention/hyperactivity, internalizing problems, and externalizing problems now or within the last two weeks, using BPM-P and BPM-T, respectively.

Of the included children, 750 ( $n=435$ , 58% girls) students had a teacher response and were included in the current study. Grade level was used as a proxy for age: Third to sixth grade represented 8–12 years of age. Approximately 4% of the participating children were in the third grade, 36.1% in fourth, 46.1% in fifth, and 13.7% in sixth. Only one parental response per child was analyzed in the present study; 596 children had a response from one of the parents (482 mothers, 80.6%).

### Instruments

*Brief Problem Monitor (BPM)*. The BPM-P (19 items) and BPM-T (18 items) has an age range from 6 to 18 years. The instruments include three subscales with six items each: ATT, INT, and EXT. The extra question on the parent version is about disobedient behavior at home. The ATT subscale contains questions like whether the child "can't concentrate or pay attention for long;" or "can't sit still, restless or hyperactive." Within the EXT subscale, there are questions on whether the child "argues a lot" or "has temper tantrums or a hot temper." In the INT subscale, the questions ask if the child is "feeling too fearful or anxious" or "unhappy, sad, or depressed." The items are rated over user-selected rating periods (e.g., 5,7,14,30, and 45 days), and are supposed to describe the child, on a scale ranging from 0 to 2 (0 = *not true*, 1 = *somewhat true*, or 2 = *very true*).

The Norwegian versions of the CBCL, TRF, and YSR were translated and published in 1986/1988, 1993, and 2002, respectively [37]. The Norwegian version of the BPM was based on these translations.

*The Multidimensional Anxiety Scale for Children—Child (MASC-C)*. In this study, children were included using the MASC-C [32] to assess anxiety symptoms, a 39-item self-report questionnaire that assesses anxiety symptoms in children and adolescents aged 8–19 years based on the past two weeks.

The MASC-C has shown favorable psychometric properties both internationally and in Norway [32, 38–40]. The internal consistency of self-reported symptoms of anxiety at baseline in the current study was good, with a Cronbach's alpha of 0.84.

*The Mood and Feelings Questionnaire-short version (SMFQ)*. To assess depressive symptoms, SMFQ [33], a 13-items questionnaire targeting children from 8 to 18 years, was used. The SMFQ assesses cognitive, affective, and behavioral-related symptoms of depression during the last two weeks.

Previous studies indicated good psychometric properties for the Norwegian version of the SMFQ [41, 42].

In this study, the internal consistency of the scale was good, with a Cronbach's alpha = 0.80 at baseline.

**Statistics analysis**

For the children who had teacher reports (n = 750), 154 parental answers were missing. For the participating parents (n = 596) and the teachers, no missing items were reported.

Reliability was measured by internal consistency (Cronbach's alpha) of the subscales and the total problem scale. According to EFPA [26], the internal consistency is considered excellent if Cronbach's alpha > 0.90, good between 0.80 and 0.90, adequate between 0.70 and 0.79, and inadequate when < 0.70.

The items on BPM-P and BPM-T have only three ordinal response categories (*not true, somewhat true, very true*). The responses were not normally distributed. To assess multi-informant agreement between the subscales on BPM-P and BPM-T, we used Spearman's correlation coefficient. According to Cohen [43], correlation coefficients were considered low between 0.10 and 0.29, moderate between 0.30 and 0.49, and high for 0.50 and above.

To assess construct validity, we conducted a CFA for ordinal categorical variables to confirm the conceptual three-factor model with the three subscales of the BPM-P and BPM-T. Weighted least square estimator with robust standard errors and mean- and variance-adjusted chi-square test statistics (WLSMV) were used as an estimator, owing to the ordinal structure of the data. The robust weighted least squares (WLSMV) estimator with Delta parameterization is recommended for the analysis of skewed categorical data [44]. In this method, error points are accounted for, and the items are interpreted as observable indicators of the non-observable (latent) factor to which they belong [45]. The following goodness-of-fit indices were used: RMSEA, CFI, and TLI. The indices were recommended by Brown [46]: RMSEA < 0.08 and CFI and TLI > 0.90 were considered acceptable fit, and RMSEA < 0.06 and CFI and TLI > 0.95 indicate excellent fit. The factor loadings for each item on the associated subscale were evaluated according to Tabachnick and Fidell's [47] suggestions, where a rating of 0.71 is considered excellent, 0.63 very good, 0.55 good, 0.45 fair, and 0.32 and lower poor.

Two-sided p-values < 0.05 were regarded as significant, and we reported 95% confidence intervals (CI) where relevant. CFA analyses were conducted using Mplus 8 [48]. Other analyses were conducted using SPSS 26.0 (IBM, Armonk, NY, USA).

**Table 2** Mean scores and standard deviation for the BPM-P and BPM-T

Domains	BPM-P (n = 596)		BPM-T (n = 750)	
	Number of items	Mean (SD)	Number of items	Mean (SD)
ATT	6	2.92 (2.88)	6	3.09 (3.27)
EXT	7	2.26 (2.50)	6	1.30 (2.07)
INT	6	2.58 (2.49)	6	2.57 (2.61)
Total	19	7.76 (6.15)	18	6.96 (6.12)

BPM-P = Brief Problem Monitor-Parents; BPM-T = Brief Problem Monitor-Teacher; ATT = attention; EXT = externalizing problems; INT = internalizing problems; Total = total problems (ATT + EXT + INT); SD = standard deviation

**Table 3** Spearman's correlations between BPM-P and BPM-T subscales and total score

BPM-T	BPM-P (n = 596)			
	ATT	EXT	INT	Total
ATT	.451**	.491**	.047	.325**
EXT	.255**	.391**	.089*	.270**
INT	.211**	.186**	.290**	.293**
Total	.409**	.315**	.181**	.384**

BPM-P = Brief Problem Monitor-parents; BPM-T = Brief Problem Monitor-teacher; ATT = attention; EXT = externalizing problems; INT = internalizing problems; Total = total problems (ATT + EXT + INT). \*p < .05 (two-tailed), \*\*p < .01 (two-tailed)

**Results**

**Descriptive statistics for the BPM-P and BPM-T subscales and total scores**

Table 2 shows the total mean scores and standard deviation for the different subscales and the total score on BPM-P and BPM-T.

**Reliability**

The BPM-P showed good internal consistency on attention problems (α = 0.834), on externalizing problems (α = 0.805), and the total problems scale (α = 0.871); and adequate internal consistency on internalizing problems (α = 0.763). The BPM-T showed good internal consistency on all the subscales and total problems scale: attention (0.878), externalizing problems (0.805), internalizing problems (0.818), and total problems (0.877).

**Multi-informant agreement**

The correlations between BPM-P and BPM-T were moderate on the total problem scale (0.384) and the subscales of ATT (0.451) and EXT (0.391). The correlation was low on INT (0.290). See Table 3.



## Validity

### Construct validity

The CFA analyses produced an excellent model fit for the BPM-P and a good model fit for the BPM-T for the three-factor model. See Table 4. The chi-square statistics were significant, as expected for a large sample size. The  $\chi^2/df$ -ratio was 2.6845 for the BPM-P and 6.6287 for the BPM-T; below 3 is commonly regarded as acceptable [46, 49, 50].

Further, all items on each subscale contributed significantly ( $p < 0.001$ ) to the three latent constructs—EXT, ATT, and INT—with satisfactory factor loadings. See Figs. 1 and 2.

For the BPM-P, the factors that correlated highest were attention and externalizing problems (ATT–EXT = 0.658). See Fig. 1. The lowest factor correlation was between attention and internalizing problems (ATT–INT = 0.403). The items with the highest loading on the subscales were “Can’t concentrate; can’t pay attention for long” (ATT = 0.900); “Argues a lot” (EXT = 0.870); and “Unhappy, sad, or depressed” (INT = 0.785).

For the BPM-T, the factors that correlated highest were attention and externalizing problems (0.744). The lowest factor correlation was between attention and internalizing problems (0.390). The items with the highest loading on the subscales were “Can’t concentrate; can’t pay attention for long” (ATT = 0.925), “Threatens people” (EXT = 0.907), and “Worries” (INT = 0.865). See Fig. 2.

## Discussion

This is the first study to present the psychometric properties concerning both the reliability and construct validity of the Norwegian version of the BPM-P and BPM-T, used to assess schoolchildren with internalizing problems. The internal consistency for both versions was good. The multi-informant agreement was moderate to low. The model fit for the three-factor

structure of the BPM was confirmed: excellent for the BPM-P and good for the BPM-T.

The internal consistency, assessed by Cronbach’s alpha, for the total scale and both the BPM-P and BPM-T were good, and the subscales generally showed good estimates. Hence, internal consistency was higher in the current study than in a representative sample from the general population in Norway [21]. In line with previous studies [21–24], this study also found higher values of attention problems than internalizing problems on both the BPM-P and BPM-T. Attention problems might be expressed through behaviors that are more visible to others, such as failing to finish tasks the child has started, inability to sit still, acting without thinking, etc. [51]. In contrast, internalizing problems exist more within the individual (e.g., feeling worthless, having worries, etc.), which are not so observable by others [52]. Children’s self-reports might be better suited to identify these problems, and triangulation of responses will create a better overall picture of children’s problem areas [27, 53].

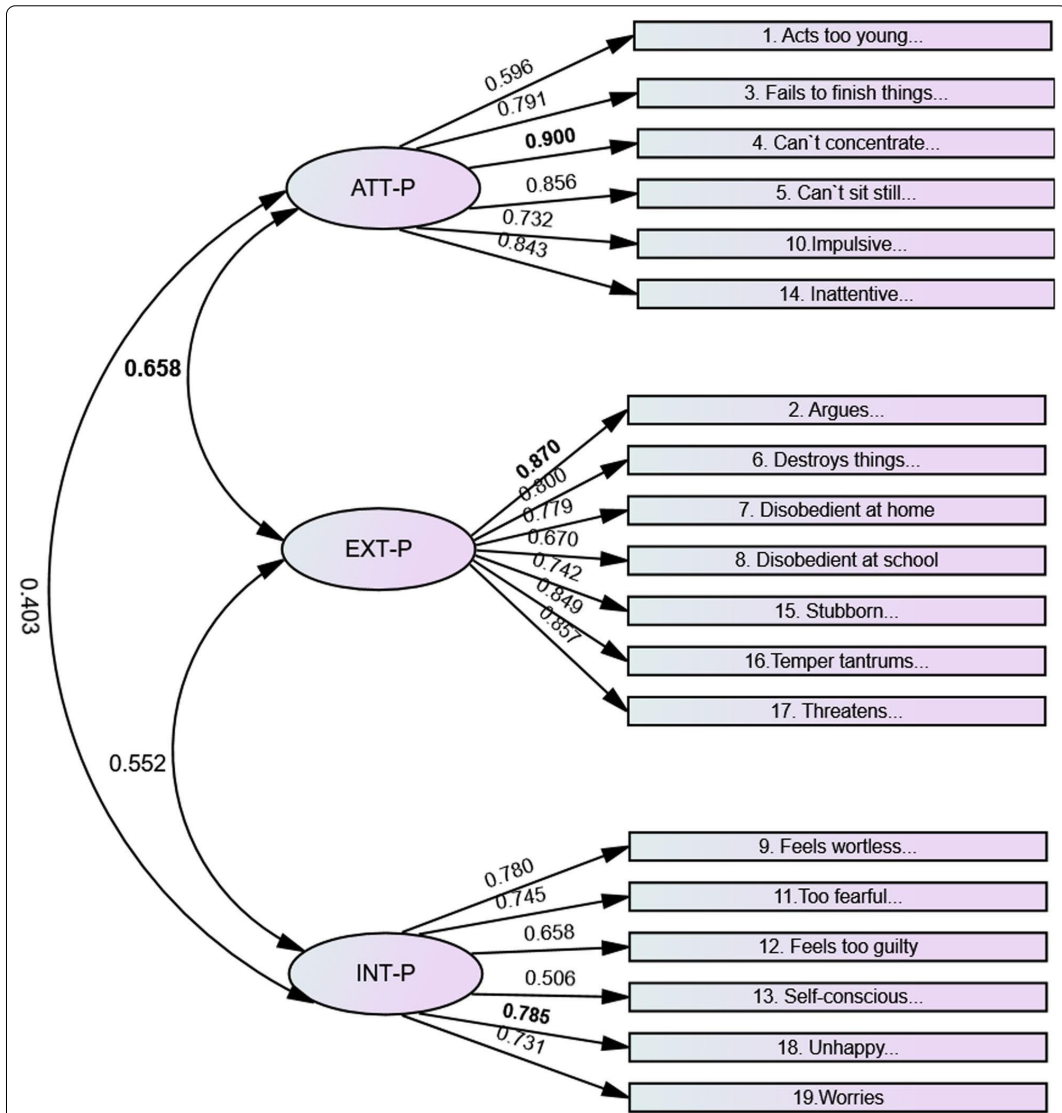
Considering multi-informant perspectives from parents and teachers, we found moderate associations between corresponding subscales of attention, externalizing problems, and the total problem scale, and a weak association between the scorings of internalizing problems. Our findings corroborate previous research indicating that it is more common to agree on externalizing behavioral and attention problems than internalizing problems [19, 27–29]. It is important to underline that in child psychology, the associations between responses from different informants are expected to be low-to-moderate because mental health problems, per se, are perceived from different perspectives and in different environments. Thus, our results are in line with previous studies [19, 27–29].

Concerning the children in our high-scoring at-risk sample, our results showed a better model fit regarding both BPM-P and BPM-T compared to clinical and population-based samples [22, 24]. In the present study, all the items of the BPM were included in the analyses of construct validity, while in a German study, only 17 items were used [24]. The German study also showed that the teacher version did not have a satisfactory model fit in the clinical or the population sample. Our study, however, yielded an acceptable model fit for the teacher version. This indicates that in the school-based population studied, the complete version of the BPM can assess different problems in young school children from teachers’ perspectives as well. The results provide an opportunity for future use of the teacher version when examining children’s mental health problems to include significant school perspectives. However, more research is needed to confirm our findings. It is crucial to identify children

**Table 4** Confirmatory factor analyses of the BPM-P and BPM-T: fit statistics for the model

Fit statistic	BPM-P	BPM-T
$\chi^2/df$	400.928/149 = 2.6845	875.361/132 = 6.6287
RMSEA	0.053 (CI 0.047–0.060)	0.087 (CI 0.081–0.092)
CFI	0.966	0.947
TLI	0.961	0.938

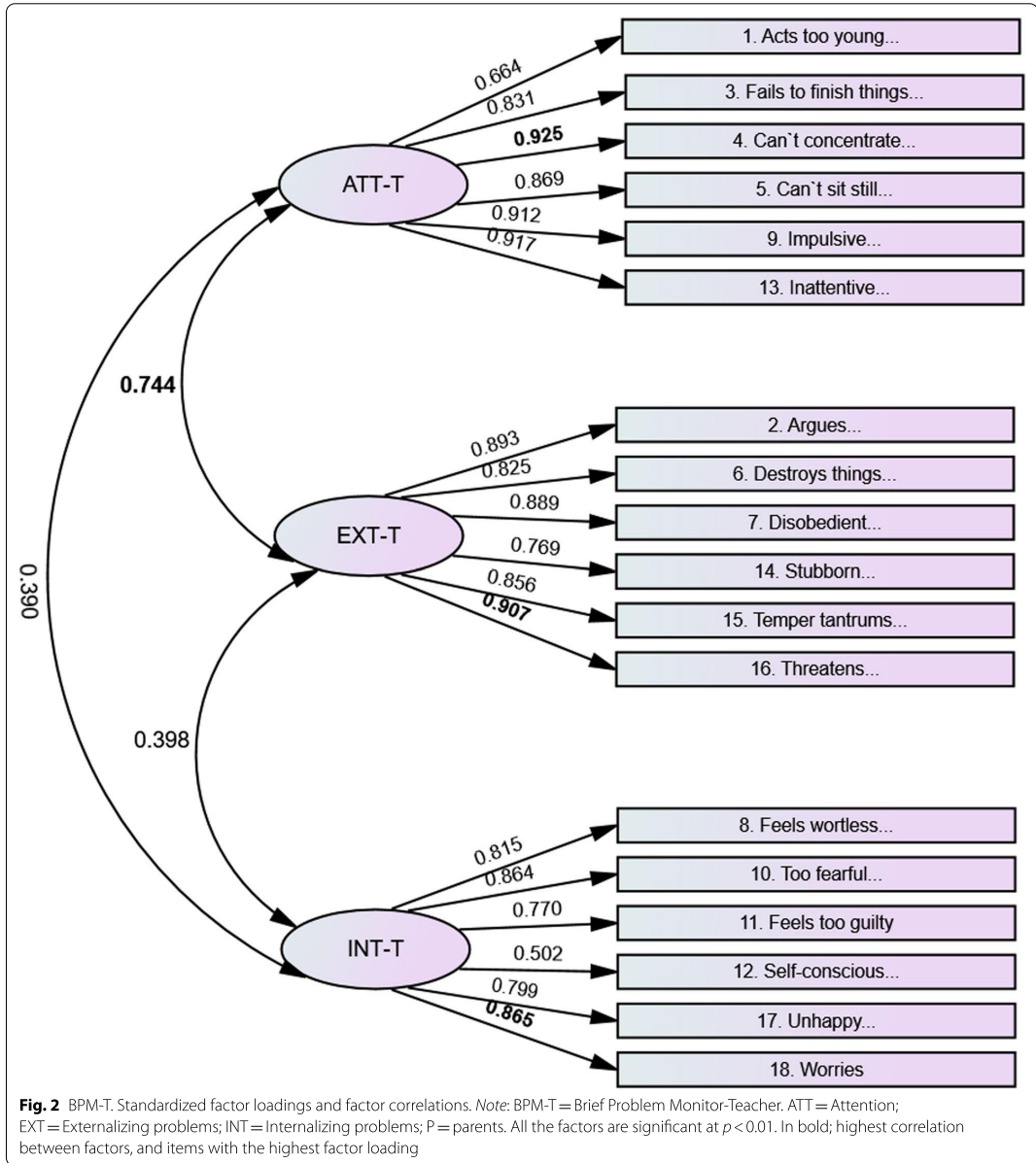
BPM-P = Brief Problem Monitor-parents, BPM-T = Brief Problem Monitor-teacher, Robust weighted least squares estimator,  $\chi^2/df$  = chi-square relative to its degree of freedom, RMSEA = root mean square error of approximation, CFI = comparative fit index, TLI = Tucker Lewis index



**Fig. 1** BPM-P. Standardized factor loadings and factor correlations. Note: BPM-P = Brief Problem Monitor-Parents. ATT = Attention; EXT = Externalizing problems; INT = Internalizing problems; P = parents. All the factors are significant at  $p < 0.01$ . In bold; highest correlation between factors, and items with the highest factor loading

with mental health issues early to prevent possible negative trajectories leading to anxiety and depression and reduced functioning in different life domains [4, 9, 12, 13]. Therefore, having available instruments that are easily administered, reliable and valid both for clinical and municipal health services are essential. It is also

important to include different perspectives from different areas of the children's lives, such as at home and school. Children can, for example, behave differently at home, where they feel safe. However, in school, which may have more unpredictable surroundings, the same child may struggle. Teachers can observe children's behavior and



well-being at school. The positive findings from our study are a much-needed supplement to the research on BPM in an understudied population of at-risk children.

Regarding the factor correlations on both BPM-P and BPM-T, attention and externalizing problems had the

highest correlations, whereas attention and internalizing problems showed the lowest factor correlations. This result was not surprising given that externalizing issues may co-occur with attentional problems [51]. Children with internalizing problems may, however,

often show avoidant behavior to their surroundings to cope with their fears [54], which may be more difficult to observe. Furthermore, the problems may be present at school and not at home or vice versa, which may make it even more difficult to identify. When exploring the factor loadings on the subscale of ATT, five of the six items showed excellent values. The exception was the item, “Acts too young for his/her age”; however, it was still considered either good (BPM-P) or very good (BMP-T). This item was included in the BPM based on earlier research indicating high factor loadings in both population and clinical samples [55]. Although this item was within the acceptable range, one might consider that the participating children were young, i.e., aged between 8 and 12 years, which is the lower age range recommended for the use of the BPM [18]. The individual differences may be large in this age group, which might have had an impact on the scoring of this item. The two items, which were not present in the German study [24], contributed significantly to the factor of attention in both the BPM-P and BMP-T in the current study. For the EXT subscale, the factors loaded well on all items for both versions. The subscale INT showed larger differences between the factor loadings in the BPM-P than in the BMP-T. However, four items were considered excellent, and the item “feels too guilty” was considered very good, whereas “self-conscious or easily embarrassed” also reflected good factor loadings. The latter item had between a good and fair factor loading on the BPM-T, while the five other items showed excellent values. Self-consciousness and embarrassment might be more difficult to observe if the child does not express these feelings overtly. Children at this age, and especially children with internalizing problems, may have difficulties expressing their emotions. An alternative explanation could be that increased self-consciousness and embarrassment typically become a challenge at an older age, i.e., around puberty [56]. Nevertheless, when examining all the items in our analysis within each of the subscales, all factor loadings were high and significant. The suggested three-factor model of the BPM was confirmed, indicating that the instrument in our sample assessed what was intended, thus displaying strong construct validity.

The BPM has formerly been psychometrically evaluated in samples from the clinical and general population [21–24]. We add to existing knowledge by evaluating it in an “at-risk sample for internalizing problems”. This fits well to its use by school- or community services for children and adolescents to identify internalizing problems among children where one suspects such problems. Moreover, such a short early systematic assessment for children at risk would provide a reliable and valid base to

prevent further development of anxiety or depression. It also could be a starting point for further referral to treatment in specialized mental health services.

### Strengths and limitations

One strength of this study was that it included a large heterogeneous sample of children from both rural and urban areas. The at-risk population of children presenting elevated symptom levels of anxiety and/or depression represents a sample less often studied than general population samples or clinical samples, which is also a strength of this study. A multi-informant approach with a high response rate, particularly from the teachers, together with sophisticated analyses, strengthened the results.

However, there are some limitations. The study was not initially designed to investigate the psychometric properties of BPM; therefore, data for tests of other instances of reliability (e.g., test–retest, sensitivity for change) and validity (e.g., convergent and divergent validity) were not available.

### Conclusion

The reliability of the Norwegian version of the BPM-P and BPM-T showed overall satisfactory internal consistency on all subscales and the total scale. Multi-informant agreement between the parents and the teacher reports were as expected—moderate on the externalizing, attention, and total scales, and low on the internalizing scale. Regarding validity, the original three-factor solution of the parents’ and teachers’ versions of the BPM was confirmed based on our sample of school children. Owing to the psychometric findings in this study, the BPM may be a valid, quick assessment tool for measuring attentional, behavioral, and internalizing problems in children. Further research in other Norwegian populations is needed to recommend the BPM for use in community health services. In addition, further evaluations that compare different short screening instruments developed during the last decade are desirable.

### Abbreviations

ASEBA: Achenbach system of empirically based assessment; ATT: Attention problems; BPC: Brief problem checklist interview; BPM-T: Brief Problem Monitor-teacher form; BPM-P: Brief Problem Monitor-parent form; BPM-Y: Brief Problem Monitor-youth form; CBCL: Child behavior checklist; CI: Confidence interval; CFA: Confirmatory factor analyses; CFI: Comparative fit index; DF: Degrees of freedom; EXT: Externalizing problems; INT: Internalizing problems; MASC-C: Multidimensional anxiety scale for children; RMSEA: Root mean square error of approximation; SD: Standard deviation; SMFQ: Mood and feelings questionnaire—short version; TLI: Tucker and Lewis index; TRF: Teachers’ report form; YSR: Youth self-report; WLSMV: Weighted least square estimator with robust standard errors and mean- and variance-adjusted chi-square test statistics;  $\chi^2/df$ : Chi-square relative to its degree of freedom.

### Acknowledgements

We thank all the children, parents, and teachers who participated in this study. Thanks also to the school personnel and project coordinators for their invaluable assistance in data collection.

### Authors' contributions

MLP contributed to the data collection, reviewed the literature, performed and interpreted statistical analyses, and drafted and revised the manuscript. AMS, SPN, KM, JP, SH, and LMR contributed to the study design and data collection. TJ was involved in drafting the manuscript and interpreting statistical analyses. SL was involved in drafting the manuscript and performing and interpreting statistical analyses. AMS, SPN, KM, SH, JP, LMPR, TJ, and SL made substantial contributions in critically revising the manuscript. All authors read and approved the final manuscript.

### Funding

The Norwegian Research Council (No. 228846) funded the national randomized controlled intervention study. This current study was funded by the DAM Foundation through the Norwegian Council of Mental Health and the Liaison Committee for Education, Research and Innovation in Central Norway and The Central Norway Regional Health Authority. The funders had no role in designing the study, collecting data, analysis or interpretation of data, or in writing the manuscript.

### Availability of data and materials

The datasets generated and/or analyzed are not publicly available owing to privacy policy; however, they are available from the author on reasonable request.

### Declarations

#### Ethics approval and consent to participate

The Regional Committee of the Medical and Health Research Ethics of Norway, South East, approved this study (No. 2013/1909; Project title: "Coping Kids: a randomized controlled study of a new indicated preventive intervention for children with symptoms of anxiety and depression"). The authors were provided with written informed consent from parents regarding their children's participation.

#### Consent for publication

Not applicable.

#### Competing interests

Author KM receives royalties from sales of the EMOTION manual. The other authors declare that they have no competing interest with publishing this article.

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Received: 7 January 2021 Accepted: 16 November 2021

Published online: 27 November 2021

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# Paper II





RESEARCH ARTICLE

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# School functioning and internalizing problems in young schoolchildren



Marit Løtveit Pedersen<sup>1\*</sup> , Solveig Holen<sup>2</sup>, Stian Lydersen<sup>1</sup>, Kristin Martinsen<sup>2</sup>, Simon-Peter Neumer<sup>2</sup>, Frode Adolfsen<sup>3</sup> and Anne Mari Sund<sup>1,4</sup>

## Abstract

**Background:** Symptoms of anxiety and depression are common mental health problems in children and are often referred to as internalizing symptoms. Youth with such symptoms are at greater risk for poor academic achievement, school non-completion, and future mental health problems, all of which, lead to public health consequences and costs to society. The aim of the current study was to investigate associations between young school children's internalizing symptoms and school functioning, as assessed separately by the teachers and the children.

**Methods:** This study is a cross-sectional study including children ( $N = 750$ , 58% girls) from the ages of 8–12 years with elevated levels of self-reported symptoms of anxiety (MASC-C) and/or depression (SMFQ). Teachers reported the academic achievement, school adaptation (TRF) and internalizing symptoms (BPM-T) of the children. Associations were analyzed using linear regression analyses.

**Results:** Both teacher-reported internalizing symptoms and children's self-reported depressive symptoms were associated with poor academic achievement and school adaptation, while self-reported symptoms of anxiety were not. Symptoms of depression as assessed by the children were associated with teacher-rated internalizing symptoms, while self-reported symptoms of anxiety were not.

**Conclusion:** We found negative associations between school functioning and internalizing symptoms, as assessed by both the teachers and the children. The dual findings strengthen the validity of these relationships. Thus, prevention of depressive and anxiety symptoms in children may lead to positive changes in school domains such as academic achievement and school adaptation. The weak and non-significant associations between teacher-rated internalizing problems and children's self-report on depression- and anxiety symptoms respectively, indicate that teachers may have difficulties recognizing children with these symptoms.

**Trial registration:** Clinical Trials [NCT02340637](https://clinicaltrials.gov/ct2/show/study/NCT02340637), Registered on June 12, 2014, Retrospectively registered.

**Keywords:** School functioning, Academic achievement, School adaptation, Anxiety, Depression, Children

## Background

Good school functioning is important from a life course perspective, both for the individual, in terms of their health and school education [1] and for society, in terms of work employment and reduced societal costs [2]. Research also indicates that school functioning and mental health are associated and that problems in one domain may affect the other [1, 3, 4]. Internalizing symptoms

(i.e. symptoms of anxiety and/or depression) are common psychological difficulties in children and adolescents [5], and several studies have reported that these children seldom receive professional care [6, 7]. Therefore, the association between school functioning and internalizing symptoms merits attention.

Academic achievement is important to every child and represents performance outcomes, i.e. the extent to which the child has accomplished educational goals [8]. The long-term implications of academic achievement can be both positive, e.g. academic career and employment possibilities when school performance is good, and

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negative, e.g. mental health problems, school dropout and unemployment when school performance is poor [1, 9, 10].

Successful adaptation to school may contribute to healthy cognitive and socio-behavioral development with good control of emotions and impulsive behaviors, and improved ability to cope with new situations and problems with peers or others [11, 12]. Several individual and contextual factors can affect and predict good school functioning. Individual factors such as intelligence [13], gender [14, 15] and beliefs about and values for the future [16] have been reported to affect school functioning. Supportive relationships with teachers and peers are also important contributors to good school functioning [17, 18]. In addition, socio-economic background, family support and parents' educational level are strong predictors of successful learning and academic achievement [15, 17, 19, 20].

Results from systematic reviews of school performance from 2000 to 2014, mainly in primary and middle schools in Norway, Europe and the United States, indicate that girls adapt better to school and attain higher academic achievement than boys [14, 15, 21]. These gender differences also increase with age and seem to be relatively stable over time in several countries.

Studies indicate that 9–12% of all children have symptoms of anxiety and/or depression, commonly called internalizing problems, which clearly reduce their daily functioning, even when they do not qualify for a full diagnosis [22]. A Norwegian study among children aged 8–10 years ( $N = 9155$ ) displayed prevalence rates in the population for psychiatric disorder ranging between 5.6–8.5% [6]. Anxiety and depressive disorders were the most common disorders. Previous research also indicates that some children have internalizing symptoms that go undetected [6].

Anxiety and depression often co-occur, and anxiety often precedes depression in youth [23, 24]. Anxiety and depression in childhood may also be precursors to other difficulties later in adolescence, such as low self-esteem and substance abuse [25], increased risk for poor academic achievement, school non-completion and future mental health problems [26–28], all of which may have serious public health consequences and costs for society [2].

The types of mental health problems reported seem to vary by gender. In general, girls report higher levels of internalizing symptoms and boys report higher levels of externalizing symptoms in primary school [5, 29]. In addition, these internalizing symptoms increase with age [5]. Hence, it is important to identify these children at an early stage; preventive efforts are imperative.

There is growing evidence of negative associations between internalizing symptoms and school functioning,

suggesting that problems in one domain affect the other [1, 3, 4]. A cross-sectional study with children aged 7–14 years reported that children with anxiety disorders had lower levels of school functioning than children without an anxiety disorder [30]. Results from a longitudinal study indicated that children who were highly anxious in first grade scored significantly lower academically and higher on symptoms of anxiety and depression in eighth grade [31]. Other longitudinal studies showed that internalizing symptoms in sixth grade led to lower grade point averages (GPA) in the same school year and predicted more depressive and anxious symptoms in the following school year [32]. Lower levels of achievement and attainment at 20 years of age have also been reported [33]. Results from a meta-analysis highlighted that depressive symptoms, more than anxiety symptoms, led to poorer school functioning [34]. However, other studies have not replicated these associations. Duncan et al. [35] summarized analyses from six longitudinal studies and reported no significant associations between internalizing symptoms from the age of school entry and later academic achievement in elementary school. For some of the studies, these non-findings were also evident in middle school [35]. The authors emphasized that the conclusion might have been different with a clinical sample.

Other studies describe associations between early academic failure and internalizing symptoms later in life [1, 36]. Masten and colleagues [37] found that low academic competence in children aged 8–12 years predicted internalizing symptoms 10 years later. Another study, including children in the same age range, reported that low academic attainment in primary school predicted increased internalizing symptoms later in life [38]. There were no gender differences for either age range.

Regarding gender, a meta-analysis of studies of youths aged 8–18 years reported that associations between anxiety and school failure were stronger in girls [34]. In another population study, girls aged 12–14 years achieved better academic results but had poorer wellbeing and more depressive symptoms than the boys. Both genders, however, have been associated with the same levels of school-related stress [39].

Overall, associations between school functioning and levels of internalizing symptoms are documented bidirectionally in both cross-sectional and longitudinal studies [1, 33, 34]. In addition, studies indicate that success in school functioning may be a protective factor against later development of mental health problems [1]. Thus, targeting domains of internalizing symptoms or poor school functioning may have the potential to be preventive in other domains, such as later school dropout and unemployment.

Internalizing symptoms in children under 10–11 years of age are usually reported by their parents [33, 35]. Teachers' reports are also often used when assessing internalizing symptoms in school [31, 40]. However, studies suggest that teachers may rate children's difficulties significantly lower than do the children themselves [41, 42]. In fact, teacher ratings are, on average, lower than the ratings of other informants. Larsson and Drugli [43] also found that teacher-rated internalizing symptoms among Norwegian school children aged 6–13 years were significantly lower than the average reported in Rescorla et al.'s study [44] examining these symptoms in 21 countries. This may indicate lower real prevalence rates of internalizing symptoms among Norwegian school children; on the other hand, Norwegian teachers may underreport internalizing symptoms even more than do teachers in other countries. One explanation of the latter may be that overt and disruptive behaviors might manifest more in the classroom and may lead to teachers being less attentive to children with internalizing symptoms [45].

However, previous research suggests that different informants contribute unique information about a child's problems [42, 46]. In other words, the informant discrepancies may reflect individual differences in how behavior is displayed based on context and the informants involved, and may reflect meaningful information on differences displayed by a child across different contexts [42, 46]. Thus, it is necessary to recognize the individual informants' unique perspectives on internalizing symptoms. Because of this, it has been advocated that ratings from different informants are preferred [46, 47]. According to a recent review of assessments of psychosocial functioning in school-based services and research, informant discrepancies seem to be consistent across samples and studies over time [47]. This can make it difficult to draw conclusions as to the prevalence, outcomes and efficacy of interventions. There is a difference between measuring the characteristics of a subject and the different informants' perceptions of those characteristics; in the latter case, preference should often be given to the reports of the different informants [48]. To further investigate the perceptions of different informants, there is a need to be more sensitive to the informant's context [47].

To obtain a more complete and valid picture of how internalizing symptoms in young children are expressed in a school setting and how different informants view this issue, we examined both the teachers' and young school children's perceptions of the children's internalizing symptoms. In addition, we investigated whether these symptoms affected the children's academic achievement and school adaptation at this young age. The target group in the current study was school children aged 8–12 years with elevated symptoms of anxiety

and/or depression, as assessed by the children themselves. The children were participating in an indicative intervention study, thus representing an at-risk population. This represents a targeted sample more seldom studied than general population or clinical samples.

Examining how symptoms of anxiety and depression as expressed at school are seen by both teachers and the children themselves may improve and broaden our understanding of at-risk children. By focusing especially on symptomatic sub-groups, we can determine if there are different relations between symptom level and school functioning, as seen by different informants. Previous research indicates that teachers are not always aware of children's internalizing problems [42]. Thus, it is important to investigate possible discrepancies to see how these differences are manifested in a school setting. Based on this, we studied the associations between internalizing symptoms as assessed by the teachers and children with elevated symptom levels of anxiety and depression, as well as how their internalizing symptoms were associated with school functioning.

We first explored the characteristics of 8–12-year-old children with respect to school functioning in terms of academic achievement, school adaptation and internalizing symptoms, separately and for each gender. Internalizing symptoms in children were rated by the teachers as well as the children themselves, who answered questions about symptoms of anxiety and depression.

Then the following research questions were studied:

- (1). Are teacher-rated internalizing symptoms among young school children associated with academic achievement and school adaptation?
- (2). Are school children's self-reported symptoms of anxiety and depression associated with academic achievement and school adaptation?
- (3). Are teacher-rated internalizing symptoms associated with school children's self-reported symptoms of anxiety and depression?

We expected girls to perform better academically than boys, and to adapt better to school, as reported by their teachers. We also expected that more girls would report internalizing symptoms. Furthermore, we hypothesized that there were negative associations between internalizing symptoms and academic achievement, as well as school adaptation, as reported by the teachers. We then hypothesized that there would be negative associations between the children's self-reporting of anxiety and depressive symptoms and their academic achievement and school adaptation. Finally, we expected that the association between teacher-rated internalizing symptoms and children's self-reported symptoms of anxiety and depression would be relatively weak.

## Method

### Procedure

This study was part of a randomized controlled intervention study called *Coping Kids: Early Intervention for Anxiety and Depression*; The TIM study [49]. The aim of the TIM study was to investigate the effectiveness of a preventive group-based cognitive behavioral intervention called *EMOTION, Coping Kids Managing Anxiety and Depression* [50], which targets children aged 8–12 years with elevated levels of anxious and depressive symptoms. The intervention aims to reduce symptoms of anxiety and depression and possibly the likelihood of developing later disorders. Data used in the present study were based on the first data collection from the TIM-study. The Regional Committee for Medical and Health Research Ethics (2013/1909/REK South East) approved the study.

### Participants

A total of 36 primary schools from rural and urban areas in Norway participated in the study from 2014 to 2016. Approximately 7300 children from third to sixth grades (8–12 years of age) and their parents were informed about the study. Children were invited to participate if they (and/or their parents) considered themselves to have more sad or anxious feelings than their peers. After informed parental consent, 1692 children were invited to be screened using web-based questionnaires on symptoms of anxiety [51] and depression [52]. The screening took place in the schools, with teachers available to answer questions the children might have.

Of the screened children, 873 scored one standard deviation or more above a predetermined mean on self-reported anxiety and/or depression scales, and were invited to participate in the study. The cut-offs were based on Nordic and international studies in the relevant age group [53–55]. Of the 873 invited children, seven were excluded due to exclusion criteria: mental retardation, autism or severe behavioral disturbance. A total of 71 children were excluded randomly due to lack of resources (i.e. lack of group leaders implementing the intervention) and 45 dropped out before the intervention study started.

For included children, the children's main teacher was asked to complete a web-based questionnaire about the children's mental health and school functioning. In total, 750 children (58% girls) were rated by their teachers and thus, included in the present study. For more details on procedures, participants and sample size, see Patras et al. [49].

### Demographic information and age

Demographic information about the parents' educational level was collected using data reported by the mothers.

Because of the relatively low level of social inequality in Norway, and the importance of the parents' education level on both the children's school functioning and their mental health [56, 57], we used the parents' education level as a socio-economic status (SES) variable. We chose to use the mothers' education level as a proxy for SES because more mothers than fathers had answered the questionnaires ( $N = 472$  versus  $N = 91$ ). Mothers' education level ( $N = 472$ ) indicated that approximately 9% had completed up to 2 years of high school, 22% had finished high school, 35% had attended up to 4 years of college or university and 33% had attended college or university for more than 4 years. Mothers' education level was treated as a nominal variable in the analyses. Statistics Norway [58] reported that, of women between the ages of 25 and 49 years in the Norwegian population in 2017, approximately 17% had finished primary school, 2% had finished vocational school, 27% had finished high school, 38% had up to 4 years of college or university and 16% had attended college or university for more than 4 years. Thus, our sample had a skewed distribution of SES toward mothers with more education compared with the population data.

Regarding place of birth, 97% of the children, 93% of the mothers and 89% of the fathers were born in Norway (including up to 3% from Northern Europe) as reported by the mothers. We therefore did not include place of birth as a control variable in this study.

Month and year of birth were available for only 472 of the children. Therefore, class level was used as a proxy for age, which ranged from 8 to 12 years. Approximately 4% of the children were in third grade, 36% in fourth grade, 46% in fifth grade and 14% participated from the sixth grade. Generally, the children started in third grade the year they turned eight.

### Measures

#### *Teacher's report form (TRF)*

Teacher-rated academic achievement and school adaptation were assessed using the Teacher's Report Form (TRF), a component of the Achenbach System of Empirically Based Assessment (ASEBA) [59]. We used the part of the TRF pertaining to academic achievement and adaptation to school. The teachers were asked to evaluate the children in four academic subjects—Norwegian, English, mathematics and social studies—and compare them with other children of the same age using a scale ranging from 1 to 5 (1 = far below average, 5 = far above average). A sum score was calculated based on the teachers' answers on all four subjects, representing the academic achievement scale for the present study.

The TRF was also used to assess four characteristics that are considered important for school adaptation: [1] how hard he/she is working, [2] how appropriately he/

she is behaving, [3] how much he/she is learning and [4] how happy he/she seems to be. The teachers were asked to compare the child's characteristics with those of other children the same age on a scale ranging from 1 to 5 (1 = far below average; 5 = far above average), and a sum score was made representing the school adaptation scale.

The ASEBA system has shown good psychometric properties and has for decades been supported by research and feedback [44, 59]. In the present study, the internal consistency of the academic achievement scale was excellent (Cronbach's alpha = 0.90) and the school adaptation scale was satisfactory (Cronbach's alpha = 0.72).

#### The brief problem monitor – teacher form (BPM-T)

Internalizing symptoms in children were assessed by the teachers using the Brief Problem Monitor – Teacher form (BPM-T) [60], a short 18-item version of the TRF which provides a uniform problem scale to assess both behavioral and internalizing symptoms of children in a school setting. In the present study, only the subscale for internalizing symptoms was used. The teachers rated the child during the previous 2 weeks on six items: (1) feeling worthless or inferior, (2) too fearful or anxious, (3) feeling too guilty, (4) self-conscious or easily embarrassed, (5) unhappy, sad or depressed and (6) worried. The items were rated on a scale ranging from 0 to 2 (0 = not true, 1 = sometimes true, 2 = very true). The sum score was used to represent internalizing symptoms as reported by teachers.

A systematic review of Scandinavian studies reported the reliability of the BPM-T total score to be satisfactory [61]. Internal consistency of the internalizing symptoms scale in the present study was good (Cronbach's alpha = 0.82).

#### The multidimensional anxiety scale for children (MASC-C)

Symptoms of anxiety were reported by the children on the Multidimensional Anxiety Scale for Children (MASC-C) [51]. This 39-item questionnaire assesses anxiety symptoms in children and adolescents between 8 and 19 years. The children rated each question on a scale from 0 to 3 (0 = never true about me, 1 = rarely true about me, 2 = sometimes true about me, 3 = often true about me) based on their experience in the past 2 weeks, and a sum score was calculated.

The MASC-C has shown high retest reliability [51, 62]. It has been evaluated in a Norwegian sample among 7–13-year-old treatment-seeking children and has favorable psychometric properties [63]. In the present study, internal consistency of the scale was good (Cronbach's alpha = 0.84).

#### The mood and feelings questionnaire-short version (SMFQ)

Symptoms of depression were reported by the children using the short version of the Mood and Feelings Questionnaire (SMFQ) [52]. This 13-item questionnaire, targeting children from 8 to 18 years, assesses cognitive, affective and behavioral-related symptoms of depression during the previous 2 weeks. The symptoms were rated from 0 to 2 (0 = not true, 1 = sometimes true, 2 = true). A sum score was calculated.

Previous studies indicated good psychometric properties on the Norwegian version of the SMFQ [64, 65]. In the current study, internal consistency of the scale was good (Cronbach's alpha = 0.80).

#### Statistical analyses

Descriptive statistics are reported as means and standard deviations (SD) for the variables in the total sample, as well as separately for each gender. Comparisons between the genders on the main independent variables were performed using Student's t-test, and the Chi-square test was used for nominal variables.

Pearson correlations between the main variables—academic achievement, school adaptation, teacher-rated internalizing symptoms and children's self-report on symptoms of anxiety and symptoms of depression—are also presented.

We used linear regression models with teacher-rated academic achievement and school adaptation, entered one at a time, as dependent variables. We carried out one set of analyses with teacher-rated internalizing symptoms as main independent variables, and one set of analyses with self-reported anxiety symptoms and self-reported depression symptoms as main independent variables. We also used linear regression models with teacher-rated internalizing symptoms as dependent variables, and children's self-reported anxiety symptoms and self-reported depression symptoms as main independent variables. All analyses were adjusted for gender and class level.

Lastly, we replicated the analyses adjusting for mothers' education level. The adjustment for mothers' education level was done separately because it was reported for only 472 of the 750 participants. Two-sided *p*-values < 0.05 were considered statistically significant, and 95% confidence intervals (CI) are reported where relevant. Analyses were carried out using SPSS (v. 25; IBM SPSS, Armonk, NY, USA).

#### Results

Descriptive data for dependent and independent variables, as well as gender differences, are presented in Table 1. More girls (58%) than boys participated in the study. On the main variables, girls reported higher levels

of both academic achievement and school adaptation than boys, and scored higher on self-reported symptoms of anxiety and depression. Teachers, however, reported no gender differences on internalizing symptoms in the children.

Pearson correlations showed significant associations between academic achievement and school adaptation as assessed by the teachers (see Table 2). Internalizing problems were negatively correlated with both academic achievement and school adaptation. Furthermore, there was a negative association between children's self-report of depressive symptoms and school adaptation reported by the teachers.

### Academic achievement

In the first regression model, teacher-rated academic achievement was the dependent variable and internalizing symptoms in children was the main independent variable (see Table 3). Results from the regression analyses indicated that, according to the teachers, internalizing symptoms were negatively associated with academic achievement ( $B = -0.24$ ,  $CI = -0.33$  to  $-0.15$ ,  $p < 0.001$ ). Adjusting for mothers' education level gave substantially the same results, even though mothers' education level was positively associated with academic achievement.

Results from the second regression model, with children's self-reported symptoms of anxiety and depression as main independent variables and academic achievement as a dependent variable, are reported in Table 4. Self-reported symptoms of depression were negatively associated with academic achievement ( $B = -0.058$ ,  $CI = -0.110$  to  $-0.006$ ,  $p = 0.028$ ). Self-reported symptoms of anxiety were not associated with academic achievement. Adjusting for mothers' education level reduced the effect of depression to a non-significant level, and substantially reduced the effect of gender. This reduced effect of depression is not because of missing data on mothers' educational level, but due to adding the mothers' educational level to the model.

### School adaptation

The results of regression analyses with internalizing symptoms in children as rated by teachers as the main independent variable, and school adaptation as the dependent variable, are reported in Table 5. Internalizing symptoms rated by the teachers were negatively associated with school adaptation ( $B = -0.26$ ,  $CI = -0.32$  to  $-0.20$ ,  $p < 0.001$ ). Adjusting for mothers' education level gave substantially the same results.

Results from regression analyses with children's self-reported symptoms of anxiety and depression as the main independent variable and school adaptation as the dependent variable are reported in Table 6. Self-reported symptoms of depression were negatively associated with school adaptation ( $B = -0.061$ ,  $CI = -0.097$  to  $-0.025$ ,  $p < 0.001$ ). Self-reported symptoms of anxiety were not associated with school adaptation. Adjusting for mothers' education level produced substantially the same results.

### Internalizing symptoms as assessed by teachers and children

Results from regression analyses including teacher-rated internalizing symptoms as the dependent variable and children's self-reported symptoms of anxiety and depression as the main independent variables are reported in Table 7. Self-reported symptoms of depression were associated with teacher-rated internalizing symptoms ( $B = 0.072$ ,  $CI = 0.021$  to  $0.122$ ,  $p < 0.01$ ). Self-reported symptoms of anxiety were not associated with teacher-rated internalizing symptoms. Adjusting for mothers' education level gave substantially the same results.

### Discussion

The current study aimed to investigate associations between young children's academic achievement and school adaptation and internalizing symptoms, as reported by children and their teachers. We also examined associations between teachers' reporting of internalizing symptoms and the children's self-report of symptoms of anxiety and depression.

**Table 1** Mean and standard deviation (SD) for the main variables in the sample

	All N = 750	Girls N = 435	Boys N = 315	Gender differences <i>p</i> -value
Academic achievement (T) <sup>a</sup>	11.81 (3.33)	12.11 (3.36)	11.38 (3.25)	0.003
School adaptation (T) <sup>a</sup>	12.15 (2.46)	12.86 (2.32)	11.17 (2.32)	< 0.001
Internalizing problems (T) <sup>a</sup>	2.57 (2.61)	2.46 (2.57)	2.73 (2.64)	0.166
Anxiety symptoms (S) <sup>b</sup>	63.60 (13.60)	66.53 (12.78)	59.55 (13.68)	< 0.001
Depression- symptoms (S) <sup>b</sup>	9.92 (4.89)	10.34 (4.92)	9.35 (4.79)	0.006

Note: Academic achievement = TRF/ASEBA (Range 4–20); School adaptation = TRF/ASEBA (Range 5–20); Internalizing problems = BPM-T (Range 0–12); Anxiety symptoms = MASC (Range 0–105); Depression symptoms = SMFQ (Range 0–26); (T) = Teacher rated; (S) = Self-report; <sup>a</sup> = High values indicate good performance; <sup>b</sup> = Higher values indicate more problems or symptoms

**Table 2** Pearson correlation matrix for the main variables in the sample  $N = 750$

	Academic achievement (T)	School adaptation (T)	Internalizing problems (T)	Anxiety symptoms (S)	Depressive symptoms (S)
Academic achievement (T)	1				
School adaptation (T)	0.656*** < 0.001	1			
Internalizing problems (T)	-0.189*** < 0.001	-0.286*** < 0.001	1		
Anxiety symptoms (S)	0.015 0.689	0.039 0.281	0.112*** < 0.001	1	
Depressive symptoms (S)	-0.068 0.061	-0.086** 0.018	0.160*** < 0.001	0.332*** < 0.001	1

Note: Academic achievement = TRF/ASEBA; School adaptation = TRF/ASEBA; Internalizing problems = BPM-T; Anxiety symptoms = MASC; Depression symptoms = SMFQ; (T) = Teacher rated; (S) = Self-report; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

The main findings indicated consistently that both teacher-reported internalizing symptoms and children’s self-report of depressive symptoms were negatively associated with academic achievement and school adaptation. Children’s self-reported anxiety symptoms were associated with neither teacher-rated academic achievement nor school adaptation. Furthermore, self-reported symptoms of depression were associated with teacher-rated internalizing symptoms, while self-reported symptoms of anxiety were not.

The descriptive data show that the total mean in academic achievement in our sample of children, who had elevated symptoms of anxiety and/or depression, was slightly lower than in the Larsson and Drugli [43] national population-based study of children from 6 to 13 years of age (Mean 2.9 versus 3.2). The total mean score in school adaptation was lower in our sample of at-risk children compared to the same national sample of children with a comparable age range (Mean 12.15 versus 17.19), as presented by Larsson and Drugli [43]. The children in our study might therefore be at risk for later problems regarding mental health and both achieving at school and school attendance [1, 36–38].

The girls in our study scored higher than the boys on teacher-rated academic achievement and school adaptation, which supports our hypothesis. These findings are in accordance with results from several previous studies [14, 21], which found that girls do better academically

and adapt better to school than boys. Larsson and Drugli [43] found that girls aged 6–13 scored significantly higher than boys on teacher-reported total adaptive functioning, as well as on factors such as working hard, appropriate behavior and learning. They did not, however, find gender or age differences for academic performance on average. Our findings, using the same measurement (TRF) as Larsson and Drugli, however, indicate that girls have higher academic achievement and adapt better to school, as reported by their teachers. Among children with internalizing symptoms, boys might be more strongly affected than girls on domains such as academic performance and adaptation to school.

The children in our study were quite young and school demands are still low. In addition, the school system in Norway at the primary school level is generally not very competitive compared with other countries. When the children start middle school (13 years of age), grades, final exams and national tests will be introduced for the first time. The academic work may therefore be more challenging in middle school and high school. By that time, more academic problems may have emerged, which might also influence the level of internalizing symptoms.

In our study, the children were included based on a cut-off score that was one standard deviation or more above a chosen population-based mean on anxiety and/or depression scales. Thus, the sample might be

**Table 3** Regression model: Academic achievement as dependent variable and internalizing problems as main covariate

Independent variables	Academic achievement (T)	
	B (95% CI) N = 750	Adj. B (95% CI) N = 472
Internalizing problems (T)	-0.24*** (-0.33 to -0.15)	-0.22*** (-0.33 to -0.12)
Female gender	0.67* (0.19 to 1.14)	0.60* (0.02 to 1.18)
Class level	0.05 (-0.26 to 0.36)	0.069 (-0.31 to 0.45)
Mothers education level		0.89*** (0.60 to 1.17)

Note: B Regression coefficient, adjusted for gender and class level; Adj B: Adjusted for gender, class level and mother’s education level; Academic achievement = TRF/ASEBA; Internalizing problems = BPM-T; (T) = Teacher rated; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Table 4** Regression model: Academic achievement as dependent variable and symptoms of anxiety and depression as main covariates

Independent variables	Academic achievement (T)	
	B (95% CI) N = 750	Adj. B (95% CI) N = 472
Anxiety symptoms (S)	0.004 (−0.016 to 0.023)	0.006 (−0.015 to 0.027)
Depression symptoms (S)	−0.058* (−0.110 to −0.006)	−0.042 (−0.101 to 0.017)
Female gender	0.77** (0.27 to 1.26)	0.43 (−0.14 to 1)
Class level	0.04 (−0.27 to 0.36)	0.12 (−0.24 to 0.48)
Mothers education level		0.83*** (0.56 to 1.10)

Note: B Regression coefficient, adjusted for gender and class level; Adj B: Adjusted for gender, class level and the mothers education level; Academic achievement = TRF/ASEBA; Anxiety symptoms = MASC; Depression symptom = SMFQ; (T) = Teacher rated; (S) = Self-report; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

relatively heterogenous with a broad range of symptoms. The relatively narrow standard deviations found in our sample, however, point to the opposite. Despite the young age of our sample, and the fact that this is not a clinical sample, the children in our study had higher levels of self-reported anxiety (Mean 63.60) than those in studies of children aged 7–13 years, both in a Norwegian clinical sample (Mean 57.00) [66]; and in a sample of referrals for anxiety with an anxiety diagnosis (Mean 55.22) [63]. Both these studies also used the MASC-C self-report instrument. Accordingly, the level of depressive symptoms in our sample, as measured by the SMFQ, was higher than in a large population-based study of 10–19-year-olds (Mean age = 13.8) from Middle Norway (Mean 9.92 vs. 4.50) [64]. This confirms that the children in our study represented an at-risk sample exhibiting elevated levels of subjective symptoms. Our findings might suggest that many of the children in our sample have high symptom levels which in many cases have not been detected. This underscores the need for early intervention for this group of children.

The girls in our study reported significantly higher levels of symptoms than the boys, both on self-reported symptoms of anxiety and depression, which also supports our hypothesis. These findings are in accordance with previous research [5, 29].

As hypothesized, the teachers reported fewer internalizing symptoms than the children themselves, as seen in Table 1. Even though the teachers knew that these

children were recruited to the study based on elevated levels of internalizing symptoms, which could lead to judgement bias, the teachers scored many of the participating children relatively low on internalizing symptoms. The mean (Mean 2.57) in teacher-reported internalizing symptoms is in the lower quartile of the range of 0–12. The means on children’s self-reported symptoms of anxiety (Mean 63.60. Range 0–105) and of depression (Mean 9.92. Range 0–26) are close to the midpoints of the ranges. One reason for this might be that internalizing symptoms in general may be under-reported by teachers, as inner thoughts, feelings and mood are not easily observable [41, 42]. The teachers also reported no gender differences for internalizing symptoms. Similar findings were identified in a population-based study of children of the same age in Norway [43, 67]. It is possible that when it comes to internalizing symptoms as assessed by their teachers, the mental health of Norwegian schoolboys and schoolgirls is equally good. On the other hand, teachers may miss actual gender differences.

As hypothesized, internalizing symptoms as assessed by the teachers in our study were negatively associated with academic achievement and school adaptation for both genders, regardless of age and mothers’ educational level. Thus, the teachers did believe that those children with emotional symptoms also struggled at school. One possible source of bias is that the same informant reported on both measurements. However, the questions about school functioning and internalizing symptoms do

**Table 5** Regression model: School adaptation as dependent variable and internalizing problems as main covariate

Independent variables	School adaptation (T)	
	B (95% CI) N = 750	Adj. B (95% CI) N = 472
Internalizing problems (T)	−0.26*** (−0.32 to −0.20)	−0.25*** (−0.33 to −0.17)
Female gender	1.62*** (1.30 to 1.94)	1.59*** (1.18 to 2.00)
Class level	0.10 (−0.11 to 0.32)	0.11 (−0.15 to 0.37)
Mothers education level		0.43*** (0.23–0.63)

Note: B Regression coefficient, adjusted for gender and class level; Adj B: Adjusted for gender, class level and mother’s education level; School adaptation = TRF/ASEBA; Internalizing problems = BPM-T; (T) = Teacher rated; \*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001



**Table 6** Regression model: School adaptation as dependent variable and symptoms of anxiety and depression as main covariates

Independent variables	School adaptation (T)	
	B (95% CI) N = 750	Adj. B (95% CI) N = 472
Anxiety symptoms (S)	-0.002 (-0.015 to 0.011)	-0.006 (-0.022 to 0.010)
Depression symptoms (S)	-0.061*** (-0.097 to -0.025)	-0.058* (-0.103 to -0.012)
Female gender	1.76*** (1.41 to 2.11)	1.69** (1.25 to 2.13)
Class level	0.09 (-0.13 to 0.31)	0.18 (-0.10 to 0.47)
Mothers education level		0.43** (0.22 to 0.64)

Note: B Regression coefficient, adjusted for gender and class level; Adj B: Adjusted for gender, class level and the mothers education level; School adaptation = TRF/ASEBA; Anxiety symptoms = MASC; Depression symptoms = SMFQ; (T) = Teacher rated; (S) = Self-report; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

not seem to overlap. Furthermore, the teachers knew the inclusion criteria for the children in the study.

Internalizing symptoms may also be expressed differently in younger children than in adolescents [68]. In children aged 8 to 12 years, depressive symptoms and anxiety are often expressed by an irritable mood and argumentative behavior. The teachers might interpret these symptoms as externalizing symptoms, rather than internalizing symptoms. In school, teachers are supposed to evaluate how the children are doing academically as part of their ordinary job and they are well trained in such evaluations. It is probably easier for teachers to evaluate how a child is doing when it comes to academic achievement and school adaptation than to know how a child feels internally. Internalizing symptoms may be difficult for teachers, health personnel or parents to identify [46], as the teacher may perceive an anxious or depressed child as calm and obedient and as a child who does not create any trouble or noise in a busy classroom. Nevertheless, as assessed by the teachers, there were strong associations between teacher-rated internalizing symptoms and how the children functioned at school.

Only children's self-reported depressive symptoms, not anxiety symptoms, were associated with teacher-rated academic achievement and school adaptation. Furthermore, the associations were weak. We hypothesized that there would be an association between both symptoms of anxiety and depression as assessed by the children

and how well these children performed academically and adapted to school. Nevertheless, the results indicate that the children with depressive symptoms did not do well at school. Depressive symptoms and thoughts, such as reduced ability to have fun, reduced ability to concentrate, restlessness, feeling they were not as good as other classmates, doing everything wrong and having little energy can cause these children to do less well at school than their capabilities suggest. These results are supported by Riglin's [34] meta-analysis, which stated that depression was more consistently associated with poor school functioning than anxiety.

When mothers' education level was added to the regression model, the association between children's self-reported depression and academic achievement were reduced to a non-significant level. This indicates that having a mother with a high level of education might reduce the negative effects that depressive symptoms have on academic achievement. Earlier studies found that SES and especially educated parents were a predictor of increased learning [15, 17, 19, 20]. Those parents might, through learning strategies, structure and close supervision, mitigate the possible negative school implications of their children's depressive symptoms.

As stated earlier, the children's anxiety symptoms were not associated with academic achievement and school adaptation. Anxious children might work harder to meet the school's requirements despite their worries which

**Table 7** Regression model: Internalizing problems as dependent variable and symptoms of anxiety and depression as main covariates

Independent variables	Internalizing problems (T)	
	B (95% CI) N = 750	Adj. B (95% CI) N = 472
Anxiety symptoms (S)	0.017 (0.001 to 0.036)	0.017 (0.002 to 0.036)
Depression symptoms (S)	0.072** (0.021 to 0.122)	0.071** (0.020 to 0.122)
Female gender	-0.455 (-0.941 to 0.031)	-0.450 (-0.937 to 0.038)
Class level	0.152 (-0.158 to 0.462)	0.151 (-0.159 to 0.462)
Mothers education level		-0.054 (-0.289 to 0.181)

Note: B Regression coefficient, adjusted for gender and class level; Adj B: Adjusted for gender, class level and the mothers education level; Internalizing problems = BPM-T; Anxiety symptoms = MASC; Depression symptoms = SMFQ; (T) = Teacher rated; (S) = Self-report; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

may or may not be related to school performance. Previous findings on this matter are contradictory [30, 31, 35]. Our study does not present a clinical sample, thus the children's internalizing symptoms might not yet have a recognizable impact on school functioning and demands are quite low at this grade level. This might change when the children enter high school, where increased school demands combine with additional symptomatology. Furthermore, their anxiety symptoms might be related to issues other than school functioning.

Regarding inter-rater agreement, the children's self-report of depressive symptoms, and not symptoms of anxiety, was associated with teacher-rated internalizing symptoms. This finding indicates that the teachers detect children with depressive symptoms more easily than those with anxiety symptoms. Depressed children can be perceived as less joyful, with diminished interest in activities, reduced motivation or energy and commitment to school work, tiredness, restlessness and irritable mood. The teacher might more easily observe these factors as such symptoms become more starkly contrasted with expected child behavior. On the other hand, it might be more difficult for teachers to differentiate between a pathological fear and a more natural fear of stressful school situations. Another possibility is that since these children seem to struggle academically, teachers can more easily identify them. When teachers try to support children who are struggling academically, they may find that some of these children have depressive symptoms. However, children with anxious symptoms who nevertheless do relatively well at school are not easily detected in the same way by their teacher. Caution should be exercised when teachers are used as informants to refer children to indicated interventions for anxiety.

As the results from the current study and previous research [46, 47] indicate outcomes do not always coincide when using different informants on internalizing symptoms. This doesn't mean that either one is wrong; different informants offer different perspectives and observations across different contexts. If we assume that the teachers are best at evaluating the children's school functioning, and that the children themselves know best how they feel, the model regarding academic achievement and school adaptation involving the two different informants is probably the most accurate one. Studies indicate that children's self-report of anxious and depressive symptoms can be tailored to identify these symptoms [69, 70], as well as getting the subjective perspective from the children themselves. This indicates that young children who consider themselves anxious do not always struggle at school. However, we do not know whether these symptoms may influence the children's academic achievement and school adaptation later in life.

### **Strengths and limitations of the study**

A strength of the study was the high response rate from both children and their teachers.

The present study was related to baseline data of an indicated preventive intervention trial that included an at-risk population of children with elevated symptom levels of anxiety and/or depression. This represents a sample more seldom studied than general population samples or clinical samples.

Although the children in our study had elevated symptom levels of anxiety and depression, and some of the children might have qualified for a diagnosis, the current sample was not a clinical population. The findings cannot therefore be generalized to a clinical sample.

The children and their parents were invited to the study based on the children's self-evaluation of sad and anxious symptoms, which may have led to more children coming forward with their internalizing problems.

A strength of the study was the use of two informants—the teachers and the children—for the reporting of internalizing symptoms. Although they used different measures, multiple informants may indicate cross-methodological validity of the results: they have also demonstrated that results can differ by informants. However, adding parental information about the children's internalizing symptoms and functioning to this study could have further strengthened the validity of the findings.

A limitation of this study was the cross-sectional design, which prevented us from making any causal inferences. Only longitudinal studies can reveal whether internalizing symptoms in young children are predictive of later disorders and later school functioning.

Another limitation may be that teachers who reported on the children in our study knew that the children had been included based on self-reported internalizing symptoms, which may have caused a possible bias in their judgement of severity. Despite this, the teachers reported fewer internalizing symptoms than did the children themselves.

Since we recruited children by using self-reported measures only, we might have missed out on children who could find it difficult to participate in studies like this (e.g. socially anxious and withdrawn children). To reach these children, and had the parents permitted it, we could have contacted school counsellors, psychologists or school nurses to nominate possible children, thus increasing representativity and possibly making it easier for the teacher to detect child anxiety in this study. However, such an approach was not approved by the ethical committee in Norway. In addition, distinguishing between different types of anxiety problems could have provided a more differentiated understanding of how these difficulties are perceived by the teachers.

Nearly 70% of mothers had up to 4 years of post-secondary education, meaning that there was a skewed distribution of SES. This level of education is relatively high compared to the 2017 Statistics Norway population data [58]. The education levels of the mothers being a strong predictor of successful learning and academic achievement [19, 20], might have buffered the full negative effects of internalizing symptoms on school functioning in this sample.

However, there was a substantial amount of missing data regarding family background. One might assume that families with low SES or a non-Norwegian background were underrepresented among parents who participated. This might have influenced the results. In sum, our results are representative of a group of children displaying depressive and/or anxious symptoms and whose mothers are more highly educated than the rest of the population. Hence, the results do not necessarily apply to children with internalizing symptoms from a non-Norwegian background.

We did not measure intelligence level, or the children's experience of family support or teacher support, information that is related to both emotional symptoms and school functioning [17, 19, 20]. Such information might have moderated the results.

## Conclusion

Both teacher-rated internalizing symptoms and children's self-report of depressive symptoms were associated with academic achievement and school adaptation, independent of age and gender. Anxiety symptoms per se, as assessed by the children, were not associated with teacher-rated academic achievement or school adaptation. Children's self-report of depressive symptoms were associated with teacher-rated internalizing symptoms, while children's self-report of anxiety symptoms were not.

Teachers should be more aware of the symptoms of childhood depression—and especially anxiety—as these children often go undetected [6, 7]. More emphasis on such problems—how to observe, detect and alleviate them—could be implemented in teacher education programs. Schools in Norway are obligated to provide a healthy and safe environment for learning and development. This involves seeing each child's needs, helping them and referring them to relevant agencies when needed. How a teacher perceives the children in the classroom might also influence how they facilitate their teaching of these children.

This study supports the importance of recognizing children's subjective internalizing symptoms in the school context and addressing preventive efforts before they enter the challenging puberty years. Children with internalizing symptoms might be at risk for later

psychiatric disorders and problems in different domains. Effective screening instruments in schools might be helpful for the detection of anxiety problems. Interventions in the school setting to improve internalizing symptoms, especially depressive symptoms, may have important long-term consequences for children and for society.

## Abbreviations

ASEBA: Achenbach System of Empirically Based Assessment; BPM-T: Brief Problem Monitor – Teacher form; CI: Confidence interval; GPA: Grade point average; MASC-C: Multidimensional Anxiety Scale for Children; SD: Standard deviation; SES: Socio-economic status; SMFQ: Mood and Feelings Questionnaire-short version; TRF: Teacher's Report form

## Acknowledgements

We would like to thank all the children, parents and teachers who participated in the study, and the school personnel and project coordinators for their invaluable assistance in data collection.

## Authors' contributions

MLP contributed to the data collection, reviewed the literature, performed and interpreted statistical analyses, drafted and revised the manuscript. AMS, SPN, KM, FA and SH contributed to the study design and data collection. AMS and SH were involved in drafting and revising the manuscript and interpreting statistical analyses. SL, in addition to being involved in revising the manuscript, contributed to performing and interpreting the statistical analyses. KM, SPN and FA made substantial contributions in critically revising the manuscript. All authors read and approved the final manuscript.

## Funding

The Norwegian Research Council (NFR), project number 228846, funded the TIM-study.

This current study was funded by the Norwegian Extra Foundation for Health Rehabilitation through the Norwegian Council of Mental Health and the Liaison Committee for Education, Research and Innovation in Central Norway and The Central Norway Regional Health Authority (HMN). They had no role in designing the study, collecting data, analysis or interpretation of data, or in writing the manuscript.

## Availability of data and materials

The datasets generated and/or analyzed are not publicly available due to privacy policy but are available from the author on reasonable request.

## Ethics approval and consent to participate

The Regional Committee for Medical and Health Research Ethics of Norway (REC), South East, approved this study. Registration number: 2013/1909; Project title: Coping Kids: a randomized controlled study of a new indicated preventive intervention for children with symptoms of anxiety and depression. The authors were provided with written informed consent from parents regarding their children's participation in the study.

## Consent for publication

Not applicable.

## Competing interests

Author AMS has received Congress fee and travel support from Medice. Author KM receives royalties from sales of the Emotion manual. The other authors declare that they have no competing interest with publishing this article.

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Received: 12 April 2019 Accepted: 8 December 2019



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## Paper III







ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/csje20>

## Targeting Internalizing Symptoms in Children: What is the Impact on School Functioning?

M. L. Pedersen, S. Holen, A. M. Sund, F. Adolfsen, M. E. Løvaas, K. D. Martinsen, S.-P. Neumer, J. Patras, L.-M. Rasmussen & S. Lydersen

To cite this article: M. L. Pedersen, S. Holen, A. M. Sund, F. Adolfsen, M. E. Løvaas, K. D. Martinsen, S.-P. Neumer, J. Patras, L.-M. Rasmussen & S. Lydersen (2022): Targeting Internalizing Symptoms in Children: What is the Impact on School Functioning?, Scandinavian Journal of Educational Research, DOI: [10.1080/00313831.2022.2042849](https://doi.org/10.1080/00313831.2022.2042849)

To link to this article: <https://doi.org/10.1080/00313831.2022.2042849>



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# Targeting Internalizing Symptoms in Children: What is the Impact on School Functioning?

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## ABSTRACT

Internalizing problems may be associated with poor academic performance and school absenteeism among youth. This study investigated the impact of the EMOTION: “Coping Kids” Managing Anxiety and Depression Program on academic achievement and school adaptation in children. Data were collected in a national cluster-randomized controlled trial at three time points in Norway. Children ( $N = 688$ , 8–12 years), who had elevated levels of anxiety or depressive symptoms from 36 schools participated. There were no significant differences between the intervention and control groups post-intervention or at 12-month follow-up regarding academic achievement and school adaptation. Likewise, no significant intervention effects were identified for school-related variables in the anxiety-only, depression-only, or combined (anxiety and depression) groups. The intervention did not have an impact on school functioning. Thus, focusing on school-related challenges and enhanced collaboration with teachers, possibly through a tailored version of the EMOTION program, could be an interesting adaptation of the intervention.

## ARTICLE HISTORY

Received 23 April 2021  
Accepted 6 February 2022

## KEYWORDS

School functioning;  
academic achievement;  
school adaptation; anxiety;  
depression; internalizing  
problems; intervention; CBT;  
elementary school

## Introduction

Good school functioning is important to promote children’s social functioning and mental health and prevent absenteeism in primary school and possible dropouts from upper-secondary school (Durlak et al., 2011; Gustafsson et al., 2010; Ingul et al., 2012; O’Connor et al., 2018; Sagatun et al., 2014). Children with healthy cognitive and socio-behavioral development who can cope with new situations and peers tend to adapt well to school (Haynes et al., 2003; Tetzchner, 2012). School functioning refers to a wide range of aspects, including school attendance, learning capacity, academic achievement, attitudes, behaviors, and social relationships (Gustafsson et al., 2010).

Studies have shown a bidirectional association between children’s mental health and school functioning, with problems in one domain affecting the other (Bru et al., 2016; Gustafsson et al., 2010; Ogden & Hagen, 2014; Weidman et al., 2015). For children, internalizing problems (e.g., anxiety and depression) and living with various risk factors may lead to academic difficulties,

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and academic difficulties could lead to internalizing problems later in life (Deighton et al., 2018; Grover et al., 2007; Masten et al., 2005; McCarty et al., 2008). Despite the potential negative impact on different life domains, including school functioning, children with internalizing problems are less likely to receive help than children with externalizing problems (Heiervang et al., 2007; Stallard et al., 2008). Interventions that address internalizing problems, especially depression in younger children (i.e., prior to middle school; Arora et al., 2019) are rare. A study on available mental health services for children across Europe showed that there is a substantial unmet need for mental health care (Kovess-Masfety et al., 2017). This circumstance involves costs and represents serious problems not only for individuals but also for the society, and it has consequences for public health (Reneflot et al., 2018).

School interventions targeting internalizing problems are often based on principles from cognitive behavioral therapy (CBT) (Paulus et al., 2016). An overview of systematic reviews and meta-analyses on school based mental health interventions, including anxiety and/or depression as an outcome variable, showed that school interventions can have a positive preventive effect on anxiety and depression (Skogen et al., 2018). In addition, most of these studies revealed that the interventions had small positive effects in the reduction of anxiety and/or depression. However, these effects were only statistically significant for up to 12 months after the intervention (Hetrick et al., 2016; Moreno-Peral et al., 2017; Stockings et al., 2016; Werner-Seidler et al., 2017).

School-based interventions may reach children of all ages with internalizing problems (Cheung et al., 2007; Mifsud & Rapee, 2005), potentially improving their school functioning and providing opportunities for collaboration between mental health professionals and school personnel. Although schools are considered a suitable arena for prevention, there is a lack of knowledge on how best to implement interventions in these settings (Hugh-Jones et al., 2021). Prevention programs can be universal (targeting all children), selective (targeting risk groups; e.g., children of parents with psychopathology), or indicated (targeting high scorers for predefined problems) (Greenberg, 2010; Mrazek & Haggerty, 1994). Selective and indicated programs aimed at preventing anxiety or depression in children and adolescents have shown to be more promising than universal ones, according to several reviews and meta-analyses (Fisak et al., 2011; Hetrick et al., 2016; Horowitz & Garber, 2006; Hugh-Jones et al., 2021; Merry et al., 2012; Stice et al., 2009). In contrast, a recent review revealed that there is a lack of evidence to support any one type of intervention as being effective in preventing depression in universal or targeted settings; in addition, to reduce anxiety symptoms, universal settings that included mindfulness and relaxation techniques achieved better results (Caldwell et al., 2019). Furthermore, several studies have argued that there is insufficient evidence to support the implementation of prevention programs for depression (Arora et al., 2019; Hetrick et al., 2016).

Research on intervention effects has mainly focused on symptom reduction as the primary outcome measure; however, Swan and Kendall (2016) highlighted the importance of examining changes in school functioning in addition to in other domains. A review of over 100 studies on universal, selective, and indicated school-based interventions for depression, revealed that few interventions focused on academic outcomes, especially for pre-adolescents (Arora et al., 2019). Earlier meta-analyses have pointed out that only a minority of studies included academic outcomes (mostly academic scores and school attendance) (Hoagwood et al., 2007; Sanchez et al., 2018). The majority of studies focused on externalizing problems (prevention of behavioral problems) and adopted universal approaches, having modest effects on academic outcomes that were not sustainable over time. The lack of inclusion of academical outcomes in mental health interventions is somewhat surprising given the extensive research on the associations and bidirectional associations between mental health and academic achievement.

Previous studies suggested that universal programs that promote individual well-being, social interaction, and coping skills may influence a wider range of outcomes, such as the atmosphere and daily life in school and academic achievement (Adi et al., 2007; Durlak et al., 2011; Holen et al., 2013). However, due to a lack of research on long-term, school-related outcomes, the benefits of school-based programs over time are somewhat unclear (Durlak et al., 2011). In addition,

Durlak's (2011) meta-analysis did not include children with preexisting emotional or academic problems, and only 15% of the included studies reported academic outcomes. One study, including academic outcomes, reported no effect on academic performance after participating in a universal FRIENDS-program (Skryabina et al., 2016). Results were based on standardized tests in reading, writing, and math at 12 months post-intervention, without assessment of other outcomes, such as adaptation, attendance, or attitudes toward school. Another study with children aged 12–13 years from low socioeconomic backgrounds showed that even the indicated version of the FRIENDS for life had no impact on school adjustment, according to self- and teacher-report measures (Rodgers & Dunsmuir, 2015). The program has CBT components (e.g., coping step plans or relaxation) that could be tailored to target specific anxiety symptoms associated with school functioning, and that specifically adjusting to academic settings could have produced a different result. In contrast, a meta-analysis of anxiety-focused CBT for children and adolescents from clinical samples reported results limited not only to symptom reduction but also showing functional improvement in several areas, including school, family, and peer interactions. At follow-up, these gains appeared to be maintained or even improved (Kreuze et al., 2018). Other studies that investigated the impact of anxiety reduction on academic achievement after participation in CBT-based interventions, have found improved achievement in children aged 6–13 years (Suveg et al., 2009; Wood, 2006), improved overall school functioning in children aged 7–17 years (completing assignments, concentrating on work, doing homework, getting good grades, giving oral reports, taking tests/exams, writing in class) (Nail et al., 2015), and improved grade point averages (GPA) in children aged 13–16 years (Weems et al., 2009). However, all these studies were performed on clinical samples, and except for one, academic performance was rated by parents.

As described above, interventions targeting anxiety and depressive symptoms vary with respect to their effects on school functioning; some report improvements, while others do not. Furthermore, most studies have included children in the clinical range or been conducted on adolescents. In addition, most of the evaluated school-based programs were universal, aiming at behavioral problems. School outcomes of mental health interventions are scarce, and if present, they tend to be based on grades, standardized performance scores, or parent-rated school-performance. Few studies have investigated whether an indicated, preventive intervention targeting both anxiety and depressive symptoms has the potential to improve school functioning in children. In the current study, we examined the effectiveness of the Norwegian version of the transdiagnostic EMOTION: “Coping Kids” Managing Anxiety and Depression Program (Martinsen et al., 2014), on academic achievement and school adaptation, measured as secondary outcomes. Academic achievement is understood as a child's academic performance in different subjects, and school adaptation is defined as adaptive functioning at school (e.g., effort, behavior, learning, mood) compared to other children of the same age. Previous findings indicated that the children participating in this study had significantly reduced anxiety and depressive symptoms (Martinsen et al., 2019), increased emotional regulation skills (Loevaas et al., 2019), and increased self-reported quality of life and self-esteem after participating in the EMOTION intervention (Martinsen et al., 2021). Further, at 12-month follow-up, participating children and parents reported a small, but significant, reduction in anxiety symptoms, while parents reported a significant reduction in depressive symptoms (Løvaas et al., 2020). Considering these findings, we aimed to examine whether the positive effects of the intervention also extended to improved academic achievement and school adaptation, as assessed by the children's teachers. Thus, we investigated the following research questions:

1. Does the EMOTION intervention, which targets anxiety and depression among 8- to 12-year-old children, improve academic achievement and school adaptation post-intervention and at 12-month follow-up?
2. Are there any differences in the intervention effects when the children are divided into three subgroups based on baseline symptom levels: (i) anxiety symptoms only, (ii) depressive symptoms only, or (iii) combined symptoms of anxiety and depression?

## Materials and Methods

### Procedure

The study was based on a cluster randomized controlled trial (cRCT) investigating the effects of the indicated EMOTION intervention for children, delivered in a school setting. The trial was approved by the Data Inspectorate and the Regional Committee for Medical and Health Research Ethics of Norway (REC), Region South and East Norway, and is registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) (Identifier: NCT02340637, June 2014).

Thirty-six public schools from rural, urban, and suburban areas in Northern, Middle, and South-East Norway participated in the study. Cluster randomization was performed at the school level in the first semester of data collection. The 36 schools were matched for size and geographic location and randomly assigned to either the control or intervention condition, with 18 schools in each condition. Due to feasibility and to avoid contamination between participants within the same school, the conditions were maintained throughout the waves.

Power calculations, accounting for the multi-level nature of the sample, were performed prior to the main study. A sample comprising a total of 560 children from 23 schools was deemed sufficient, based on an anticipated effect size on anxiety and depression of 0.35, and an intraclass correlation coefficient of 0.05. For more details, see the study protocol (Patras et al., 2016). The intervention ran from 2014 until 2016, with new children entering every semester. Data were collected electronically pre-intervention (T1), directly post-intervention (T2), and at 12-month follow-up (T3) in 2017. Teachers answered questionnaires about each child at all three time points. Participants could withdraw from the study at any time. For more details regarding the effectiveness study, see Patras et al. (2016).

### Participants

Children between the ages of 8–12 years ( $N = 7,322$ ) who considered themselves to be more sad or anxious than their peers were invited to participate in the screening phase. Children who returned an informed consent form ( $N = 1,692$ ) were assessed for self-reported anxiety and depressive symptoms. Children who reported one standard deviation (SD) or more above the population mean on anxiety and/or depression were invited to participate in the study ( $N = 873$ ). Population means were based on results from national and international studies for the relevant age groups (Angold et al., 2002; Ólason et al., 2004; Rhew et al., 2010).

Seven children who, for different reasons, were not expected to benefit from the intervention (e.g., developmental delays, autism, severe behavioral disturbance), were excluded. Due to lack of sufficient number of group leaders to implement the intervention, 71 children were excluded from the intervention condition; 74 children (67 intervention and 7 control) withdrew before the intervention started. In total, 688 children, for whom corresponding teacher-reports were also available, were enrolled in the current study (57.9% girls); 269 received the intervention and 419 constituted the control group. Both the control and intervention schools were given half-day seminars, during their working hours, designed to increase knowledge of internalizing symptoms in children and how teachers could support these children.

Grade level was used as a proxy for age; third to sixth grade represented 8–12 years of age. Approximately 4.4% of the participating children were in the third grade, 38.2% in the fourth grade, 45.6% in the fifth grade, and 11.8% in the sixth grade. Most of the children lived with both of their parents (71%). The majority of families had average to above-average income levels (82%) (Statistics-Norway, 2019b) and reported higher education levels than the national average in Norway (i.e., 67% with a college or university education). Comparatively, the corresponding education level in the general Norwegian population is approximately 33% (Statistics-Norway, 2019a).

## Intervention

The EMOTION: “Coping Kids” Managing Anxiety and Depression intervention is an indicated prevention program developed to reduce anxiety and depressive symptoms (transdiagnostic) in children and is implemented in groups in a school setting. The program is manual-based and integrates core components of empirically supported treatments for anxiety (the Coping Cat program; (Kendall et al., 2006)) and depression (Action; (Stark et al., 2007)) in children.

The intervention is CBT-based, includes 20 group meetings, and focuses on teaching children coping skills and strategies to deal with difficult thoughts, feelings, and situations. The first ten sessions focus on psychoeducation, including strategies to regulate mood, problem-solving skills, and understanding feelings and bodily reactions. The next ten sessions focus on building a positive self-schema, cognitive restructuring, working with behavioral activation targeting depressive symptoms (e.g., making activity plans, talking with peers), and graded exposure to fear-inducing situations for anxious children. Additionally, parents meet in groups seven times, four of which are together with their child. The corresponding parent meetings are intended to increase support for their children. Individual aims related to the child’s daily life, at school, at home, and during leisure activities, are decided for each child in the first joint meeting and continually revised together with parents and children.

In the present study, two trained group leaders from primary or secondary health services delivered the EMOTION program in groups of three to seven children, twice a week for ten weeks (45–60 min each session). The same group leaders also led the parent groups. Group leaders participated in a three-day training seminar, covering basic CBT principles and the EMOTION manual. Additionally, trained CBT therapists provided weekly supervision to the group leaders during the intervention period. Of the total number of sessions, 20% were randomly chosen to be videorecorded, due to both organizational reasons and security reasons. Fidelity to the intervention was assessed by scoring 239 observations, which corresponded to 17% of the sessions, using the Competence and Adherence Scale for Cognitive Behavioral Therapy (CAS-CBT); (Bjaastad et al., 2015), and was found to be good overall (Rasmussen et al., 2021). The remaining 3% of videorecords could not be rated due to the limited quality of the recordings (e.g., sound problems, zoom not correct, or incomplete recording).

## Measures

Teachers rated *academic achievement* and *school adaptation* on an adapted version of two factors from the Teacher’s Report Form (TRF). The TRF is a component of the Achenbach System of Empirically Based Assessment – ASEBA (Achenbach & Rescorla, 2001), investigating students’ problem areas, academic performance, and adaptive functioning at school. Norwegian elementary school students (8–12 years old) do not have exams or grades. Evaluating and following-up on students is part of teachers’ regular work; therefore, teachers’ subjective evaluations, as assessed by the TRF, were used.

*Academic achievement* was thus assessed by teachers’ evaluation of children’s performance in Norwegian, English, Mathematics, and Social Studies rated on a scale from 1 (*far below mean*) to 5 (*far above mean*), as compared to children of the same age. A mean item score was calculated based on the teachers’ answers for all four subjects, representing the academic achievement scale.

*School adaptation* was evaluated by teachers assessing the children’s work effort, behavior, learning skills, and mood on a scale from 1 (*far below mean*) to 5 (*far above mean*). A mean score was calculated based on the teachers’ answers for all four characteristics, representing the school adaptation scale.

The ASEBA system has shown good psychometric properties and has been supported by research for decades (Achenbach & Rescorla, 2001; Rescorla et al., 2007). Previous studies on the Norwegian version of the TRF have shown good to excellent internal consistency; however, test-

retest reliability and inter-rater reliability have not been documented (Kornør & Drugli, 2011). In the present study, internal consistency at baseline was excellent for the academic achievement scale (Cronbach's alpha = 0.90) and satisfactory for the school adaptation scale (Cronbach's alpha = 0.72).

*Anxiety symptoms* were assessed using the Multidimensional Anxiety Scale for Children – MASC-C (March et al., 1997), a 39-item self-report scale designed for children and adolescents between 8 and 19 years old. Children rated each question on a scale ranging from 0 to 3 (0 = *never true*, 1 = *rarely true*, 2 = *sometimes true*, 3 = *often true*), based on their experiences in the past two weeks. A total sum score was calculated and used in the present study.

The MASC-C has shown high retest reliability (March et al., 1997, 1999) and favorable psychometric properties in a Norwegian sample (Villabø et al., 2012). The internal consistency of self-reported anxiety symptoms at baseline in the present study was good (Cronbach's alpha = 0.84).

*Depressive symptoms* were assessed by the children, using the Mood and Feelings Questionnaire-short version – SMFQ (Angold et al., 1995), which comprises 13 items and assesses cognitive, affective, and behavioral symptoms of depression during the last two weeks in children 8–18 years old. Symptoms are rated on a scale ranging from 0 to 2 (0 = *not true*, 1 = *sometimes true*, 2 = *true*). A total sum score was calculated and used in the present study.

Previous studies indicated good psychometric properties for the Norwegian-version SMFQ (Larsson et al., 2016; Richter & Sund, 2013). In the current study, internal consistency of self-reported depressive symptoms at baseline was good (Cronbach's alpha = 0.80).

### **Statistical Analysis**

We compared the intervention and control groups at baseline regarding teacher-reported academic achievement and school adaptation and child-rated symptoms of anxiety and/or depression. The children were also grouped based on symptom presentation: anxiety symptoms only, depressive symptoms only, or combined symptoms (anxiety and depression). Possible differences based on grade level (age) and gender were examined using Student's *t*-test, linear-by-linear test for association, or Pearson's chi-squared test, as appropriate.

We used linear mixed model analyses with academic achievement and school adaptation as dependent variables. We included child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusting for gender and grade level. The three timepoints were baseline (T1), post-intervention (T2), and 12-month follow-up (T3). We also conducted the analyses separately for the subgroups defined by the symptom profile: anxiety symptoms only, depressive symptoms only, and combined symptoms.

Statistical significance was set at  $p < 0.05$ , and 95% confidence intervals (CI) were reported where relevant. Statistical analyses were conducted using SPSS v26.

### **Results**

The baseline characteristics of the total sample and the intervention and control groups are presented in Table 1, and for the subgroups in Table 2. At baseline, the intervention group scored significantly higher than the control group on anxiety and depressive symptoms (Table 1). For the dependent variables (academic achievement and school adaptation), there were no group differences at baseline. When divided by subgroups, there were significant differences in school adaptation for the anxiety-only subgroup; the intervention group scored lower than the control group (Table 2). There were also significant differences for the depression-only subgroup; the intervention group scored higher than the control group on school adaptation.

Of the 688 cases included in the sample at baseline, 627 yielded data for academic achievement and school adaptation at one or more timepoints. Among those, 29 had data only at baseline and post-intervention, 6 had data only at baseline, and 26 had data only at baseline and the 12-month follow-up.

**Table 1.** Descriptive statistics for all participants at baseline.

	All ( <i>N</i> = 688)	Intervention condition ( <i>n</i> = 269)	Control condition ( <i>n</i> = 419)	Differences between conditions; <i>p</i> -value
Academic achievement (T) <sup>1</sup>	2.96 (0.83)	2.997 (0.825)	2.968 (0.807)	0.649 <sup>a)</sup>
School adaptation (T) <sup>1</sup>	3.03 (0.62)	3.0362 (0.617)	3.051 (0.598)	0.760 <sup>a)</sup>
Anxiety symptoms (S) <sup>2</sup>	63.60 (13.60)	65.67 (13.22)	62.37 (13.53)	<b>0.002</b> <sup>a)</sup>
Depressive symptoms (S) <sup>2</sup>	9.92 (4.89)	10.53 (5.29)	9.43 (4.56)	<b>0.005</b> <sup>a)</sup>
Grade level (age)				
3rd	30 (4.36%)	12 (4.5%)	18 (4.3%)	0.554 <sup>c)</sup>
4th	263 (38.23%)	103 (38.3%)	160 (38.2%)	
5th	314 (45.64%)	116 (43.1%)	198 (47.3%)	
6th	81 (11.77%)	38 (14.1%)	43 (10.3%)	
Gender (female)	398 (57.85%)	170 (63.2%)	228 (54.4%)	<b>0.023</b> <sup>b)</sup>

Note: Mean (SD) or *n* (%). *N* = 688. Academic achievement = TRF (Range 4–20); School adaptation = TRF (Range 5–20); Anxiety symptoms = MASC-C (Range 0–105); Depressive symptoms = SMFQ (Range 0–26); (T) = Teacher rated; (S) = Self-report; <sup>1</sup> High value indicate good performance; <sup>2</sup> Higher values indicate more problems or symptoms; <sup>a)</sup> Student's *t*-test; <sup>b)</sup> Pearson's chi-square test; <sup>c)</sup> Linear-by-linear association.

**Table 2.** Descriptive statistics for subgroups at baseline.

	Intervention condition	Control condition	Differences between conditions. <i>p</i> -value <sup>a)</sup>
<i>Anxiety symptoms only:</i>	<i>n</i> = 49	<i>n</i> = 94	
Academic achievement (T) <sup>1</sup>	2.98 (0.73)	3.22 (0.82)	0.092
School adaptation (T) <sup>1</sup>	3.00 (0.52)	3.24 (0.62)	<b>0.024</b>
<i>Depressive symptoms only:</i>	<i>n</i> = 67	<i>n</i> = 129	
Academic achievement (T) <sup>1</sup>	3.09 (0.84)	2.88 (0.77)	0.076
School adaptation (T) <sup>1</sup>	3.20 (0.67)	3.0 (0.56)	<b>0.024</b>
<i>Combined symptoms:</i>	<i>n</i> = 153	<i>n</i> = 196	
Academic achievement (T) <sup>1</sup>	2.96 (0.85)	2.91 (0.81)	0.548
School adaptation (T) <sup>1</sup>	2.98 (0.60)	3.0 (0.60)	0.736

Note: Mean (SD). Academic achievement = TRF (Range 4–20); School adaptation = TRF (Range 5–20); (T) = Teacher rated; <sup>1</sup> High value indicate good performance; <sup>a)</sup> Student's *t*-test.

**Table 3** show changes in academic achievement and school adaptation. There were no significant differences in changes from baseline to post-intervention between the intervention and control groups for academic achievement, difference  $\Delta = -0.027$ , 95% CI (–0.102 to 0.047),  $p = 0.469$ , or from baseline to 12-month follow-up,  $\Delta = -0.074$ , 95% CI (–0.148 to 0.0002),  $p = 0.051$ . There were no significant differences in changes from baseline to post-intervention between the intervention and control groups for school adaptation, difference  $\Delta = 0.0499$ , 95% CI (–0.0194 to 0.1193),  $p = 0.158$ , or from baseline to 12-month follow-up,  $\Delta = 0.039$ , 95% CI (–0.029 to 0.10z87),  $p = 0.266$ .

**Table 3.** Mixed model analyses, with child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusted for gender and grade level.

Time	Dependent variable	Intervention condition			Control condition			Difference from T1 (interaction between group and time)	<i>p</i> - value
		<i>n</i>	Mean* (SE)	(SE)	<i>n</i>	Mean* (SE)	(SE)	Estimate (95% CI)	
Baseline (T1)	Academic achievement	269	2.989	0.050	419	2.968	0.040		
	School adaptation	269	3.015	0.036	419	3.064	0.029		
Post-intervention (T2)	Academic achievement	260	3.004	0.050	396	3.015	0.040	–0.027 (–0.102 to 0.047)	0.469
	School adaptation	260	3.068	0.037	396	3.067	0.029	0.0499 (–0.0194 to 0.1193)	0.158
Follow-up at 12 months (T3)	Academic achievement	263	3.007	0.050	390	3.065	0.040	–0.074 (–0.148 to 0.0002)	0.051
	School adaptation	263	3.115	0.037	390	3.125	0.030	0.039 (–0.0290 to 0.1087)	0.266

Note: \*Estimated marginal means and standard errors. Academic achievement and school adaptation – Teacher's Report Form (TRF).



**Table 4.** Anxiety-only subgroup ( $n = 143$ ): Mixed model analyses, with child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusted for gender and grade level.

Time	Dependent variable	Intervention condition $n = 49$			Control condition $n = 94$			Difference from T1 (interaction between group and time) Estimate (95% CI)	$p$ - value
		$n$	Mean*	(SE)	$n$	Mean*	(SE)		
Baseline (T1)	Academic achievement	49	2.949	0.114	94	3.228	0.082		
	School adaptation	49	2.956	0.079	94	3.259	0.057		
Post-intervention (T2)	Academic achievement		2.952	0.114		3.232	0.083	-0.001365 (-0.158381 to 0.155650)	0.986
	School adaptation		3.048	0.080		3.275	0.058	0.071719 (-0.075212 to 0.228570)	0.321
Follow-up at 12 months (T3)	Academic achievement		2.891	0.114		3.259	0.082	-0.089379 (-0.245922 to 0.067165)	0.262
	School adaptation		3.075	0.080		3.307	0.058	0.071719 (-0.079724 to 0.223163)	0.352

Note: \*Estimated marginal means and standard errors. Academic achievement and school adaptation – Teacher's Report Form (TRF).

**Table 5.** Depression-only subgroup ( $n = 196$ ): Mixed model analyses, with child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusted for gender and grade level.

Time	Dependent variable	Intervention condition $n = 67$			Control condition $n = 129$			Difference from T1 (interaction between group and time) Estimate (95% CI)	$p$ - value
		$n$	Mean*	(SE)	$n$	Mean*	(SE)		
Baseline (T1)	Academic achievement	67	3.091	0.097	129	2.883	0.070		
	School adaptation	67	3.184	0.073	129	3.004	0.053		
Post-intervention (T2)	Academic achievement		3.103	0.098		2.988	0.071	-0.092647 (-0.246887 to 0.061594)	0.238
	School adaptation		3.204	0.074		3.040	0.053	-0.016693 (-0.156224 to 0.122839)	0.814
Follow-up at 12 months (T3)	Academic achievement		3.007	0.098		3.057	0.071	-0.257625 (-0.413412 to -0.101839)	<b>0.001</b>
	School adaptation		3.183	0.074		3.076	0.054	-0.074395 (-0.215295 to 0.066506)	0.300

Note: \*Estimated marginal means and standard errors. Academic achievement and school adaptation – Teacher's Report Form (TRF).

**Table 6.** Combined subgroup ( $n = 349$ ): Mixed model analyses, with child as a random factor, and intervention group, time, and their interaction as fixed factors, adjusted for gender and grade level.

Time	Dependent variable	Intervention condition $n = 153$			Control condition $n = 196$			Difference from T1 (interaction between group and time) Estimate (95% CI)	$p$ - value
		$n$	Mean*	(SE)	$n$	Mean*	(SE)		
Baseline (T1)	Academic achievement	153	2.956	0.067	196	2.909	0.059		
	School adaptation	153	2.960	0.048	196	3.008	0.043		
Post-intervention (T2)	Academic achievement		2.975	0.067		2.931	0.059	-0.001463 (-0.101603 to 0.098676)	0.977
	School adaptation		3.015	0.049		2.984	0.043	0.078359 (-0.016495 to 0.173213)	0.105
Follow-up at 12 months (T3)	Academic achievement		3.041	0.067		2.978	0.059	0.016079 (-0.083696 to 0.115855)	0.752
	School adaptation		3.099	0.048		3.068	0.043	0.078369 (-0.016148 to 0.172887)	0.104

Note: \*Estimated marginal means and standard errors. Academic achievement and school adaptation – Teacher's Report Form (TRF).

Tables 4–6 show the separate analyses for the subgroups defined by symptom profile: anxiety-only ( $n = 143$ ), depression-only ( $n = 196$ ), and combined ( $n = 349$ ). There were no significant differences regarding academic achievement and school adaptation, from baseline to post-intervention or baseline to 12-month follow-up, between the intervention and control groups for the anxiety-only (Table 4) and combined subgroups (Table 6). For the depression-only subgroup, there were no significant differences from baseline to post-intervention for either academic achievement or school adaptation. However, the depression-only subgroup did show significant improvement for academic achievement in the control group from baseline to 12-month follow-up, difference  $\Delta = -0.258$ , 95% CI ( $-0.413$  to  $-0.102$ ),  $p = 0.001$  (Table 5). There were no long-term significant differences for school adaptation.

## Discussion

The main results indicated no significant positive effects on academic achievement or school adaptation after participating in the EMOTION intervention. Furthermore, when looking closer at the different subgroups (anxiety-only, depression-only, and combined), results showed no significant improvements in academic achievement or school adaptation post-intervention or at 12-month follow-up.

The children participating in the present study had higher levels of self-reported anxiety than those in studies with a comparable age range, both in a Norwegian clinical sample (Villabø et al., 2013) and a sample referred to clinics for anxiety (Villabø et al., 2012). Furthermore, children in the present study reported higher depressive symptoms than those in a large national population-based pooled sample of children aged 10–19 years (Larsson et al., 2016). Previous studies used the same anxiety or depression measures as in the current study (Angold et al., 1995; March et al., 1997). Hence, children in the present study represented an at-risk sample, exhibiting elevated levels of internalizing symptoms.

Nevertheless, since the participating children scored higher for anxiety and depression symptoms than the general population, one might expect correspondingly lower scores on academic achievement and school adaptation, as shown in previous studies (Bru et al., 2016; Gustafsson et al., 2010; Ogden & Hagen, 2014). However, the children's mean academic achievement score in the total sample was slightly lower than in a national population-based study of children aged 6–13 years (Larsson & Drugli, 2011), both assessed using the TRF (Achenbach & Rescorla, 2001). School adaptation indicated the same pattern (Larsson & Drugli, 2011). This suggests that even at these symptom levels, the children in our sample managed to uphold a certain academic standard. Although it was not accounted for in the current analyses, families in the present study had a high education level and above-average income, which could influence academic achievement (Statistics-Norway, 2019a, 2019b). Socioeconomic background is a strong predictor for successful learning and academic achievement (Backe-Hansen et al., 2014). Thus, resourceful and supportive families, often with higher education as in our sample, may buffer the otherwise negative effects of internalizing symptoms on school functioning.

Somewhat surprisingly, results from the current study showed no significant differences between the EMOTION and control groups on academic achievement or school adaptation from baseline to post-intervention or from baseline to 12-month follow-up. The lack of effect on school functioning in the current study contrasts with Kreuze et al.'s (2018) meta-analysis reporting that anxiety-focused CBT improved both short- and long-term general functioning, including school outcomes. Other studies have also demonstrated improvement in school performance post-intervention (Keogh et al., 2006; Nail et al., 2015; Weems et al., 2009). However, these interventions targeted older children or clinical samples. The lack of improvement reported in the present study might be due to the participating children's young age. Norwegian children do not receive grades or have annual standardized tests at school until they are 13–14 years of age; therefore, the demands from school might be lower compared to other countries. Norwegian schools have high levels of

autonomy in implementing curricula and assessments (Borgonovi et al., 2018); however, the national government plays a central role in ensuring minimum quality standards are met, including norms for academic achievement in all subjects. This means that children are compared to other children of the same age group across the country. Additionally, the Norwegian school system generally includes all children; therefore, the teachers aim to provide education adapted to meet the needs of each child (Overland, 2015). Norwegian teachers may be less attuned to academic achievement and school adaptation than they are to other potential challenges (e.g., children's well-being and social competence).

Results from the current study also showed that, when divided into subgroups, a small but significant long-term improvement was identified in the depression-only subgroup on academic achievement in the control group; children with only depressive symptoms in the control group showed improved academic achievement at 12-month follow-up as compared to the those who participated in the EMOTION intervention. This was an unexpected finding which is difficult to explain. The teachers' assessments of the children could have been influenced by being aware that these children were included in the study. At the control schools, the teachers might have made extra efforts and facilitated the school day for them. However, previous analysis in the EMOTION study including the same children as the current study, contradicts these findings (Pedersen et al., 2019). Teachers scored the participating children low on internalizing problems despite knowing they were included in the study based on their internalizing symptoms. Consequently, there was a strong association between teacher ratings of internalizing problems and children's school functioning. Thus, when teachers reported that children had emotional symptoms, they were also more likely to report that these children struggled at school (Pedersen et al., 2019).

As mentioned previously, the children who participated in the EMOTION intervention also reported reduced anxiety and depressive symptoms (Martinsen et al., 2019) and improved emotional regulation skills (Loevaas et al., 2019), quality of life, and self-esteem (Martinsen et al., 2021) compared to non-participating children. However, although the differences were significant, they were small. Hence, it may be less likely to expect changes in other secondary outcome measures, such as school functioning. This is supported by other studies indicating that small reductions in anxiety have no effect on academic performance (Skryabina et al., 2016). Nevertheless, reduced anxiety and depressive symptoms are still important to facilitating school functioning (Bos et al., 2006; Jozefiak et al., 2009; Thaulow & Jozefiak, 2012); thus, the intervention may have the potential to facilitate academic achievement and school adaptation over time.

To improve effectiveness for school outcomes, the EMOTION intervention might be tailored more toward components in anxiety or depressive symptoms specifically related to school functioning. Rodgers & Dunsmuir (2015) suggested that CBT interventions have several relevant components (e.g., coping and problem-solving strategies). One approach could be to focus specifically on school-related challenges using the components of the EMOTION intervention, such as handling difficult academic tasks to build problem-solving skills, addressing perceived school pressure when teaching children how to think realistically, offering more frequent feedback on children's coping skills, and helping children conduct class presentations. The inclusion of competence skills such as positive mental health in interventions for children with internalizing problems may also promote their learning potential (O'Connor et al., 2018).

A systematic review of mental health promotion and prevention in schools, indicated that effective interventions included characteristics such as teaching skills, linking mental health work with academic learning, and focusing on positive health (Weare & Nind, 2011). According to the findings in the review, integrating mental health issues in the school curriculum seemed to have a greater impact compared with focusing on specific issues. It was also more efficient with a robust targeted component for high-risk children. The EMOTION intervention conducted as part of this study did not directly include the teachers in the program; however, implementing this intervention within schools provided opportunities for closer collaboration between group leaders and teachers. Furthermore, including teachers more frequently during intervention implementation and showing

them how to support affected children and participate in exposure exercises, may help teachers reinforce the effects in a school setting.

Clinical studies including children with anxiety symptoms have shown parent-reported improvement in academic performance (Nail et al., 2015; Suveg et al., 2009; Wood, 2006). This suggests that our results may have been different if parents were included as informants for school functioning. Furthermore, one might assume that the children's perceived increased self-esteem could have a positive effect on their self-perception of academic achievement and school adaptation; thus, using the children as informants might have shown different results for school functioning. Self-perceived academic competence is important because it has been shown to be predictive of school dropouts (Quiroga et al., 2013). Nevertheless, a lack of improvement in teacher-rated school functioning is particularly notable, given that the children and their parents reported intervention effects in several other domains (Loevaas et al., 2019; Martinsen et al., 2019, 2021).

While previous studies have shown positive results for academic achievement, they were primarily conducted with adolescents whose problems might have reached a clinical range, with academic tasks that were likely more demanding compared to those experienced by the present sample. Adolescents are also more at risk for school absenteeism or missing important curricula due to internalizing problems (e.g., avoidance, reduced energy, decreased motivation). As the children in the present sample grow older, promoting well-being and coping skills may have a positive influence on a wider range of outcomes, including school functioning (Adi et al., 2007; Durlak et al., 2011).

### **Strengths and Limitations**

The present study was part of a multi-site effectiveness study. The cRCT design and large, heterogeneous sample size, and the diversity among schools from rural, urban, and suburban communities were strengths of the study. Other strengths were the use of well-established measures to assess school functioning and internalizing symptoms and including teacher reports in an intervention study targeting both anxiety and depressive symptoms. The response rates from both children and teachers were also high.

However, there are some limitations. The self-selective nature of the indicated sample implies that it was not representative for the targeted child population. Thus, there might be children relevant for this study that were not included because they did not enroll. This may have led to a skewed socioeconomic level, due to parents' higher education and income compared to the general population.

Children aged 8–12 years do not take exams or receive grades in Norway, which could have provided a more objective assessment of academic achievement. Thus, since only teachers' subjective evaluations were available, academic tests administered by the research team would have allowed for a more objective assessment of the children's academic performance. Using additional school-related surveys or gathering information on school functioning from multiple informants, including children and parents, could have added important information and yielded different results. Furthermore, there were relatively few questions regarding academic achievement and school adaptation; thus, the TRF scales might not have been sensitive enough to detect small changes.

It was recommended that group sessions be planned with teachers to avoid children missing too many lessons; afterschool group sessions were recommended if possible. Unfortunately, there are no records of lessons missed. If too many school lessons were missed, academic achievement may have been negatively affected.

Another limitation was that there were no restrictions on what treatment, if any, the children in the control group received during the intervention period. Both parents and teachers were informed of the screening results and encouraged to seek help if they considered it necessary.

Ideally, more than 17% of the sessions should have been observed to ensure fidelity. However, due to practical reasons, this was not possible. Together with checklists that were completed for

each session by the group leaders and the standardized written materials that were provided, we still believe that the level of treatment integrity was satisfactory for a study conducted in municipal services (Perepletchikova et al., 2007).

## Conclusion and Future Directions

Based on the current findings, the EMOTION intervention does not appear to impact academic achievement and school adaptation, as reported by teachers. The intervention, however, still provides children with different skills and strategies to deal with depressive or anxious feelings, which are useful in several life domains.

To increase children's school functioning, one approach could be to facilitate the use of the EMOTION intervention to address school-related challenges and goals more specifically. A separate module for teachers could also be designed and included in the intervention. For instance, teachers could be included through weekly teacher meetings or asked to participate as one of the two group leaders who run the intervention, to facilitate a greater focus on school-related tasks. Thus, more extensive collaboration with teachers with tailored and more comprehensive school measures and support when implementing the intervention could potentially produce a different outcome regarding school functioning.

## Acknowledgements

We would like to thank all the children, parents, and teachers who participated in the study, and the school personnel and project coordinators for invaluable assistance in the data collection.











## Disclosure Statement

Author KM receives royalties from sales of the EMOTION manual. The other authors declare no competing interests.

## Funding

The Norwegian Research Council [grant number: 28846]; funded the RCT study. The current study was supported by [the DAM Foundation through the Norwegian Council of Mental Health #1] under [grant number: 2017/FO144706]; and [the Liaison Committee for Education, Research and Innovation in Central Norway and the Central Norway Regional Health Authority #2] under [grant number 90168800]. The funders had no role in the study or the manuscript.

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ISBN 978-82-326-6356-9 (printed ver.)  
ISBN 978-82-326-5993-7 (electronic ver.)  
ISSN 1503-8181 (printed ver.)  
ISSN 2703-8084 (online ver.)



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