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**Abstract**

**Objective:** To examine the effectiveness of a transdiagnostic program (i.e., EMOTION) targeting symptoms of anxiety and depression in school children by comparing the intervention condition (EC) to a control condition (CC).

**Method:** A clustered randomized design was used with schools as the unit of randomization. Children (N = 1,686) aged 8 – 12 years in 36 schools completed screening using the Multidimensional Anxiety Scale (MASC-C) and The Mood and Feelings Questionnaire Short version (SMFQ). Scoring 1 SD above a population-based mean on anxiety and/or depression, 873 children were invited to participate. Intent-to-treat analyses were performed, and mixed effects models were used.

**Results:** Analyses revealed significant reductions of anxious and depressive symptoms as reported by the children, where children in the intervention condition EC had almost twice the reduction in symptoms compared to the control condition CC. For parent report of the child's depressive symptoms, there was a significant decrease of symptoms in the intervention condition EC compared to CC. However, parents did not report a significant decrease in anxious symptoms in the intervention condition EC as compared to CC.

**Conclusion:** A transdiagnostic prevention program, provided in schools, was successful in reducing youth-reported symptoms of anxiety and depression, and parent-reported depression. The EMOTION program has the potential to reduce the incidence of anxious and depressive disorders in youth.

**Keywords;** Anxiety, depression, transdiagnostic intervention, prevention, early intervention

**Public health significance:** Anxiety and depression are common in youth and have unwanted effects on their functioning. Targeting both anxiety and depression in one protocol has important public health significance: symptom levels can be reduced thus preventing children from developing full blown disorders.

## The transdiagnostic EMOTION program

27 Anxiety and depression are prevalent and impairing disorders in childhood (e.g.,  
28 Merikangas, Nakamura, & Kessler, 2009). The disorders often co-occur and may result in  
29 greater impairment and worse prognosis (Cummings, Caporino, & Kendall, 2014). Youth  
30 with subclinical levels of anxious and depressive symptoms experience significant  
31 impairment, and the symptoms predict later disorders (Kovacs & Lopez-Duran, 2010; Pine,  
32 2007). Despite the high prevalence and negative sequela, there is a gap between the children  
33 in need and those few receiving care (Chavira, Stein, Bailey, & Stein, 2004; Heiervang et al.,  
34 2007). Prevention in a school setting with early identification and initiation of early symptom-  
35 reducing interventions may bridge this gap. Previous research suggests modest, but positive  
36 effects regarding prevention of anxiety and depression in school settings (e.g., Werner-  
37 Seidler, Perry, Calear, Newby, & Christensen, 2017). Transdiagnostic interventions targeting  
38 more than one disorder/problem, are promising approaches to tackle both symptom  
39 presentations in anxious and sad children (Ehrenreich-May & Chu, 2014).

40 The present study evaluated the effectiveness of a ten-week transdiagnostic indicated  
41 prevention program (i.e., EMOTION; Kendall, Stark, Martinsen, O'Neil, & Arora, 2013)  
42 targeting anxious and depressive symptoms in children aged 8 – 12 years compared to a  
43 control condition (CC). We hypothesized that the intervention would be more effective than  
44 CC as measured by a decrease in symptoms of anxiety and symptoms of depression reported  
45 by children and by parents. A prior study (Martinsen, Kendall, Stark, & Neumer, 2016) found  
46 high acceptability. The current study is the largest to date investigating the effectiveness of a  
47 transdiagnostic prevention program in schools.

### 48 Method

#### 49 Study design and participants

50 This study used a clustered randomized design, for description of protocol, see Patras  
51 et al. (2016). Schools (36 from seven sites in Norway) were randomized. Allocation of the  
52 schools to (a) EMOTION intervention (EC) or (b) control condition (CC) involved pairing

53 schools based on geography, school-size and demography, and then randomly assigning  
54 schools. The Regional Committees for Medical and Health Research Ethics (2013/1909/REK  
55 South-East) approved the study.

56 Recruitment used multiple gating as symptomatic children were the target group for  
57 the intervention. Children and parents were informed about the study, then children  
58 experiencing symptoms of anxiety and/or depression and with parental consent, were  
59 screened. Inclusion/exclusion criteria are in Table 1. The parents of children scoring above the  
60 cut-off completed questionnaires. For demographics and flow of children in study, see Table  
61 1 and Figure 1. ----- *Insert Table 1 and Figure 1 about here* -----

## 62 **Measures**

63 MASC-C/P (March, 1997). This 39-item, child self-report, assesses anxiety in youth  
64 ages 8 - 19 during the last two weeks. Internal consistency of the MASC-C in the present  
65 study was  $\alpha = 0.91$  and  $\alpha = 0.90$  for MASC-P.

66 SMFQ-C/P (Angold, Costello, Messer, & Pickles, 1995). The Mood and Feelings  
67 Questionnaire Short version (SMFQ) has 13 questions assessing cognitive, affective and  
68 behavioral-related depressive symptoms in youth ages 8 – 18 during the last two weeks.  
69 Internal consistency of the SMFQ-C in the present study was  $\alpha = 0.94$ , for the parent version  
70 SMFQ-P,  $\alpha = 0.88$ .

## 71 **The intervention and procedures**

72 The indicated preventive intervention was the Norwegian version of the  
73 transdiagnostic EMOTION, Coping Kids Managing Anxiety and Depression program  
74 (Martinsen, Kendall, Stark, Rodriguez, & Arora, 2014) for youth aged 8 – 12 years  
75 considered at-risk for emotional difficulties. EMOTION is cognitive-behavioral and based on  
76 the notion that anxiety and depression arise from a combination of a diathesis that in the  
77 presence of stress leads to their expression. The intervention targets disturbances in cognition,  
78 affect regulation, problem solving and coping skills that are indicated as transdiagnostic

79 mechanisms of change (Kendall et al., 2014). The EMOTION intervention includes group  
80 meetings with children and with their parents (see Table 2).

81 ----- *Insert Table 2 about here* -----

82 Primarily psychologists and school health nurses provided the EMOTION intervention  
83 after a 3-day training. CBT supervisors gave weekly supervision to EMOTION group leaders.  
84 The control condition (CC) involved normal contact with school health nurse/physician.

### 85 **Statistical analysis**

86 Power calculations accounted for multilevel data with an effect size of 0.35, power of  
87 0.80, an alpha of 0.05 (see also Patras et al., 2016). Accordingly, the number of children  
88 needed was 630 recruited from 36 schools.

89 Mixed effects models were used, giving valid inference for missing at random values  
90 in dependent variables. Fixed effects included a time by randomization group interaction, and  
91 analyses were adjusted for gender and age group (3<sup>rd</sup> and 4<sup>th</sup> grade = younger; 5<sup>th</sup> and 6<sup>th</sup> =  
92 older). Subgroup analyses for gender and age group were performed; results can be obtained  
93 from first author. The missing at random assumption was supported by statistical analysis.

94 Intent-to-treat analysis (ITT) was used. The statistical program IBM SPSS (version 22)  
95 was used for descriptive analyses. Estimation of mixed effects models used the R (The R  
96 Foundation for Statistical Computing, Vienna, Austria) package nlme.

### 97 **Results**

98 Means on primary outcomes of anxiety and depression as reported by children and  
99 parents are presented in Table 3.

100 ----- *Insert Table 3 about here* -----

### 101 **Intervention effects – children**

102 We first ran the analyses with schools included. This multilevel model was unstable  
103 for anxiety and within some subgroups for depression, so models were run without the school  
104 level for child- and parent data. The results are in Table 4. The interaction of Time and

105 Condition was significant, indicating a larger reduction in anxious symptoms in the EC  
106 compared to CC. In the EC, there was a reduction in anxious symptoms of 11.83 points,  
107 corresponding to a reduction between 17.4 % and 19.7 % depending on gender and age group.  
108 In CC, the reduction was 4.63 points, corresponding to a reduction between 7.0 % and 8.0 %  
109 depending on gender and age group. There was a significant difference between the EC and  
110 CC at posttreatment where the CC youth were 5.35 points higher than the EC youth, see  
111 Figure 2A. We found a significant difference in the two conditions for gender, where girls had  
112 6.99 higher scores than boys. The difference by age group was not significant in the two  
113 conditions.

114 -----Insert Figure 2A and 2B and Table 4 about here -----

115 For depressive symptoms, the Time X Condition interaction was significant,  $p = 0.04$ .  
116 The intervention resulted in a decrease in depressive symptoms of 2.31 points, corresponding  
117 to a reduction between 21.0 % and 25.0 % depending on gender and age group. The CC  
118 reduction was 1.50 points, corresponding to 14.6 % and 17.6 %. At pre-intervention, the  
119 difference between the conditions was significant, where CC was 0.73 points lower than EC.  
120 At postintervention, the difference was not significant (see Figure 2B).

### 121 **Intervention effects by parents' report**

122  
123 Parent report was collected from 615 parents, where 568 answered both primary  
124 outcome questions at pre- ( $n = 268$  EC,  $n = 300$  CC), and 421 parents provided answers post-  
125 intervention ( $n = 193$  EC,  $n = 228$  CC). Non-responders at both T1 and T2 were excluded  
126 from analysis.

127 The Time X Condition Interaction was not significant for parent-reported anxiety  
128 (Table 4). There were significant differences between conditions at both pre- and post-  
129 intervention. At pre- and at post, the parent reported EC scores were higher than CC.



155 Accordingly, reductions in anxiety could change the developmental trajectory – preventing  
156 later anxiety and depressive disorders.

157 CBT has been found to be effective for preventing depression in youth (e.g., Clarke et  
158 al., 2001). Some studies indicate lower response rates to CBT (March et al., 2004), while  
159 others have indicated better response rates (Stark, Streusand, Prerna, & Patel, 2012).  
160 Mychailyszyn et al. (2012) reported that youth with elevated symptoms of depression  
161 receiving an intervention did not get greater symptom reductions than did controls. Stice,  
162 Shaw, Bohon, Marti, and Rohde (2009), however, reported that in 13 of 32 prevention  
163 programs, the interventions showed greater decreases in symptoms compared to controls. In  
164 our study, the EC condition had a significantly greater decrease of depressive symptoms than  
165 CC. Subclinical depressive symptoms are meaningful predictors for later development of  
166 disorders (e.g., Kovacs & Lopez-Duran, 2010), and for each depressive symptom the risk for  
167 later disorder increases about twofold (Keenan, Feng, Hipwell, & Klostermann, 2009). Hence,  
168 even modest reductions in depressive symptoms may be important for long-term prevention.  
169 Preventing or delaying the onset of disorders can have public health benefits: Stockings et al.  
170 (2016) reported that preventive programs were associated with a decrease in risk for  
171 internalizing disorder onset.

172 Although the EC had larger symptom reductions than CC, both conditions showed a  
173 decrease in symptom levels. Some reductions among controls is not uncommon (e.g.,  
174 Kendall, Hudson, Gosch, Flannery-Schroeder, & Suveg, 2008). It is also possible that controls  
175 learned coping skills as teachers in control schools attended workshops on how to help  
176 anxious/sad children.

177 Parents reported that children in the EC group had a significantly greater reduction in  
178 symptoms of depression than CC although this was not the case for anxious symptoms. Note  
179 that parents reported lower symptom levels than the children. Although having multiple

180 informants is recommended, parent-child disagreement is common (e.g., De Los Reyes et al.,  
181 2015). This is especially so for internalizing problems that are difficult for parents to identify  
182 (Comer & Kendall, 2004) and possibly to observe changes in these symptoms.

183 Before participating, EC children reported significantly higher depressive scores than  
184 CC children (Table 3). This difference is surprising given randomization. Examining parent-  
185 reported demographics (Table 1) revealed higher pre-intervention child stress levels in the EC  
186 which could contribute to the difference. Further, there was a higher dropout pre-intervention  
187 in the EC condition than in CC. The intensity of the intervention may account for the higher  
188 dropout, and initiatives to make the intervention more flexible could be important for  
189 dissemination.

190 The study had several strengths: it was conducted in the “real-world” with group  
191 leaders conducting EC groups in addition to usual work load. Children were recruited from  
192 urban and rural schools. Established measures were used to identify and recruit children,  
193 treatment integrity was secured, and sound statistical methods were used. However,  
194 limitations merit mentioning: a low rate of the overall school population participated in the  
195 study as at-risk children were targeted, knowledge about the school being in CC or EC  
196 condition could have influenced the recruitment and/or the reporting of symptoms, and  
197 recruitment was based on child report. Although screening all children could have increased  
198 the participation rate, this was not possible due to Norwegian ethical guidelines. Because the  
199 aim was to recruit children with elevated symptoms (i.e. an indicated approach), the sample  
200 exhibited more problems than many school children.

### 201 **Conclusion**

202 Children at risk for developing internalizing disorders benefitted from receiving a  
203 transdiagnostic intervention with significantly higher reduction in both anxious and  
204 depressive self-reported symptoms and depressive symptoms as reported by parents.



## The transdiagnostic EMOTION program

205 Future research could focus on identifying which specific mechanisms account for the  
206 reduction in anxious and depressive symptoms, possibly done through dismantling studies.  
207 Such studies could include functional outcomes and innovative research designs. When  
208 implemented in community settings, the EMOTION program holds the promise of being an  
209 effective preventive intervention with the potential of reducing the incidence of anxious and  
210 depressive disorders in youth.

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