

1 **Abstract**

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

5 **Method:** A clustered randomized design was used with schools as the unit of randomization.
6 Children (N = 1,686) aged 8 – 12 years in 36 schools completed screening using the
7 Multidimensional Anxiety Scale (MASC-C) and The Mood and Feelings Questionnaire Short
8 version (SMFQ). Scoring 1 SD above a population-based mean on anxiety and/or depression,
9 873 children were invited to participate. Intent-to-treat analyses were performed, and mixed
10 effects models were used.

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

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

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

23 **Public health significance:** Anxiety and depression are common in youth and have unwanted
24 effects on their functioning. Targeting both anxiety and depression in one protocol has
25 important public health significance: symptom levels can be reduced thus preventing
26 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 (3rd and 4th grade = younger; 5th and 6th =
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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