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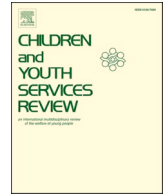
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## Brief online ACT intervention to improve adolescents' well-being: Effectiveness among adolescents with depressive symptoms during COVID-19

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### ABSTRACT

**Background:** The mental health and well-being of children and adolescents declined globally during the COVID-19 pandemic. Young people need support, yet relatively few receive psychological help, even among those who experience psychological symptoms. The existing options for support that focus on the traditional one-on-one treatment delivery approach require alternatives that can be widely disseminated.

**Purpose:** The current study examined the effectiveness of a brief acceptance- and values-based online intervention for alleviating symptoms of stress, anxiety and depression and for improving psychological flexibility among adolescents who experience depressive symptoms.

**Methods:** A total of 43 adolescents reporting elevated levels of depression symptoms who were selected from a total of 348 adolescents were randomized to receive a five-week intervention with support from a coach and/or virtual coach or to participate in the treatment-as-usual control condition.

**Results:** The results suggest that the online intervention alleviated symptoms of depression and anxiety, while adolescents who received only the usual support from their schools reported increasing symptoms during the COVID-19 pandemic (Cohen's  $d = 0.70$  and  $d = 0.66$ , respectively).

**Conclusions:** The online intervention is a promising alternative to respond to the increased need for support among young people who experience ill-being. Technology-based approaches can increase the reach of evidence-based psychological support while also offering an acceptable and motivating approach to young people who may not actively seek traditional face-to-face treatment. The current results support the inclusion of online support in the services provided to young people facing mental health problems.

### 1. Introduction

The COVID-19 pandemic poses a risk of increased ill-being among adolescents. Recent systematic reviews suggest that up to 50 % of adolescents have reported anxiety symptoms and that up to 64 % have reported depressive symptoms during the COVID-19 pandemic (Panchal et al., 2021). The pandemic has challenged mental health and well-being globally, particularly affecting the mental health of children and adolescents (World Health Organization [WHO], 2021). The increased need for support is especially troubling, given that many young people who experience psychological symptoms do not receive support even in usual circumstances (Kazdin, 2019). To alleviate the effect of the pandemic on the mental health of young people and to decrease long-term

psychological effects, alternatives to traditional one-on-one, face-to-face intervention delivery are needed. One approach to making easily disseminated and effective interventions available is providing online interventions that require little resources from mental health professionals or alternatively from teachers. For example, the National Institute for Health and Care Excellence (NHS) has recommended that children and young people with mild depression be offered digital cognitive behavioral therapy (CBT) as the first treatment option (Wise, 2019).

Acceptance and commitment therapy (ACT) is a modern cognitive behavioral therapy that focuses on building psychological flexibility—i. e., skills that increase the ability to be *open* and *accepting* to different inner experiences and commit to valued behaviors (Hayes, 2004). The

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lack of these skills, that is psychological *inflexibility*, on the other hand, is a longitudinal vulnerability factor. Individuals with high inflexibility report fewer positive events and emotions and experience lower life satisfaction (Kashdan et al., 2006). In addition, studies have shown that attempts to *avoid* or *control* inner experiences, i.e., experiential avoidance, are associated with various psychological symptoms, such as depression, anxiety, or post-traumatic stress (Hayes et al., 2006).

Indeed, ACT has been found to be effective in alleviating symptoms of depression and anxiety among children and adolescents (for a meta-analysis, see Fang & Ding, 2020). It may be particularly suitable for interventions aimed at large groups of young people, as it is not only restricted to symptom reduction but also focused on facilitating constructive behavioral patterns of adolescents, such as values-based actions or present-moment awareness (Pielech et al., 2017). In essence, ACT aims to improve well-being by targeting six core processes that form three “response styles,” referring to how individuals can respond and adapt to challenging circumstances in life and take actions toward valued goals and life directions (see Fig. 1; Hayes et al., 2006; Hayes et al., 2011). These response styles are essentially sub-domains of psychological flexibility: (1) open (openness to experience; processes of acceptance and defusion), (2) centered (behavioral awareness; processes of present-moment awareness and self-as-context), and (3) engaged (valued action; processes of values and values-based actions; Hayes et al., 2011).

Online ACT interventions have been shown to alleviate symptoms of anxiety and depression and increase quality of life and psychological flexibility among adult participants, especially among clinical samples (Thompson et al., 2021). Online interventions that have included guidance have yielded superior results, compared to interventions completed independently without support (Thompson et al., 2021). However, studies on the effectiveness of online ACT interventions held for young people are scarce, as very few studies have focused on participants under 18 years old. We previously reported that the earlier version of the guided online ACT intervention under investigation in the current paper was effective in alleviating depression and stress and improving life satisfaction among adolescents who actively participated in the intervention ((Puolakanaho et al., 2019); (Lappalainen et al., 2021)). In addition, research on online interventions based on other methods—mostly on traditional CBT methods—supports the effectiveness of online-delivered interventions in alleviating anxiety and depression among children and adolescents (e.g., Clarke et al., 2015; Välimäki et al., 2017, Zhou et al., 2021).

As the need for psychological support among adolescent is rising, it is crucial to understand how services should be targeted and how to best utilize digital services. This requires exploring the effectiveness and acceptability of interventions using different evidence-based approaches and the variation in the outcomes of these interventions among young people.

In the current study, we set out to examine the effectiveness of a brief online intervention based on ACT for symptoms of depression, stress, and anxiety seen among adolescents during the COVID-19 pandemic. We aimed to compare the effectiveness of the brief ACT-based online intervention with the usual support provided by the school and healthcare system. We were particularly interested in examining the

well-being of adolescents who reported depressive symptoms above the clinical cut-off score for the risk of depression. Thus, we wanted to examine whether the brief online ACT intervention improved psychological flexibility and related sub-domains among adolescents with elevated levels of depressive symptoms. We hypothesized that adolescents who surpassed the cut-off score for risk of depression and actively engaged in the intervention (completing at least 30 % of the intervention) would benefit from the intervention in the context of the COVID-19 pandemic.

The research questions were as follows:

- 1) Is the five-week online ACT intervention effective in alleviating symptoms of anxiety, stress, and depression among adolescents with elevated levels of depression symptoms during the COVID-19 pandemic?
- 2) Is the five-week online ACT intervention *Youth Compass* effective in increasing psychological flexibility and its related sub-domains—i.e., openness to experience, behavioral awareness, and valued actions—among adolescents with elevated levels of depression symptoms during the COVID-19 pandemic?

## 2. Method

### 2.1. Participants and design

The participant flow diagram is shown in Fig. 2 (for details of the study procedures, see (Lappalainen et al., 2023)). The data for the current study were collected as part of the original RCT study during the COVID-19 pandemic in 2020 in the fall of ninth grade (the age of participants was 14–16 years). The original sample included 348 adolescents from 17 schools. Among the participants, 197 were girls (56,6 %) and 148 were boys (42,5 %). Three participants preferred not to include their gender or identified as non-binary (<1 %). Our previous study has shown that *Youth Compass plus* was effective in promoting self-compassion and psychological flexibility among a non-clinical school-based sample and in adolescents who used the intervention actively (Lappalainen et al., 2023). The current study focused on adolescents reporting elevated levels of depression symptoms at baseline and aimed to examine the effectiveness of the intervention among adolescents at risk for developing more severe symptomatology. The participants of the RCT were randomly allocated to three conditions: 1) *Youth Compass Plus*, an intervention with online support from both a student coach and a virtual coach (Intervention 1); 2) *Youth Compass Plus*, an intervention with support from a virtual coach only (Intervention 2); and 3) no intervention or online support, where the control group received usual support from the school (Control). Randomization was completed among individual participants (i.e., school was not controlled for). As no significant differences were observed in preliminary analyses between the conditions of the two ACT-based online interventions, Interventions 1 and 2, they were combined for further analysis. In addition, based on our aim and hypothesis, the following two exclusion criteria were applied: (1) adolescents with depression scores under the clinical cut-off score (9 points) for the risk of depression on the Depression Scale (DEPS) and (2) participants who declined the

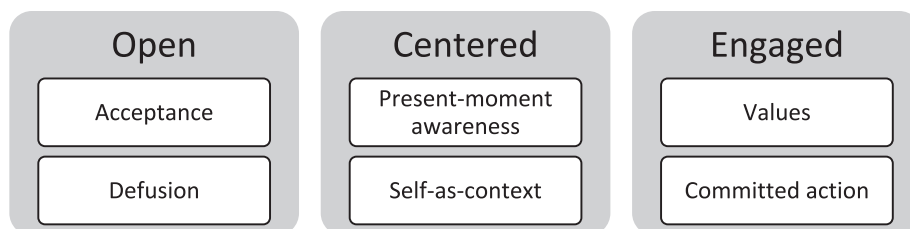


Fig. 1. Three basic response styles and six core processes that form psychological flexibility.

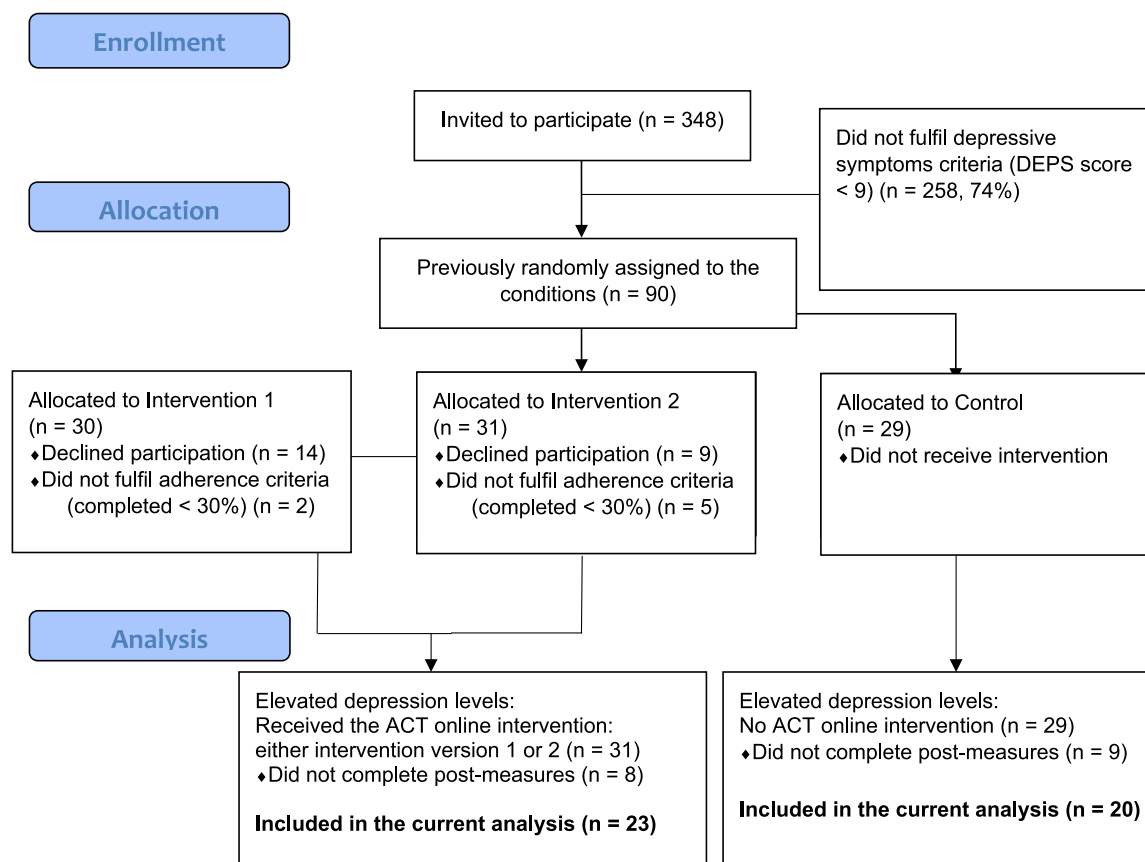


Fig. 2. Flow of participants.

intervention (by not logging into the online program) or adolescents who completed less than 30 % of the intervention (see Fig. 1 for a flowchart of the selection of the current study sample [n = 43]). In the final sample, 35 participants were girls (81,4%) and 8 participants were boys (18,6%).

## 2.2. Intervention

*Youth Compass Plus* is a five-week online intervention that attempts to alleviate stress, low mood, and anxiety and improve the well-being of participating adolescents. The content is based on the theoretical approach and methods of ACT, and the intervention is based on an earlier version of the program, *Youth Compass*, which has been previously reported to be effective in improving life satisfaction and academic buoyancy and decreasing stress (Puolakanaho et al., 2019). The earliest version of the intervention was improved based on feedback from the earlier study. Individual exercises were revised and changed, and interactive elements (a mini-game and a virtual coach delivering chatbot-style exercises and SMS reminders) were added to the online intervention to increase commitment among the participants. The intervention is available online at [www.nuortenkompassi.fi](http://www.nuortenkompassi.fi).

The five-week intervention includes five weekly modules that focus on themes aiming to increase psychological flexibility and well-being: 1) Direction for Life (values and committed action), 2) Me and My Mind (defusion and acceptance), 3) Me in the Now (mindfulness), 4) Me Myself (self-as-context and self-compassion), and 5) Me and Other People (committed action and pro-social behavior). The online intervention includes audio and video exercises, written assignments, and behavioral tasks. Adolescents using the program have the freedom to select which exercises they wish to complete if the six mandatory exercises included in each module are completed.

The participants included in the conditions of the two interventions

received support from a virtual coach during the intervention. The virtual coach sent participants text messages three times a week and was also included in the intervention's content in chatbot-based exercises that allowed discussions with the virtual coach and in module introductions that included the virtual coaches' messages to the user. The participants who were allocated to the intervention condition that included support from a student coach (Intervention 1) also received two online sessions (45 min) with a student of psychology. The first session included an introduction to the program and a structured psychosocial interview (Strosahl et al., 2012) to establish an understanding of each participant's individual circumstances. The first session was scheduled before starting the online program, and the second session was scheduled after two modules (i.e., two weeks after starting the program). It included a structured interview on experiences with the program and words of encouragement to continue with the intervention. The coaches were psychology students (n = 27, mean age 25.04 years (SD = 5.21, range 20–43 years)) who received an introduction to the study's protocols and participated in a four-hour training session on conducting ACT and the interview. The coaches received weekly supervision from a licensed psychologist. Participating in at least two supervision sessions was mandatory for all coaches (two hours each and a total of four hours). For a detailed description of the intervention and support, see (Lappalainen et al., 2023).

Participants who were allocated to the intervention condition (2) that included only the virtual coach did not attend the two online support sessions from the student coaches. However, they attended a brief online introduction session with a coach. The virtual coach sent text messages (three messages each week), as described above, to all participants, but the participants in this group did not receive additional in-person support.

The control group did not receive an intervention during the study. They had access to the usual support provided by the school and the

healthcare system. However, it should be noted that the usual school and healthcare services were affected by the pandemic and therefore less services may have been available than usual. Possible use of services during the study was not recorded or measured. The control group completed the questionnaires at the same time as the intervention groups.

### 2.3. Measures

The outcome measures included questionnaires on symptoms of depression, anxiety, and stress and on psychological flexibility. All measures were filled online using the Webropol survey tool before and after the intervention—i.e., approximately seven weeks from the pre-measurement.

#### 2.3.1. Depression scale (DEPS)

The DEPS is a screening questionnaire for depressive symptoms (Salokangas et al., 1995; see also Kiuru et al., 2012). In the current study, it was used to select the participants and to evaluate changes during the intervention. The scale consists of 10 items that evaluate the frequency of various depressive symptoms on a scale of 0 (not at all) to 3 (very much). The items include statements such as “I felt sad” and “I did not enjoy my life.” The range of the scale is 0–30 with higher scores indicating more severe depressive symptomatology. The measure is a screening scale meant to evaluate the risk of depression. Scores over 9 points indicate an elevated risk of depression, which was used as an inclusion criterion for the current study. In the current study, the scale was found to be highly reliable (10 items;  $\alpha = .93$ ).

#### 2.3.2. Spielberg state-trait anxiety inventory (STAI)

The STAI is a six-item scale for measuring the severity of anxiety symptoms (Marteau & Bekker, 1992). The items include three anxiety-absent statements (such as “I feel calm”) and three anxiety-present statements (such as “I feel upset”). Each item is evaluated on a scale of 1 (not at all) to 4 (very much). The range of the scale is 6–24 with higher scores indicating higher levels of anxiety. The scale was found to be highly reliable (6 items;  $\alpha = .80$ ).

#### 2.3.3. Perceived stress scale (PSS)

The PSS is a 10-item scale used to evaluate the severity of symptoms of stress (Cohen et al., 1983). The items include questions such as “How often have you felt nervous and stressed during the past month?” and “How often did you feel that you were in control of the situation during the past month?” Each question asks participants to provide their answer on a scale of 0 (never) to 4 (very often). The range of the scale is 0–40 with higher scores indicating higher levels of stress. Scores from 0 to 13 are considered to reflect low stress, 14–26 moderate stress, and 27–40 high perceived stress. In the current study, the scale was found to be highly reliable (10 items;  $\alpha = .84$ ).

#### 2.3.4. Comprehensive assessment of acceptance and commitment therapy (CompACT)

CompACT is a 23-item questionnaire that measures psychological flexibility (Francis et al., 2016). The measure consists of three sub-scales that correspond to the theoretical model of three sub-domains or response styles forming psychological flexibility: openness to experience (OE), behavioral awareness (BA), and valued action (VA). Items include statements such as “I try to stay busy to keep thoughts or feelings from coming” and “I find it difficult to stay focused on what’s happening in the present.” Each item is evaluated on a scale of 0 (strongly disagree) to 6 (strongly agree). Higher scores indicate higher overall psychological flexibility and higher psychological flexibility on the facets represented by the three sub-scales (i.e., openness to experience, behavioral awareness, and valued action). In the current study, the scale was found to be reliable (OE,  $\alpha = .77$ ; BA,  $\alpha = 0.77$ ; and VA,  $\alpha = .84$ ).

### 2.4. Statistical analysis

All analyses were conducted using IBM SPSS Statistics (version 26). Baseline differences between the two intervention groups and the control group were explored using a one-way ANOVA. The effectiveness of the intervention was examined using a repeated measure MANOVA, where depression, anxiety, stress, and psychological flexibility were entered as the with-in subject factors and the intervention condition was entered as the between-subjects factor. Effect sizes were corrected for between-group differences. The corrected between-group effect size was calculated by dividing the change in the mean difference between the intervention and control groups by the mean of the standard deviation of the pre-measurement ((Intervention: MPre – Mpost + Control: Mpost-MPre) divided by ((Intervention: SDpre + Control: SDpre) divided by 2); the Excel formula:  $A4-C4 + H4-F4)/((B4 + G4)/2)$ . To interpret Cohen’s *d*, an ES of 0.20 was considered small, 0.50 moderate, and equal to or above 0.80 large (Cohen, 1988).

### 3. Results

A significant interaction effect between group and time was observed when depression, anxiety, stress and psychological flexibility (including the three sub-scales, openness to experience, behavioral awareness, and valued action) were included in the analysis ( $F(6,36) = 2.34, p = 0.026$ ). In the univariate tests, a significant interaction effect between time and group was observed for depression ( $F(1,41) = 4.57, p = 0.020$ ) and anxiety ( $F(1,41) = 3.28, p = 0.039$ ). The interaction was non-significant for stress.

In addition, the univariate tests suggested that there was a significant interaction effect in the valued action sub-scale of psychological flexibility ( $F(1,41) = 4.72, p = 0.018$ ). The interaction was non-significant in the total score of psychological flexibility and other sub-scales. The findings suggest that the intervention was effective in alleviating depressive and anxiety symptoms and increasing valued action among adolescents with elevated depression symptoms when compared to the control group.

The between-group effect sizes for post-measurement suggested a moderate effect for depression (corrected Cohen’s  $d = 0.70$ ) and a moderate effect for anxiety (corrected Cohen’s  $d = 0.66$ ). For the valued action sub-scale of psychological flexibility, a close to moderate effect was seen (corrected Cohen’s  $d = 0.48$ ). Figs. 3 and 4 show that in the control group, adolescents with elevated depression symptoms showed a tendency to experience an increase in depression and anxiety symptoms and a decrease in valued actions, whereas in the intervention group, the trend was the opposite.

### 4. Discussion

The current study sought to examine the effectiveness of an online ACT intervention among adolescents with elevated symptoms of depression. The effectiveness of the intervention was examined for symptoms of depression, anxiety, and stress and for psychological flexibility and its related sub-domains or response styles (openness to experience, behavioral awareness, and valued action) during the COVID-19 pandemic. The results suggest that a five-week guided online ACT intervention was effective in alleviating symptoms of depression and anxiety among a sub-sample of adolescents at risk of depression, while a tendency toward an increase in symptoms was observed among adolescents in the control group. The adolescents with elevated depressive symptoms who participated in the online intervention effectively experienced an increase in psychological flexibility, e.g., values-based actions, while participants in the control group who did not receive an intervention reported a decrease in values-based actions during the COVID-19 pandemic. This result is congruent with earlier findings suggesting that higher levels of psychological flexibility skills (e.g., engagement in meaningful activities) may protect against

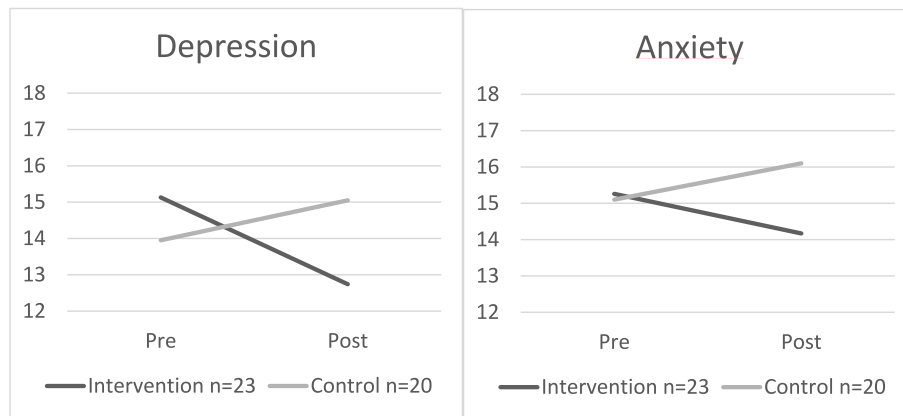


Fig. 3. Changes in depressive and anxiety symptoms among at-risk adolescents ( $n = 43$ ).

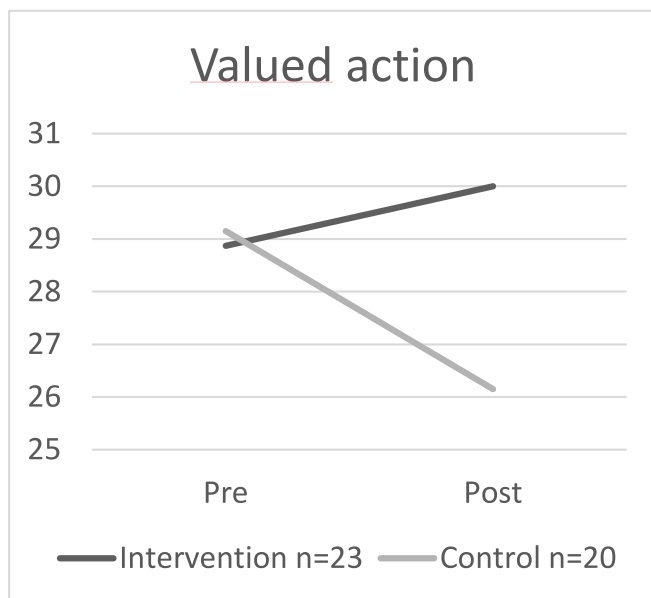


Fig. 4. Changes in the valued action subscale of psychological flexibility among at-risk adolescents ( $n = 43$ ).

psychosocial stressors (Grégoire et al., 2021; Miller & Orsillo, 2020), depressive symptoms (Fonseca et al., 2019), and anxiety during the pandemic (Dawson & Golijani-Moghaddam, 2020; Pakenham et al., 2020; Smith et al., 2020). Indeed, psychological flexibility has been found to decrease anxiety-related worrying and lead to increased engagement in valued actions (Presti et al., 2020). It is possible that adolescents in the current study adopted a more accepting and non-judging attitude towards their internal experiences and increased their engagement in value-based actions (e.g., increased psychological flexibility) which had a protective effect against their psychological distress.

The current results are encouraging, as they suggest that brief online ACT-based interventions can significantly alleviate psychological symptoms among adolescents who have been identified as being at risk of major depressive disorder. As schools play a central role in identifying the need for support among young people but have access to limited resources to respond to that need, online interventions may offer novel solutions and reach more adolescents (Kazdin, 2019). As the COVID-19 pandemic seems to have exacerbated the already increasing need for psychological support among children and adolescents (Hafstad & Augusti, 2021), innovative ways to offer help are urgently needed to prevent accumulating effects on adolescent health.

The findings are in line with previous results suggesting that online

ACT can alleviate symptoms of depression and anxiety, especially in samples defined by psychological symptoms (Thompson et al., 2021). The findings are also in line with the results we have previously reported on the effectiveness of the online intervention's earlier pilot version, where adolescents with high depressive symptoms and high experiential avoidance enjoyed the most benefits during the intervention (Keinonen, Lappalainen, Puolakanaho, Lappalainen, & Kiuru, 2021; Authors et al., 2021).

There are several limitations to the current study that should be considered when interpreting the findings. First, the sample sizes of adolescents with elevated symptoms of depression were relatively small, and for this reason, further research is needed to determine their effectiveness in larger samples. Second, the participants were randomly selected from a larger school-based sample and did not actively seek support, which may explain the relatively high drop-out rates. Participants completing the intervention may have represented a highly motivated group, which should be considered when interpreting the results. Third, the current study did not include follow-up data, and conclusions regarding the long-term effectiveness of the intervention cannot be established. Finally, girls were overrepresented in the current analyses with less than 20 % of boys included in the sample. More research is needed to understand the effect of gender in experiencing depressive symptoms and in participating in psychological interventions and benefitting from online support.

The current study contributes to the literature by highlighting the usefulness of brief supported digital interventions for adolescents with elevated depression symptoms. The demand for psychological support is increasing among adolescents, and responding to this need requires incorporating novel ways of carrying out interventions. As suggested by the WHO (2020), universally delivered psychosocial interventions should be offered to all adolescents through digital platforms or in various settings. Schools are a cost-effective platform to reach adolescents and provide them with support services and early interventions, as personnel who are equipped to deliver traditional face-to-face interventions are limited.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

Data will be made available on request.

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## Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chilyouth.2024.107671>.

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