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A guided online ACT intervention may increase psychological well-being and support school engagement in adolescents

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ABSTRACT

Objective: The aim of the present study was to investigate the extent to which initial levels and changes in ninth-grade adolescents' ($n = 243$) psychological well-being were associated with their school engagement after the transition to upper secondary education. In addition, we investigated whether a brief guided online acceptance and commitment therapy (ACT) intervention program delivered during ninth grade was associated with adolescents' subsequent school engagement through changes in their psychological well-being.

Method: Latent growth modeling (LGM) was used to examine the levels of and changes in well-being during ninth grade. Next, school engagement (measured by school satisfaction and dropout intentions) at the first year of upper secondary education was added to the model as a distal outcome variable. Finally, we examined the indirect effects of an online ACT intervention on subsequent school engagement through changes in psychological well-being. Effects of gender and academic achievement were controlled for in all analyses.

Results: A higher level of life satisfaction at the beginning of ninth grade predicted higher engagement in upper secondary education, whereas increased depressive symptoms during ninth grade predicted lower engagement in upper secondary education. Also, participation in the brief guided online ACT intervention during ninth grade promoted school satisfaction through decreased depressive symptoms.

Conclusions: The results suggested that psychological well-being and changes in psychological well-being during the final year of basic education are associated with school engagement after the transition to upper secondary education. The results also suggested that a brief guided online ACT intervention may increase psychological well-being, which can, in turn, support later school engagement.

1. Introduction

Education stands as one of the most influential factors on career paths and other chances in life. People with a higher level of education tend to have better occupational prospects, higher earnings and likelihood of employment, longer life expectancy, and experience higher well-being (Brekke, 2014; Edgerton et al., 2012; Rumberger & Roter-mund, 2012). According to the Organisation for Economic Co-operation and Development (OECD, 2021, 2022), around one in five upper secondary education students do not graduate. Explanations for high dropout rates include, but are not limited to, students' feelings of boredom or alienation, low academic achievement, and lack of motivation regarding schoolwork (Appleton et al., 2008; Fredricks, 2011; Fredricks et al., 2004). Research has turned towards the concept of school engagement in efforts to prevent dropout and support students' success in their educational goals.

School engagement (Appleton et al., 2008; Finn & Zimmer, 2012; Fredricks et al., 2004) is a multidimensional construct, commonly divided into emotional engagement (e.g., positive and negative reactions to teachers, peers, and academics, attitudes towards learning, sense of belonging), behavioral engagement (e.g., positive conduct, attendance, participation), and cognitive engagement (e.g., self-regulation, investment of effort, learning goals). Dropping out, in turn, is considered to be the result of a gradual process that involves experiences of disengagement from the academic and social facets of school life (Appleton et al., 2008). The present study examined school engagement in upper secondary education in terms of *school satisfaction* and *dropout intentions*, which can be considered to represent the emotional and behavioral dimensions of engagement. Higher school satisfaction is strongly associated with a range of social, behavioral and academic indicators of positive adjustment (Huebner & Gilman, 2006). In turn, having intentions to drop out predicts later actual dropout and

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has been associated with aspects of maladjustment and psychological ill-being (Garvik et al., 2014; Parviainen et al., 2020; Vasalampi et al., 2018).

Supporting school engagement also involves addressing student well-being. The global prevalence of common mental health disorders in adolescents is estimated to be around 25–31% (Silva et al., 2020). That is, at least one in every four adolescent experiences challenges in their psychological well-being, which can also reflect as challenges in school life. Psychological well-being was approached in the present study in terms of life satisfaction and depressive symptoms (Diener & Chan, 2011; Proctor et al., 2009).

1.1. The role of psychological well-being in school engagement and educational transition

According to self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), innate basic needs for autonomy, competence, and relatedness are at the center of psychological growth and motivation. SDT-based psychological needs have been shown to predict adolescent psychological well-being (Cordeiro et al., 2016) and to associate with school engagement (Hardré & Reeve, 2003; Tian et al., 2014). Across studies, adolescents' higher psychological well-being has been demonstrated to be associated with higher school engagement (Awang-Hashim et al., 2015; Heffner & Antaramian, 2016; Huebner & Gilman, 2006; Lewis et al., 2011; Rodríguez-Fernández et al., 2018; Yuen, 2016). Likewise, higher psychological ill-being has been connected to lower school engagement, namely, greater risk of dropout (Eicher et al., 2014; Garvik et al., 2014; Parviainen et al., 2020; Sagatun et al., 2014; Thorley, 2017). Psychological ill-being has also been recognized to predict risk of dropout after an educational transition (Duchesne et al., 2008; Mikkonen et al., 2021; Quiroga et al., 2013). However, less is known whether earlier occurring changes in psychological well-being play a role in predicting later school engagement.

1.2. Acceptance and commitment therapy in supporting well-being and school engagement

Acceptance and commitment therapy (ACT; Hayes et al., 1999; 2006) uses mindfulness-, value- and acceptance-based processes to increase psychological flexibility, which refers to the ability to be in contact with the present moment and the thoughts and feelings it produces, as well as to clarify personal values and act according to said values (Fletcher & Hayes, 2005; Hayes et al., 2006). ACT has received support in its feasibility of improving adolescent well-being and preventing and treating various mental health problems (Armstrong et al., 2013; Fang & Ding, 2020b; Harris & Samuel, 2020; Hayes & Ciarrochi, 2015). ACT has also been applied in the form of online intervention programs for adolescents (Lappalainen et al., 2021; Puolakanaho et al., 2019), adults (Brown et al., 2020; Lappalainen et al., 2013; Pots et al., 2016; Thompson et al., 2021), and parents of children with chronic conditions (Sairanen et al., 2020). ACT-based online intervention programs have been suggested to be as effective as ACT-based face-to-face interventions (Lappalainen et al., 2014; Ruiz, 2012).

The possibilities of ACT-based interventions in supporting school engagement have recently attracted attention in research. In two separate studies, Grégoire et al. (2016, 2018) found that university students who took part in an ACT-based workshop showed greater gains in their school engagement, psychological well-being, and psychological flexibility compared to the control group. Similarly, Fang and Ding (2020a) discovered that junior high school students who took part in an ACT intervention group experienced greater gains in their school engagement and psychological capital (i.e., self-efficacy, optimism, hope, resilience) compared to the control group. Katajavuori et al. (2021) reported an increase in university students' skills related to time and stress management, studying, and coping with negative thoughts after an online ACT-based intervention program. Kiuru et al. (2021) reported

a decrease in adolescents' career-related insecurity after an online ACT-based intervention program.

Based on works by Fang and Ding (2020a) and Grégoire et al. (2018), it could be anticipated that changes in psychological processes could mediate the effects of ACT-based interventions on later school engagement. Previous studies on mediational processes regarding school engagement have shown that grade points (Sagatun et al., 2014) and self-perceived academic competence (Quiroga et al., 2013) have mediated the relationship between psychological well-being and school dropout. However, no previous studies have, to our knowledge, been conducted on mediational processes between online ACT intervention programs and subsequent school engagement through changes in psychological well-being.

1.3. The present study

The present study had two aims. The first aim was to investigate the extent to which psychological well-being and changes in psychological well-being during the ninth grade are associated with school engagement after the transition to upper secondary education. This was examined with levels of and changes in life satisfaction and depressive symptoms in relation to subsequent levels of school satisfaction and dropout intentions. The second aim was to investigate whether a brief guided online ACT intervention program delivered during the ninth grade (i.e., the final year of basic education) predicts adolescents' subsequent school engagement through their increased well-being. This was examined with direct and indirect associations from online ACT intervention to school engagement. The conceptual model illustrating the aims of the present study is presented in Fig. 1.

Hypothesis 1. It was anticipated that higher initial levels of well-being (i.e., higher life satisfaction and lower depressive symptoms) and increases in well-being (i.e., increased life satisfaction, decreased depressive symptoms) during the ninth grade would be linked to higher school engagement in upper secondary education (see also Awang-Hashim et al., 2015; Garvik et al., 2014; Lewis et al., 2011; Parviainen et al., 2020).

Hypothesis 2. It was anticipated that the investigated brief guided online ACT intervention program would predict higher school engagement (i.e., higher school satisfaction, lower dropout intentions) through increased well-being (i.e., increased life satisfaction, decreased depressive symptoms) (Fang & Ding, 2020a; Grégoire et al., 2018).

Academic achievement and gender were included as covariates in all models to control for their potential effects. Previous research has suggested academic achievement to be associated with psychological well-being (Lewis et al., 2011) and school engagement (Antaramian et al., 2010; Quiroga et al., 2013; Upadyaya & Salmela-Aro, 2017; Virtanen et al., 2016). Regarding gender, girls have been shown to express higher levels of school engagement and higher academic achievement, but also more depressive symptoms and lower levels of life satisfaction compared to boys (Lewis et al., 2011; Quiroga et al., 2013; Silva et al., 2020).

2. Method

2.1. Participants and procedure

The participants were recruited from a broader community sample consisting of around 800 students taking part in an ongoing longitudinal project carried out in 15 schools in two municipalities (population ~130,000) in Central Finland. Written consent was obtained from all participating adolescents and their parents. A subsample ($n = 249$) of students with equal number of girls and boys was selected for the randomized controlled trial of a five-week brief guided online ACT intervention program. The participants were randomized by an independent researcher to one of the following three groups: an intervention group with online support ($n = 82$), an intervention group with online support

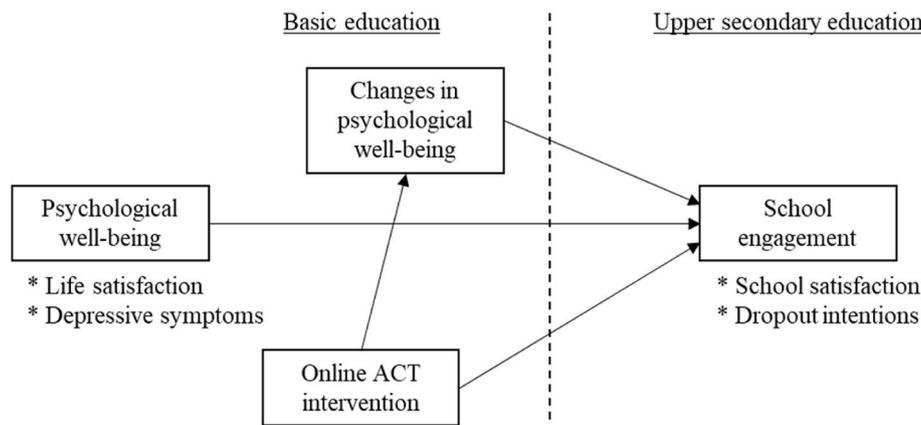


Fig. 1. A conceptual model illustrating the purpose of the present study.

and minimal face-to-face contact ($n = 83$), or the control group ($n = 84$) (see also Puolakanaho et al., 2019). Six adolescents did not take part in the first measurement ($n = 80, 81,$ and 82 respectively). The present study analyzed the intervention groups as one whole group ($n = 161$), because differences in terms of intervention outcomes were non-significant between the forms of support (online support vs. online support and face-to-face meetings; Puolakanaho et al., 2019).

The participants were Finnish adolescents ($n = 243, M_{age} = 15.27, SD_{age} = 0.39$; see Table 1 for more detailed demographic information) who at the time of the online ACT intervention were at ninth grade. The intervention group took part in the intervention program during fall of 2017, at the beginning of ninth grade (see a more detailed description in the next section). Participants received a brief introduction and an instructions sheet with credentials and the program timetable. The control group received school counselling as usual and no intervention. Further details on randomization and the procedure are available in previous efficacy studies by Lappalainen et al. (2021) and Puolakanaho et al.

Table 1

Demographic information was gathered during early fall of ninth grade. Educational track was reported by participants in the fall of the first year of upper secondary education.

Characteristic	All participants ($n = 243$)	Intervention group ($n = 161$)	Control group ($n = 82$)
Age M (SD)	15.27 (0.39)	15.26 (0.32)	15.29 (0.50)
Gender n (%)	119 (48.97)	81 (50.31)	38 (46.34)
Girl	124 (51.03)	80 (49.69)	44 (53.66)
Boy			
Lives with n (%)	167 (68.72)	111 (68.94)	56 (68.29)
Mother and father	20 (8.23)	16 (9.94)	4 (4.88)
Mother or father	38 (15.64)	23 (14.29)	15 (18.29)
Alternately with mother and father	14 (5.76)	7 (4.35)	7 (8.54)
Other arrangement ^a			
GPA M (SD) ^b	7.90 (0.90)	7.88 (0.92)	7.96 (0.86)
Mother's education level M (SD) ^c	4.28 (1.31)	4.34 (1.31)	4.16 (1.30)
Father's education level M (SD) ^c	3.84 (1.47)	3.87 (1.50)	3.79 (1.42)
Educational track n (%)	119 (48.97)	75 (46.58)	44 (53.66)
General	100 (41.15)	72 (44.72)	28 (34.15)
Vocational	6 (2.47)	2 (1.24)	4 (4.88)
Other ^d			

Note. M = mean, SD = standard deviation.

^a Participant lives with mother and stepfather, father and stepmother, in foster care, or in approved home.

^b GPA on a scale from 4 to 10.

^c Education level on scale of 1–7, where 1 = no vocational training, 7 = post-graduate degree, i.e., licentiate, doctorate.

^d Participant takes part in pre-vocational preparatory education.

(2019).

Participants' subjective well-being was measured twice, at early fall (September–October) of the ninth grade, before the five-week online ACT intervention (T1, $n = 243$) and at late fall (October–November) of ninth grade, after the intervention (T2, $n = 238$). The time gap between the pre- and post-measurements was seven weeks. Measurements for participants' school engagement were carried out in the fall of the following year, after the transition to upper secondary education (T3, $n = 197$). Measurements for subjective well-being and school engagement were carried out in group-form, that is, in class during school hours.

2.2. The intervention program

The five-week online ACT-based intervention program examined in the present study was called *Youth Compass*. The program is a web application that can be accessed via browser with a computer, tablet, or smartphone. The program consisted of five modules, one per intervention week. Each module was based on a different theme in ACT: (1) finding personal values and interests, (2) promoting self-awareness, skills of acceptance, and cognitive defusion, (3) being present, (4) self as context and self-compassion, and (5) applying important actions to one's social life and compassion toward others. The program contained short texts, audio clips, video clips, and comic strips, and was designed to fit adolescents by having short exercises and an interactive feel. Each module began with an introduction, which was followed by three consecutive sections that contained exercises. More information on intervention structure and content is available in previous efficacy studies by Lappalainen et al. (2021) and Puolakanaho et al. (2019) and more information on program usage and adherence is available in a previous study by Hämäläinen et al. (2022).

All exercises in *Youth Compass* were designed to take around two to five minutes each to complete, and most of them were in written and audio form. A module was marked complete when two mandatory exercises were completed in all three sections. A new module was accessible after completing the preceding sections. The participants were recommended to do the mandatory exercises, that is, six exercises per week (in total, 30 exercises during the five-week intervention period), which would mean investing around 15–30 min per week in the program. All modules also contained voluntary exercises, which the participants could do if they wanted. The participants used the intervention program outside school hours, during their leisure time.

All participants in the intervention group ($n = 161$) received support during the intervention from appointed personal coaches. The coaches were bachelor's and master's level psychology students, who had received training on the ACT approach prior to the intervention and had weekly access to a licensed psychologist's supervision during the intervention. Half of the intervention participants ($n = 80$) received online support from coaches in the form of instant text messages

(WhatsApp), and the other half ($n = 81$) received online support in addition to two face-to-face meetings with their coach (before and after the intervention).

2.3. Measures

2.3.1. Subjective well-being (T1 and T2, ninth grade)

Life satisfaction. Participants' life satisfaction was measured with the Finnish version of the Satisfaction with Life Scale (SWLS; Diener et al., 1985; see also Mauno et al., 2018; Pavot et al., 1991). The questionnaire consists of five items (e.g., "The circumstances in my life are excellent."), which are answered on a scale from 1 to 5 (1 = *completely disagree*, 5 = *completely agree*). The mean score of the scale's items reflects the level of life satisfaction, where a higher value indicates higher satisfaction (Cronbach's $\alpha = 0.90$).

Depressive symptoms. Participants assessed their mood using the Depression Scale (DEPS; Salokangas et al., 1995; see also Kiuru et al., 2012; Poutanen et al., 2010). The questionnaire consists of 10 items (e.g., "I feel that my future is hopeless."), which are answered on a four-point scale (0 = *not at all*, 3 = *very much*). The final score from the questionnaire can be from 0 to 30 points (Cronbach's $\alpha = 0.95$), where a higher score indicates more severe symptoms.

2.3.2. School engagement (T3, first year of upper secondary education)

School satisfaction. Participants rated on a scale from 1 to 5 their levels of satisfaction with their current place of education (e.g., "Are you satisfied with your current form of education?"; 1 = *not at all*, 5 = *very much*; see also Vasalampi et al., 2018). Mean scores over the four items are then calculated, where a higher value indicates higher school satisfaction (Cronbach's $\alpha = 0.90$).

Dropout intentions. Participants rated on a two-item scale their intentions to drop out from their current place of education ("Have you considered changing your school or field of study?"; "Have you considered quitting your current school or field of study?"; 1 = *not at all*, 5 = *very often*; see also Parviainen et al., 2020; Vasalampi et al., 2018). Mean scores over the items are then calculated, where a higher value indicates higher intentions to drop out (Cronbach's $\alpha = 0.78$).

2.3.3. Intervention group

The intervention group variable was coded as follows: 0 = control group ($n = 82$) and 1 = intervention group ($n = 123$, i.e., those who fulfilled the adherence criterion, which was the completion of three or more out of five modules in the intervention program, see also (Lapalainen et al., 2021; Puolakanaho et al., 2019).

2.3.4. Covariates

Gender and academic achievement were used as covariates in the analyses.

Gender. Gender was coded as 1 = girl, 2 = boy.

Academic achievement. The participants self-evaluated their previous school report's grade point average (GPA). The commonly used grade range in the Finnish school system is from 4 (failure) to 10 (excellent), where 5 represents the lowest accepted grade for passing. Self-reported GPA has been shown to have a high correlation with actual grades from school registers (Sainio et al., 2019).

2.4. Statistical analyses

The research aims were addressed with the following analysis strategy. First, descriptive information was explored and initial levels and changes in psychological well-being in terms of life satisfaction and depressive symptoms during the ninth grade (i.e., from T1 to T2) were investigated through parallel latent growth modeling (LGM). Designs with two time points allow the changes between individuals as well as the direction and amount of change to be estimated (Duncan & Duncan, 2009). In LGM, the intercept factor refers to information concerning the

collection of initial levels (intercepts) that characterize individuals, whereas the slope factor refers to information concerning the rate of change, that is, the slope of the straight line between the two time point measures (Duncan & Duncan, 2009; Preacher et al., 2008). In the present study, LGM were created for depressive symptoms and life satisfaction by fixing the loadings of the intercept factors to 1 and the loadings of the slope factors to 0 for T1 (i.e., early fall of ninth grade), and to 1 for T2 (i.e., late fall of ninth grade).

Second, the LGM was extended by including a new wave of assessment (T3) as the distal outcome variable, which in this study was school engagement (i.e., school satisfaction and dropout intentions). Participants' school satisfaction and dropout intentions in the fall of the first year of upper secondary education were predicted by both initial levels (intercepts) and changes (slopes) of life satisfaction and depressive symptoms during the fall of ninth grade (T1, T2). Adding a distal outcome variable to LGM allows examining the extent to which it can be predicted by the initial level or rate of change (Smid et al., 2020).

Third, the direct and indirect effects of online ACT intervention (0 = control group, 1 = intervention group) on school engagement through increased psychological well-being in our LGM were estimated (see also Cheong et al., 2003). Only the statistically significant associations were included in the final model. No direct effects were detected from online ACT intervention on school engagement, meaning that effects were mediated by changes in psychological well-being. Bootstrapping and 95% confidence intervals (CI) were used to assess the significance; effects are considered statistically significant when the 95% CI for the given estimates does not include zero (Preacher & Hayes, 2008). The CI was based on 1000 bootstrap resamples. Gender and academic achievement were controlled for by including them as covariates in all models.

All analyses in the present study were conducted using the Mplus software (Muthén & Muthén, 2017). Model fit was examined with a chi-square test (χ^2), the comparative fit index (CFI), and standardized root mean square residual (SRMR). A CFI value of around 0.95 or higher and an SRMR value of around 0.09 or lower show good model fit (Hooper et al., 2008; Hu & Bentler, 1999).

3. Results

3.1. LGM models for psychological well-being: associations with school satisfaction

Descriptive statistics and correlations of observed variables are presented in Table 2.

The estimation results regarding the final parallel LGM growth model for life satisfaction and depressive symptoms are presented in Table 3. The mean of the linear slope was significant for life satisfaction, indicating that on average adolescents' life satisfaction increased during the fall of ninth grade. In turn, the mean of the linear slope for depressive symptoms was not significant. The significant variances of both initial levels and linear slopes for life satisfaction and depressive symptoms showed further that there were statistically significant individual differences at initial levels as well as in the rates of change in both psychological well-being variables. Covariances between intercept and slope were significant and negative for both psychological well-being measures.

Our first research aim was to investigate the extent to which adolescent psychological well-being and changes in psychological well-being during ninth grade predict subsequent engagement in upper secondary education. This was done by adding school satisfaction and dropout intentions as distal outcome variables in the LGM by predicting them with initial levels and changes of life satisfaction and depressive symptoms. The results of the final LGM with distal outcomes including only statistically significant associations are shown in Fig. 2. The model fit the data well ($\chi^2 [4] = 2.66, p = .62$; CFI = 1.00; SRMR = 0.01). The results showed that higher initial level of life satisfaction in ninth grade

Table 2
Descriptive statistics and correlations of observed variables.

Variable	n	M	SD	Min–Max	Range	1	2	3	4	5	6	7	8
1 Gender ^a	243	1.51	0.50	1–2	1	–							
2 GPA ^b	231	7.90	0.90	5.40–9.90	4.50	–.22***	–						
Depression													
3 T1	242	6.80	7.14	0–29	29	–.41***	–.09	–					
4 T2	237	6.50	6.88	0–30	30	–.31***	–.20**	.80***	–				
Life satisfaction													
5 T1	243	3.54	0.89	1–5	4	.25***	.22**	–.66***	–.63***	–			
6 T2	237	3.65	0.85	1.60–5	3.40	.20**	.23***	–.53***	–.63***	.78***	–		
School engagement													
7 School satisfaction	197	4.09	0.71	1.75–5	3.25	.02	.23**	–.06	–.19**	.26***	.29***	–	
8 Dropout intentions	197	1.93	1.07	1–5	4	.06	–.24***	.03	.18*	–.20**	–.23**	–.59***	–

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. M = mean; SD = standard deviation; T1 = early fall of ninth grade; T2 = late fall of ninth grade.

^a Gender coded as 1 = girl, 2 = boy.

^b GPA on a scale from 4 to 10.

Table 3
Growth factor parameter estimates for life satisfaction and depressive symptoms.

	Life satisfaction		Depression	
	Estimate	SE	Estimate	SE
Intercept				
Mean	3.54***	0.06	6.78***	0.46
Variance	0.79***	0.07	50.81***	4.62
Slope				
Mean	0.10**	0.04	–0.27	0.29
Variance	0.33***	0.03	19.46***	1.79
Covariance				
Intercept and slope	–0.20***	0.04	–11.60***	2.17

Note. ** $p < .01$; *** $p < .001$. SE = standard error.

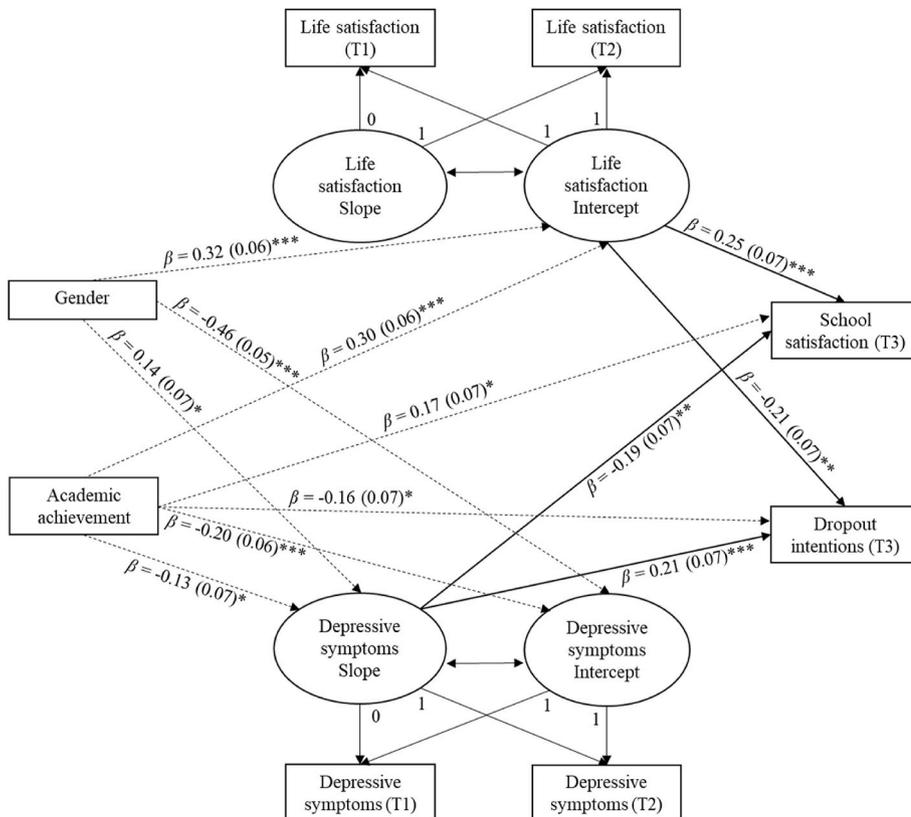


Fig. 2. Parallel latent growth model with statistically significant associations of psychological well-being measures (life satisfaction, depressive symptoms) with school engagement (school satisfaction, dropout intentions). Gender (coded as 1 = girl, 2 = boy) and academic achievement (GPA) were included in the model as covariates.

T1 = early fall of ninth grade; T2 = late fall of ninth grade; T3 = fall of first year of upper secondary education; β = standardized path coefficients (standard errors in parentheses). * $p < .05$; ** $p < .01$; *** $p \leq .001$.

predicted higher satisfaction to upper secondary school and lower intentions to drop out. In addition, increased depressive symptoms in ninth grade predicted lower satisfaction to upper secondary school and higher intentions to drop out. Rate of change in life satisfaction and initial level of depressive symptoms did not significantly predict subsequent school engagement.

3.2. LGM models with indirect effects

Our second research aim was to examine the extent to which a brief online ACT intervention program promoted adolescents’ school engagement in the first year of upper secondary education through changes in psychological well-being. This was done by investigating the direct and indirect associations in the LGM (the intervention group variable was coded as 0 = control group and 1 = intervention group). Only statistically significant effects were included in the final model. The fit indexes showed appropriate model fit ($\chi^2 [10] = 4.63, p = .91$;

CFI = 1.00; SRMR = 0.03). The results regarding direct effects showed that the online ACT intervention significantly predicted an increase in life satisfaction ($\beta = 0.15$, $SE = 0.06$, 95% CI [0.016, 0.269]) and a decrease in depressive symptoms ($\beta = -0.14$, $SE = 0.06$, 95% CI [-0.256, -0.018]). Additionally, depressive symptoms were directly connected to school satisfaction ($\beta = -0.22$, $SE = 0.09$, 95% CI [-0.401, -0.040]) but not to dropout intentions. That is, decreased depressive symptoms during ninth grade predicted higher subsequent school satisfaction. No similar findings were detected for life satisfaction.

The results also revealed a significant indirect effect from online ACT on subsequent school satisfaction through changes in depressive symptoms ($\beta = 0.03$, $SE = 0.02$, 95% CI [0.001, 0.078]). That is, participating in the online ACT intervention program in ninth grade predicted a decrease in depressive symptoms, which further predicted higher school satisfaction after the transition to upper secondary school. By contrast, direct effects from online ACT on subsequent school engagement were not significant ($p > .05$), suggesting that the effect of online ACT intervention on subsequent school satisfaction was fully mediated through changes in depressive symptoms. The previous literature has noted that a significant direct effect from the independent variable on the dependent variable is not necessary for the occurrence of a significant indirect effect (Preacher & Hayes, 2008; Zhao et al., 2010).

4. Discussion

The present study examined the extent to which levels of and changes in psychological well-being during the final year of basic education were associated with later school engagement. Additionally, we investigated if increased psychological well-being during ninth grade mediated the effects of an online ACT intervention program on later school engagement. The effects of gender and academic achievement were controlled for in all analyses. The results suggested that level of life satisfaction and changes in depressive symptoms during ninth grade were connected to later school engagement. One significant indirect effect was also detected from online ACT on school satisfaction through changes in depressive symptoms.

Regarding the first research aim, the results showed that higher school engagement at the upper secondary level was associated with adolescents' higher initial life satisfaction in ninth grade. Adolescents who experienced an increase in depressive symptoms during ninth grade were more likely to have lower school engagement at the upper secondary level. The results partly supported the first hypothesis and seem to fall in line with previous studies on the relationship between higher well-being and higher school engagement (Awang-Hashim et al., 2015; Heffner & Antaramian, 2016; Yuen, 2016), as well as lower well-being and lower school engagement (Garvik et al., 2014; Parviainen et al., 2020; Sagatun et al., 2014). On one hand, it was unexpected that a change in life satisfaction and initial level of depressive symptoms would show non-significant associations with school engagement. On the other hand, one explanation for the results could be that different aspects of and processes in well-being may be differently connected to school engagement. Global life satisfaction is considered to be relatively stable and not as prone to sudden changes as mood-related scales (Eid & Diener, 2004). The present results can be seen to offer new information regarding the complexity of the relationship between psychological well-being and school engagement. Continuing to examine well-being and changes in well-being is encouraged in future studies to allow for further comparisons.

Regarding the second research aim, the results showed that the effect of online ACT intervention on higher school satisfaction (but not on dropout intentions) was mediated by decreasing depressive symptoms, thus providing support for the second hypothesis. The results seem to be in line with previous notions that ACT-based interventions may promote students' well-being and encourage them to take action towards building a more meaningful life, which can also be reflected in their commitment to educational goals (Fang & Ding, 2020a; Grégoire et al.,

2018). In turn, contrary to the second hypothesis, no significant indirect effects were detected from online ACT on school engagement through life satisfaction. It seems possible that different aspects of psychological well-being react differently to online ACT interventions, which can produce different results in terms of mediation as well.

4.1. Limitations and future proposals

This study has several limitations. First, the present study used LGM with two time points to investigate adolescent psychological well-being, which allows the individual changes and direction of changes to be estimated, but not the trajectories (Duncan & Duncan, 2009). Future studies utilizing longitudinal designs could offer a deeper understanding on the individual trajectories of psychological well-being and their associations with school engagement or trajectories of school engagement over time.

Second, attention should be drawn to the sample and how participants' characteristics were assessed. The present study used a non-clinical sample of Finnish adolescents, which encourages future research to be conducted with new samples, including other age groups and ethnic groups and clinical samples. In the present study, gender was addressed with binary coding. Taking gender diversity into account may reveal important knowledge on the possibly unique experiences relating to school life and well-being (Johnson et al., 2020; Perry et al., 2018). Hence, future studies should include the possibility of reporting also non-binary gender identities.

Third, taking into account the bidirectional relationships between well-being and school engagement (Lewis et al., 2011) would be beneficial in the future. Important additional information could presumably be obtained by also using other indicators of psychological well-being, such as ACT-based process measures (see also Grégoire et al., 2016, 2018; Liinamaa et al., 2022; Sairanen et al., 2020). In addition, adjusting for possible externalizing symptoms could offer a fuller view on the association between internalizing symptoms and school engagement (Melkevik et al., 2016).

Fourth, the school engagement measures used in the present study reflected emotional and behavioral dimensions of engagement, but did not include the cognitive dimension (see also Fredricks, 2011). In future research, using measures that represent all dimensions of school engagement could also provide deeper understanding on their associations with psychological well-being and changes in well-being. One way of integrating cognitive engagement could be by including measures related to academic aspirations, goals, or goal progress (Lewis et al., 2011; Vasalampi et al., 2018). Another point to consider is that the present study examined dropout intentions, but no information was available on actual dropout. Among the students having dropout intentions, some continue their studies and graduate, some switch schools and eventually graduate, and some drop out before graduating. It seems possible that a closer comparison between students having dropout intentions and different dropout outcomes could show different associations with psychological well-being as well.

4.2. Conclusions

Our results suggested that adolescent mental health plays a role in the transition and adjustment to upper secondary education. The results supported previous research regarding the connection between higher psychological well-being and higher school engagement. New viewpoints were also discovered, as it was found in the present study that changes in well-being, here represented by decreased depressive symptoms, were associated with higher school engagement. In addition, the present study showed that an online ACT intervention program delivered during ninth grade can promote adolescent well-being, which can, in turn, promote later engagement in upper secondary education. We propose that supporting adolescent psychological well-being plays an important role in efforts to promote school engagement and prevent

dropout from upper secondary education. With some caution, we suggest that online ACT-based intervention programs may be one method for providing this support.

Ethical approval

This study was conducted in compliance with APA ethical standards and with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The study has been approved by the Ethical Committee of the University of Jyväskylä and has been registered at [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT03274934).

Informed consent

Informed consent was obtained from all participants of the study.

Data sharing and declaration

The datasets generated and/or analyzed in this study are not publicly available but are available from the corresponding author on a reasonable request.

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Declaration of competing interest

The authors declare that they have no conflict of interest. Given his role as an Editorial Board Member, Dr. Raimo Lappalainen had no involvement in the peer-review of this article and had no access to information regarding its peer-review.

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