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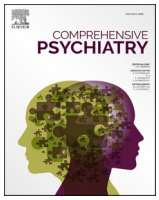

Prevalence and factors associated with depression and anxiety among young school-going adolescents in the Western Cape Province of South Africa

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ABSTRACT

Introduction: Between 10 and 20% of children and adolescents globally experience common mental health conditions such as depression or anxiety. Given the dearth of mental health services in low- and middle-income countries, most mental health conditions among adolescents remain undiagnosed and untreated. In South Africa, few studies have explored the prevalence of depression and anxiety among young adolescents aged 10–14 years. This study examined the prevalence of, and factors associated with depression and anxiety among young school-going adolescents in the Western Cape Province of South Africa.

Methods: A cross-sectional study was conducted in 10 schools in the Western Cape Province from February to July 2022. Data were collected using a tablet-based survey and included sociodemographic items, the Generalized Anxiety Disorder 7-item scale (GAD-7), the Patient Health Questionnaire for Adolescents (PHQ-A) and other psychosocial measures. The prevalence of depression and anxiety was estimated based on cut-off scores for the GAD-7 and PHQ-A. Multivariable logistic regression models were used to investigate the associations between sociodemographic and psychosocial factors, and depression and anxiety.

Results: Of the 621 adolescents, 33.5% ($n = 208$) reported experiencing symptoms of depression and 20.9% ($n = 130$) symptoms of anxiety potentially indicative of a diagnosis. The results of the multivariable logistic regression model indicate that being in a higher grade in school (AOR = 1.65, CI:1.43–1.92), any lifetime alcohol use (AOR = 1.62, CI:1.04–2.64), other drug use (AOR = 2.07, CI:1.06–4.04), and witnessing violence among adults at home (AOR = 2.12, CI:1.07–1.41) were significantly associated with experiencing depressive symptoms. Being in a higher grade in school (AOR = 1.69, CI: 1.42–2.01), poor emotional regulation skills (AOR = 1.03, CI: 1.00–1.07), and the use of cannabis (AOR = 1.03, CI: 1.00–1.07) were significantly associated with experiencing anxiety symptoms.

Conclusion: These findings add to our understanding of school-going adolescents' pressing mental health needs and suggest that mental health adolescent and caregiver interventions may be required to address mental health symptoms and associated risk factors.

1. Introduction

Common mental health conditions such as depression and anxiety are prevalent among adolescents and result in a significant mental health burden on children and adolescents globally. Between 10% and 20% of adolescents experience a mental health condition [1,2]. Mental health conditions account for 5% of disability life adjusted years (DALYS) and are reported to be the leading cause of years lived with disability (YLDs), accounting for a quarter of all YLDs among adolescents 10 to 19 years of age [3]. Several systematic reviews globally have investigated the prevalence of depression and anxiety among adolescents with pooled prevalence ranging from 13% - 19% [4–6]. Despite adolescents making up approximately 23% of the population in sub-Saharan Africa [7], available information on the prevalence of mental health problems is limited [8].

A few studies have been conducted in South Africa among adolescents generally (predominately in schools) and adolescents living with HIV [9–19]. The available data shows that 4–41% of adolescents report

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experiencing symptoms of depression potentially indicative of a diagnosis [19–21] and 14%–38% report experiencing symptoms of anxiety. For example, a recent study conducted among (n = 302) adolescents aged 10 to 19 years mostly recruited from school settings in the Western Cape province found that the prevalence of depression and anxiety symptoms was 32% and 17% respectively [22]. Although the available studies provide initial estimates, methodological limitations are present, such as small sample sizes [15,19,23], limited recruitment of younger adolescents, and lack of reporting of disaggregated data for the younger age group [1,24,25].

A number of factors are associated with symptoms of depression and anxiety among adolescents, including individual, household and family related factors [26,27]. At the individual level, there is substantial evidence globally that females are more at risk for developing symptoms of depression and anxiety than males [28–30]. Furthermore, other studies have reported a higher risk among older adolescents (15 years and older) as compared to younger adolescents 10–14 years [31,32]. Research indicates that adolescent mental health outcomes are negatively impacted by exposure to traumatic experiences and engaging in health risk behaviours. Adolescent risk-taking behaviours peak during this period, and include substance use, risky sexual behaviour, violence, and self-harm [33–37]. Poor emotional regulation skills and low self-esteem have also been found to be associated with anxiety and depression among adolescents [38–40].

Factors within the household level such as household socio-economic factors, parenting practices, and violence exposure in the home are significant risk factors for mental health conditions [2,41–44]. Adolescent mental health is impacted by parenting styles and disciplinary strategies, harsh parenting and corporal punishment is associated with poor mental health outcomes, including depression and anxiety, as shown in studies conducted in school settings in Tanzania, Kenya and South Africa [45,46]. Apart from corporal punishment in the home, witnessing other forms of violence in the home setting has a detrimental impact on adolescent development and mental health outcomes. Findings from systematic reviews conducted in both high-income countries (HICs) and low to middle income countries (LMICs) indicate higher risk for depression and anxiety among adolescents exposed to violence at home [47–49]. These findings suggest that the relationship between exposure to family violence and the development of depression and anxiety is not limited to specific regions.

In summary, few studies in Africa, including South Africa, have investigated mental health among younger adolescents. This study sought to address this gap to determine the prevalence and factors associated with depression and anxiety among young school-going adolescents in the Western Cape Province of South Africa.

2. Material and methods

2.1. Participants

This study recruited a total of 621 participants between the ages of 10 and 14 years in collaboration with three non-profit organizations based in schools and providing psychosocial support and counselling for learners in marginalized rural and semi-urban communities in the Western Cape Province: 1) Students for Better a Future Foundation (SBF); and 2) Community Keepers (CK) and (3) Empilweni. The organizations were selected for easy access to psychosocial services and support and referral pathways if needed for the participants in the respective schools.

Participants were screened to meet study inclusion criteria at 10 schools. The criteria included adolescents who: (1) were enrolled in the selected schools in Western Cape province; (2) were aged 10 to 14 years; (3) provided assent; and (4) had caregivers who provided consent for their child to participate.

2.2. Study procedure

Following approval from the University of Cape Town Human Research Ethics Committee (HREC: 565/2020) and the Western Cape Education Department, the 10 schools were approached and permission from the respective principals was sought. Thereafter, the study team approached classes in grades 4 to 8. Data for this study was collected between February 2022 and July 2022.

A description of the study was provided to all learners in each class (approximately 30 learners per class) as chosen by each grade head at the respective schools. Those learners interested in participating were given consent forms to take home to discuss with their guardians. After obtaining informed consent and assent participation response rate estimated to 64%, the research team identified a time to meet with the adolescents who met the inclusion criteria. The purpose and study procedures were then described again, and participants were given the opportunity to ask questions. Each participant was provided with a tablet to complete the survey, which was conducted through the user-friendly REDCap platform available in English, Afrikaans, and isiXhosa. To ensure that participants were comfortable with the technology, a short tutorial was conducted to demonstrate how to complete the survey. The survey itself took approximately 45 to 60 minutes to administer, and an energizer activity was facilitated by the research team halfway through the allocated time. Finally, after all participants had completed the survey, each one received a snack box as a token of appreciation for their participation.

2.3. Measures

Guided by the available literature, the mental health social-ecological model adapted from Bronfenbrenner's social-ecological model was utilized to outline pertinent factors for adolescent mental health in this study across four levels include individual factors, household and family factors, school related factors and community factors in this study. [50]. In addition to sociodemographic and household characteristics of participants, the following measures were included in the survey:

2.3.1. Poverty

The household poverty index of access to the eight highest socially perceived necessities previously adapted for children and adolescents in South Africa was utilized [51]. Items are scored between 0 - has access and 1 - does not have access and include: three meals per day, a visit to the doctor when needed, medicines when needed, enough clothes to remain warm and dry, soap to wash every day, money for school fees, school uniform, and more than one pair of shoes.

2.3.2. Depression

The Patient Health Questionnaire for Adolescents (PHQ-A) is an adolescent version of the Patient Health Questionnaire - 9 item and is used as a severity measure to detect depression among adolescents aged between 10 and 18 years [52,53]. It is self-administered and consists of the nine criteria used in the DSM-IV diagnosis of depressive disorders [52]. The scale has 9 items, scored from 0 to 3 using the response categories of"not at all","several days", "more than half the days", and "nearly every day". The total score can range from 0 to 27, with higher scores indicating greater severity of depression. The PHQ-A was identified as a a reliable tool for identifying depressive symptoms in Mozambican adolescents, with a high sensitivity and specificity of ($>$0.70) [54]. In this study the Cronbach's Alpha for the measure was (α = 0.81).

2.3.3. Anxiety

The Generalized Anxiety Disorder (GAD-7) scale is a screening and severity measure for anxiety symptoms [55]. The GAD-7 scale is a 7-item self-administered tool developed to screen for probable cases of GAD

based on the DSM-IV criteria [55]. These items are scored from 0 to 3, using the response categories of "not at all", "several days", "more than half the days" and "nearly every day", providing a 0 to 21 severity score for anxiety. The cut-off scores for the GAD-7 include scores of 5, 10, and 15 representing cut points for mild, moderate, and severe anxiety, respectively. The isiXhosa version of GAD-7 was tested in South Africa, using a cutoff score of 6 or more, a sensitivity of 67% and a specificity of 75% was found for identifying adolescents with anxiety [22]. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.80$).

2.3.4. Emotional regulation

The Emotion Regulation Questionnaire for Children and Adolescents (ERQ–CA) was used to investigate emotional regulation strategies [56]. The ERQ-CA is a 10-item child-report questionnaire based on the original adult version and is deemed suitable for use with children and adolescents aged 10–18 years strategies [56]. Revisions to the original ERQ during adaptation for children and adolescents include the simplification of item language and the length of the response scale was reduced from a 7-point Likert scale to 5-points from 1 (strongly disagree) to 5 (strongly agree) [56]. The ERQ-CA has not been validated in the South African context. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.80$).

2.3.5. Corporal punishment

Traumatic experiences were measured using items from the UNICEF's Psychosocial Vulnerability and Resilience Measures For National-Level Monitoring of Vulnerable Children [57]. These items were scored from 0 (never) to 3 (weekly) on punishment by caregiver, namely direct violence, psychological aggression, and witnessing violence at home [57]. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.82$).

2.3.6. Substance use

Items of the Alcohol, Smoking and Substance Involvement Screening Test for Youth (ASSIST-Y) ASSIST-Y was used to measure any lifetime substance use among adolescents. The substances included tobacco, alcoholic beverages, cannabis, and inhalants. Use is rated on a scale on 5 Likert scale of (0 - never to 5 - daily or almost daily). Although this ASSIST-Y has not been validated in the South African context, research among Zambian adolescents show good reliability of Cronbach's alpha of $\geq$0.80 and sensitivity and specificity of the tool (AUC range: 0.68–0.80). In this study the Cronbach's Alpha for the measure was($\alpha = 0.78$).

2.3.7. Self-esteem

Self-esteem was measured using the 8-item Global Self Worth subscale of the Self Esteem Questionnaire [58]. This sub-scale has demonstrated adequate psychometric properties in South African adolescents [59]. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.76$).

2.3.8. Parent supervision

The Alabama Parenting Questionnaire-42 (APQ-42) was used to assess parenting behaviour. Only the 10 supervision and monitoring items [60] previously used in South Africa among adolescents were included [61]. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.79$).

2.3.9. Social support

The Multi-Dimensional Scale of Perceived Social Support (MSPSS) [62] was used to assess social support from family, friends and significant others. This instrument has been shown to have good concurrent, construct and discriminant validity and high internal and test re-test reliability [63] and good reliability and validity with adolescents in South Africa [64]. In this study the Cronbach's Alpha for the measure was ($\alpha = 0.93$).

2.3.10. Bullying and victimisation

We used the Social and Health Assessment Peer Victimisation Scale to measure bullying in South African children and adolescents. The scale measures physical, verbal, property damage, and invasion of physical space [65]. Items are responded according to frequency in the past year (1: Never, 2: Once, 3: Two to three times 4: Four or more times). This scale has been used previously with this age group in South Africa [66] and demonstrated excellent reliability in the current sample ($\alpha = 0.81$). In this study the Cronbach's Alpha for the measure was ($\alpha = 0.88$).

2.4. Data analysis

The Statistical Package for Social Science (SPSS) (28.0) was used to clean and analyse the data. Frequency distributions and descriptive statistics were calculated for the sociodemographic and psychosocial characteristics of the sample. Prevalence was calculated for anxiety and depressive symptoms based on the cut-off score of 10 for the GAD-7 and PHQ-A. Two logistic regression models were developed to analyse the unadjusted and adjusted associations between the sociodemographic variables and psychosocial factors and depression and anxiety symptoms. The results of the regression models were reported as odds ratios (ORs) with 95% confidence intervals (CIs).

3. Results

3.1. Socio-demographics of characteristics

The socio-demographic characteristics of the sample are shown in Table 1. Of the total of 621 adolescents surveyed, the majority were female (61.2%) with an average age of 12 years (SD = 1.46). More than two-thirds of the participants reported having a dual home language,

Table 1
Socio-demographic characteristics of the sample.

Variables	n	%
Age (m, sd)	12.09, 1.45	
10 years	125	20.1
11 years	112	18.0
12 years	115	18.5
13 years	123	19.8
14 years	146	23.5
Gender		
Female/Girl	380	61.2
Male/Boy	241	38.8
Home language*		
English	402	64.7
IsiXhosa	318	51.2
Afrikaans	112	18.0
Other	60	9.7
Grade		
Grade 4	86	13.8
Grade 5	112	18.0
Grade 6	120	19.3
Grade 7	88	14.2
Grade 8	215	34.6
Family structure		
Living with both parents	162	26.1
Living with single parent	364	58.6
Living with no parent	95	15.3
Living with siblings	155	25.0
Living with extended family	513	82.6
8 Necessities		
All 8 necessities	352	56.7
1. 3 meals (yes)	543	87.4
2. Doctor's visit (yes)	529	85.2
3. Medication (yes)	541	87.1
4. Clothes to keep warm (yes)	556	89.5
5. Soap (yes)	586	94.4
6. Money for school fees (yes)	505	81.3
7. School uniform (yes)	577	92.9
8. More than one pair of shoes (yes)	511	82.3

with 402 (64.7%) speaking English, 321 (51.2%) speaking isiXhosa, 112 (18.0%) speaking Afrikaans, and 60 (9.7%) speaking another language. The participant's family structure indicated that more than half 364 (58.6%) live with a single parent, while more than a quarter 162 (26.1%) live with both parents and 95 (15.3%) do not live with their parents.

3.2. Psychosocial characteristics of the sample

Table 2 shows the psychosocial characteristics of the sample. Of the total sample only majority of the 500 participants (80.5%) reported experiencing bullying, particularly verbal bullying (53%). More than two-thirds of the sample (78.6%) reported witnessing violence at home, and slightly more than half reported exposure to punishment 348 (56.4%) by caregivers. A total of 148 adolescents (23.8%) reported lifetime alcohol use.

Table 2
Psychosocial characteristics of the sample.

Variables	n	%
Emotional Regulation		
Cognitive reappraisal	19.08	4.86
Expressive suppression	11.92	3.22
Substance use		
1. Tobacco		
Yes	95	15.3
No	526	84.7
2. Alcohol		
Yes	148	23.8
No	473	76.2
3. Cannabis		
Yes	52	8.4
No	569	91.6
4. Other drugs		
Yes	55	8.9
No	566	91.1
Punishment		
Direct violence		
1. Using stick, belt or other hard item to hit you?		
Yes	283	45.8
No	334	54.1
2. Slap, punch or hit you so you were hurt?		
Yes	200	32.2
No	417	67.6
Psychological aggression		
3. Said that you would be sent away or kicked out of the house?		
Yes	166	26.9
No	451	73.1
4. Said they would call ghosts, evil spirits or harmful people?		
Yes	103	16.7
No	514	82.8
5. Insulted you by calling you dumb, lazy or other names?		
Yes	348	56.4
No	269	43.6
Witnessing violence (adults) at home		
1. Shout at each other		
Yes	345	55.9
No	272	44.1
2. Hit each other		
Yes	484	78.6
No	132	21.4
Self esteem (GSW)		
Low self esteem	44	7.1
Moderate self esteem	308	50.0
High self esteem	264	42.5
MPSS mean score categories		
Low support	73	2.0
Moderate support	345	56.7
High support	190	31.3
Bullying (any victimisation)		
Yes	500	80.5
No	121	19.5
Physical wellbeing (median, range)	17,19	

3.3. Symptoms of depression and anxiety

Table 3 reports adolescents' symptoms of depression and anxiety. Of the 621 adolescents, 208 (33.5%) reported experiencing symptoms of depression on the PHQ-A potentially indicative of a diagnosis. The GAD-7 identified 130 (20.9%) adolescents experiencing symptoms of anxiety, while 108 (17.4%) adolescents reported symptoms of both depression and anxiety. Female participants were more likely to screen at risk for both depressive and anxiety symptoms.

3.4. Sociodemographic and psychosocial factors associated with depressive symptoms

The unadjusted and adjusted associations between sociodemographic and psychosocial variables and depressive symptoms are shown in Table 4. The adjusted model in this table shows that 4 variables were significantly associated with experiencing depressive symptoms: being in a higher grade in school (Adjusted odds ratio AOR = 1.65, CI:1.43–1.92), alcohol use (AOR = 1.62, CI:1.04–2.64), the use of other drugs (AOR = 2.07, CI:1.06–4.04) and witnessing violence among adults at home (AOR = 2.12, CI:1.07–1.41).

The unadjusted and adjusted associations between sociodemographic and psychosocial variables and depressive symptoms are shown in Table 5. There were other variables that were included in the model, but this table includes the ones that were significant. The adjusted model in this table shows that 3 variables were significantly associated with experiencing anxiety symptoms: being in a higher grade in school (AOR = 1.69, CI: 1.42–2.01), poor emotional regulation skills (AOR = 1.03, CI: 1.00–1.07), and the use of cannabis (AOR = 1.03, CI: 1.00–1.07).

4. Discussion

There are four main findings reported in this study. First, a high proportion of adolescents (34%) experiencing symptoms of depression on the PHQ-A potentially indicative of a diagnosis. Second, similarly, a high proportion of adolescents (21%) were experiencing symptoms of anxiety. Third, several risk factors were significantly associated with depressive and anxiety symptoms.

First, this study found a higher prevalence of depression symptoms in adolescents aged 10–14 compared to previous research in Africa. Using a range of screening measures to screen for symptoms of depression, these studies found lower prevalence rates of 15% using the Beck Depression Inventory, 10.4% using the PHQ-9, and 19.6% using the PHQ-A [67–69]. Likewise, South African studies show a lower percentage of adolescents aged 10–19 with depressive symptoms, with 26% using the CES-D, 4.4% using the PHQ-9, and 21% using the Children's Depression

Table 3
Anxiety and depressive symptoms of the sample.

Measures	Total n (%)	Females (*n* = 380)	Males (*n* = 241)
Generalized Anxiety Disorder Scale (GAD-7)			
Yes	136 (21.9)	96 (25.3)	40 (16.6)
No	485 (78.1)	284 (74.7)	201 (83.4)
Patient Health Questionnaire for Adolescents (PHQ-A)			
Yes	208 (33.5)	143 (37.6)	65 (27.0)
No	413 (66.5)	237 (62.4)	176 (73.0)
Both (comorbid)			
Yes	108 (17.4)	79 (20.8)	29 (12.0)
No	513 (82.6)	301 (79.2)	212 (88.0)

Table 4
Unadjusted and adjusted associations between sociodemographic and psychosocial variables and depression.

Variables	% Yes	% No	Unadjusted OR (95% CI)	Adjusted OR (95%CI)
Gender				
Female	143 (68.8)	237 (57.4)	1.00	1.00
Male	65 (31.3)	176 (42.6)	0.61 (0.41–0.87)	0.56 (0.38–0.84)
Age (m, sd)	12.26, 1.43	12.00, 1.46	1.13 (1.01–1.27)*	
Grade (m, sd)	7.04, 1.19	6.04, 1.46	1.69 (1.47–1.93)*	1.65 (1.43–1.92)*
Family structure				
Live with both parents	51 (24.5)	111 (26.9)	1.00	
Live with a single parent	118 (56.7)	246 (59.6)	1.04 (0.70–1.55)	
Live with no parent	39 (18.8)	56 (13.6)	1.51 (0.89–2.56)	
Emotional regulation (m, sd)	31.88, 6.98	30.56, 7.22	1.02 (1.00–1.05)*	1.02 (0.97–1.05)
Substance use				
Tobacco				
No	162 (77.9)	364 (88.1)	1.00	1.00
Yes	46 (22.1)	49 (11.9)	2.11 (1.36–3.29)*	0.84 (0.46–1.51)
Alcohol				
No	135 (64.9)	338 (81.8)	1.00	1.00
Yes	73 (35.1)	75 (18.2)	2.44 (1.67–3.56)*	1.62 (1.04–2.64)*
Cannabis				
No	176 (84.6)	393 (95.2)	1.00	1.00
Yes	32 (15.4)	20 (4.8)	3.57 (1.98–6.42)*	1.67 (0.76–3.36)
Other drugs				
No	175 (84.1)	391 (94.7)	1.00	
Yes	33 (15.9)	22 (5.3)	3.35 (1.89–5.91)*	2.07 (1.06–4.04)*
Punishment (m,sd)	(4.18, 3.82)	(2.59, 3.59)	1.11 (1.07–1.17)*	1.03 (0.97–1.10)
Witnessing violence (adults) at home (m, sd)	(1.83, 1.75)	(1.05, 1.51)	1.32 (1.19–1.47)*	2.12 (1.07–1.41)*
Multidimensional Scale of Perceived Social Support (MSPSS)				
Low support	27 (13.0)	46 (11.3)	1.00	
Moderate support	137 (65.9)	208 (51.1)	1.12 (0.66–1.89)	
High support	37 (17.8)	153 (37.6)	0.41 (0.22–0.74)	
Global self worth				
Low self esteem	37 (18.0)	7 (1.7)	1.00	
Moderate self esteem	116 (56.6)	192 (46.7)	0.11 (0.49–0.26)	
High self esteem	52 (25.4)	212 (51.6)	0.46 (0.20–0.11)	
Bullying				
No	40 (19.2)	81 (19.6)	1.00	
Yes	168 (80.8)	332 (80.4)	0.25 (0.67–1.57)	
Physical wellbeing (m, R)	16, 18	17, 19	0.94 (0.90–0.99)	

* Statistically significant variables include: Grade, alcohol, other drugs, and witnessing violence (adults) at home.

Table 5
Unadjusted and adjusted associations between sociodemographic and psychosocial variables and anxiety.

Variables	% Yes	% No	Unadjusted OR (95% CI)	Adjusted OR (95%CI)
Gender				
Female	96 (70.6)	284 (58.6)	1.00	1.00
Male	40 (29.4)	201 (41.4)	0.59 (0.39–0.89)	0.56 (036–0.88)
Age m,sd	12.18,1.41	12.06,1.46	1.06 (0.93–1.21)	
Grade m,sd	7.15, 1.12	6.16, 1.46	1.72 (1.47–2.02)*	1.69 (1.42–2.01)*
Family structure				
Live with both parents	40 (29.4)	122 (25.2)	1.00	
Live with a single parent	73 (53.7)	291 (60.0)	0.76 (0.49–1.18)	
Live with no parent	23 (16.9)	72 (14.8)	0.97 (0.54–1.75)	
Emotional regulation m,sd	32.40, 7.04	30.62, 7.15	1.03 (1.00–1.07)*	1.03 (1.00–1.07)*
Substance use				
Tobacco				
No	105 (77.2)	421 (86.8)	1.00	1.00
Yes	31 (22.8)	64 (13.2)	1.94 (1.20–3.14)*	0.92 (0.49–1.73)
Alcohol				
No	89 (65.4)	384 (79.2)	1.00	1.00
Yes	47 (34.6)	101 (20.8)	2.01 (1.33–3.04)*	1.23 (0.73–2.08)
Dagga				
No	112 (82.4)	457 (94.2)	1.00	1.00
Yes	24 (17.6)	28 (5.8)	3.50 (1.95–6.27)*	2.18 (1.03–4.63)*
Other drugs				
No	115 (84.6)	451 (93.0)	1.00	1.00
Yes	21 (15.4)	34 (7.0)	2.42 (1.35–4.33)*	1.47 (0.73–2.95)
Punishment (m, sd)	(4.10, 3.67)	(2.85, 3.71)	1.08 (1.03–1.13)*	1.03 (0.96–1.10)
Witnessing violence (adults) at home (m, sd)	(1.74, 1.63)	(1.19, 1.62)	1.20 (1.07–1.33)*	1.11 (0.95–1.29)
Multidimensional Scale of Perceived Social Support (MSPSS)				
Low support	19 (14.6)	54 (11.3)	1.00	
Moderate support	82 (63.1)	263 (55.0)	0.88 (0.49–1.58)	
High support	29 (22.3)	161 (33.7)	0.51 (0.26–0.98)	
Global self worth				
Low self esteem	24 (18.0)	20 (4.10	1.00	
Moderate self esteem	76 (57.1)	232 (48.0)	0.27 (0.14–0.52)	
High self esteem	33 (24.8)	231 (47.8)	0.11 (0.59–0.23)	
Bullying				
No	30 (22.1)	91 (18.8)	1.00	
Yes	106 (77.9)	394 (81.2)	0.81 (0.51–1.29)	
Physical wellbeing (m, range)	16, 18	17, 19	0.96 (0.91–1.01)	

* Statistically significant variables inlude: Grade, emotional regulation skills, and cannabis.

Inventory [12,14,18]. Understanding screening tools' sensitivity and specificity could explain variations in reported prevalence rates across the regions. This study reveals a higher prevalence of depressive symptoms among South African adolescents, indicating a significant mental health concern and the need to develop targeted interventions and support systems for this vulnerable population.

Second, similar to the high proportion of depressive symptoms identified, this study found a high prevalence of anxiety symptoms

among adolescents in South Africa. Previous research conducted at primary healthcare settings reported a range of 2.2% to 10%, a much lower estimate than the findings of this study conducted in school settings [12,13,70]. The reliance on self-report measures, may introduce measurement biases and potentially underestimate the true prevalence of anxiety symptoms [13,70]. Therefore, the findings of this study in a school setting provide valuable insights into the prevalence of anxiety symptoms among South African adolescents. Likewise, other studies in Africa show a lower prevalence of anxiety ranging from 9% to 13% among adolescents aged 10–17 [71–73], but studies conducted in Uganda and Kenya report a higher prevalence of 26.9%. This suggests that the prevalence of anxiety may vary across settings and age groups, necessitating further research to understand factors contributing to these differences and develop targeted interventions for younger adolescents.

Third, to address the high prevalence of depression and anxiety in adolescents, it is critical to identify the risk factors. This study found that adolescents in higher school grades are more likely to experience depressive symptoms. Consistent with previous studies being in a higher grade at school is associated with elevated levels of stress and anxiety in adolescents [32,74,75]. This finding isn't surprising given the estimate age of onset of mental health problems among adolescents is 14 years of age [76].

Fourth, this study reported that adolescent substance use was associated with an increased risk of depression and anxiety. The finding aligns with previous studies conducted in African settings [32,33,37], globally and in sub-Saharan Africa [77–79], research shows a significant association between cannabis use and anxiety symptoms [33]. Substance use, particularly alcohol and cannabis, may significantly impact depression and anxiety symptoms in African adolescents, but further research is needed to fully comprehend this complex interplay between substance use, mental health and contextual factors.

Fifth, adolescents who are exposed to violence are at a higher risk of developing depression. In the South African context, exposure to violence in homes and in the community is common [35]. This study indicated a significant association between witnessing violence at home and depressive symptoms in adolescents, consistent with previous studies conducted in both HIC and LMICs including South Africa [46,80,81]. Further research is needed to better understand this association and its implications for adolescent mental health interventions. The findings underscore the importance of early preventative efforts targeting pertinent risk factors such as violence in families to reduce the risk of depressive symptoms in adolescents.

Lastly, adolescents with poor emotional regulation skills are more likely to experience anxiety symptoms, consistent with international research [38,82,83]. Emotional regulation is defined as the ability to effectively manage and control emotions and respond to emotional experiences through the use of two strategies: cognitive reappraisal (antecedent focused strategy) and expressive suppression (response-focused strategy) [84]. Emotional regulation skills training has been recommended as an active ingredient for mental health promotion and prevention interventions [85].

The findings of this study highlight the urgent need for interventions implemented in schools for adolescents experiencing depression and anxiety to promote early identification, prevention, and effective intervention strategies [86]. This is consistent with the World Health Organizations (WHO) guidelines on mental health promotive and preventive interventions for adolescents [87]. These guidelines emphasize the importance of utilizing active ingredients in interventions, such as psychoeducation, social and emotional skills, and cognitive-behavioral therapy techniques etc. [85,87]. By incorporating these active ingredients into mental health interventions, adolescents can receive comprehensive psychoeducation and social emotional skills training to prevent the onset of mental health problems and support their mental well-being.

This findings of this study should be considered in light of several limitations. First, given the cross sectional nature of the study claims regarding causality can not be made. Second, although this study had a relatively large sample size ($n = 621$) selection bias may be influencing our findings given selection of schools and adolescents were influenced by parental and adolescent opt-in and our collaboration with the three organizations restricting our selection of schools. Further, geographical limitations may limit the generalizability of the findings to schools in the Western Cape province. Third, not all the measures included in the survey have been validated in the South African context and data collected through self-report could lead to potential social desirability bias.

5. Conclusion

Despite these limitations, the high prevalence of depression and anxiety among South African adolescents aged 10–14 years underscores the need for targeted mental health interventions. Furthermore, this highlights the importance of considering contextual factors in prevention and intervention strategies. These findings shed light on the complex interplay between social, environmental, and individual factors that contribute to mental health issues in this specific population. Recognizing these risk factors can inform targeted school-based prevention programmes and interventions, improving the mental well-being of adolescents in South Africa and other regions facing similar challenges.

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CRediT authorship contribution statement

Mirriam Mkhize: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Claire van der Westhuizen:** Conceptualization, Funding acquisition, Resources, Supervision, Writing – review & editing. **Katherine Sorsdahl:** Conceptualization, Funding acquisition, Resources, Supervision, Writing – review & editing.

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References

[1] Silva SA, Silva SU, Ronca DB, Goncalves VSS, Dutra ES, Carvalho KMB. Common mental disorders prevalence in adolescents: a systematic review and meta-analyses. PloS One 2020;15:e0232007. https://doi.org/10.1371/journal.pone.0232007.
[2] Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. Lancet 2007;369:1302–13. https://doi.org/10.1016/s0140-6736(07)60368-7.
[3] Erskine HE, Moffitt TE, Copeland WE, Costello EJ, Ferrari AJ, Patton G, et al. A heavy burden on young minds: the global burden of mental and substance use disorders in children and youth. Psychol Med 2015;45:1551–63. https://doi.org/10.1017/S0033291714002888.
[4] Barker MM, Beresford B, Bland M, Fraser LK. Prevalence and incidence of anxiety and depression among children, adolescents, and young adults with life-limiting conditions: a systematic review and meta-analysis. JAMA Pediatr 2019. https://doi.org/10.1001/jamapediatrics.2019.1712.

[5] Polanczyk GV, Salum GA, Sugaya LS, Caye A, Rohde LA. Annual research review: a meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. J Child Psychol Psychiatry 2015;56:345–65. https://doi.org/10.1111/jcpp.12381.

[6] Bronsard G, Alessandrini M, Fond G, Loundou A, Auquier P, Tordjman S, et al. The prevalence of mental disorders among children and adolescents in the child welfare system: a systematic review and meta-analysis. Med (Balt) 2016;95. https://doi.org/10.1097/MD.0000000000002622. e2622-e.

[7] UNICEF. UNICEF: Adolescent Demographics. 2019.

[8] Jörns-Presentati A, Napp A-K, Dessauvagie AS, Stein DJ, Jonker D, Breet E, et al. The prevalence of mental health problems in sub-Saharan adolescents: a systematic review. PloS One 2021;16:e0251689.

[9] Bhana A, Mellins CA, Petersen I, Alicea S, Myeza N, Holst H, et al. The VUKA family program: piloting a family-based psychosocial intervention to promote health and mental health among HIV infected early adolescents in South Africa. AIDS Care 2014;26:1–11.

[10] Boyes ME, Cluver LD. Relationships between familial HIV/AIDS and symptoms of anxiety and depression: the mediating effect of bullying victimization in a prospective sample of south African children and adolescents. J Youth Adolesc 2015;44:847–59. https://doi.org/10.1007/s10964-014-0146-3.

[11] Rochat TJ, Houle B, Stein A, Pearson RM, Bland RM. Prevalence and risk factors for child mental disorders in a population-based cohort of HIV-exposed and unexposed African children aged 7–11 years. Eur Child Adolesc Psychiatry 2018;27:1607–20.

[12] Haas AD, Technau K-G, Pahad S, Braithwaite K, Madzivhandila M, Sorour G, et al. Mental health, substance use and viral load suppression in adolescents receiving ART at a large paediatric HIV clinic in South Africa. medRxiv 2020;23:e25644. https://doi.org/10.1002/jia2.25644.

[13] West N, Schwartz S, Mudavanhu M, Hanrahan C, France H, Nel J, et al. Mental health in south African adolescents living with HIV. AIDS Care 2019;31:117–24.

[14] Jayaweera RT, Goin D, Twine R, Neilands TB, Wagner RG, Lippman SA, et al. Associations between WASH-related violence and depressive symptoms in adolescent girls and young women in South Africa (HPTN 068): a cross-sectional analysis. BMJ Open 2022;12:e061032. https://doi.org/10.1136/bmjopen-2022-061032.

[15] Cortina MA, Fazel M, Hlungwani TM, Kahn K, Tollman S, Cortina-Borja M, et al. Childhood psychological problems in school settings in rural southern Africa. PloS One 2013;8:e65041. https://doi.org/10.1371/journal.pone.0065041.

[16] Cluver L, Orkin M, Boyes ME, Sherr L. Child and adolescent suicide attempts, suicidal behavior, and adverse childhood experiences in South Africa: a prospective study. J Adolesc Health 2015;57:52–9. https://doi.org/10.1016/j.jadohealth.2015.03.001.

[17] Das-Munshi J, Lund C, Mathews C, Clark C, Rothon C, Stansfeld S. Mental health inequalities in adolescents growing up in post-apartheid South Africa: cross-sectional survey. SHaW Study PLoS One 2016;11:e0154478. https://doi.org/10.1371/journal.pone.0154478.

[18] Khoza TV, Mokgatle MM. Prevalence of depression symptoms amongst orphaned adolescents at secondary schools in townships of South Africa. Open Public Health J 2021;14:324–31.

[19] Morojele N, Myers B, Townsend L, Lombard C, Plüddemann A, Carney T, et al. Survey on substance use, risk behaviour and mental health among grade 8–10 learners in Western cape provincial schools, 2011. Cape Town: South African Medical Research Council; 2013.

[20] Plüddemann A, Flisher AJ, Mathews C, Carney T, Lombard C. Adolescent methamphetamine use and sexual risk behaviour in secondary school students in Cape Town, South Africa. Drug Alcohol Rev 2008;27:687–92. https://doi.org/10.1080/09595230802245253.

[21] de Vries PJ, Davids EL, Mathews C, Aarø LE. Measuring adolescent mental health around the globe: psychometric properties of the self-report strengths and difficulties questionnaire in South Africa, and comparison with UK, Australian and Chinese data. Epidemiol Psychiatr Sci 2018;27:369–80. https://doi.org/10.1017/S2045796016001207.

[22] Marlow M, Skeen S, Grieve CM, Carvajal-Velez L, Åhs JW, Kohrt BA, et al. Detecting depression and anxiety among adolescents in South Africa: validity of the isiXhosa patient health Questionnaire-9 and generalized anxiety Disorder-7. J Adolesc Health 2023;72:S52–60.

[23] Sharp C, Venta A, Marais L, Skinner D, Lenka M, Serekoane J. First evaluation of a population-based screen to detect emotional-behavior disorders in orphaned children in sub-Saharan Africa. AIDS Behav 2014;18:1174–85. https://doi.org/10.1007/s10461-014-0739-6.

[24] Merikangas KR. Time trends in the global prevalence of mental disorders in children and adolescents: gap in data on U.S. Youth J Am Acad Child Adolesc Psychiatry 2018;57:306–7. https://doi.org/10.1016/j.jaac.2018.03.002.

[25] Charlson F, van Ommeren M, Flaxman A, Cornett J, Whiteford H, Saxena S. New WHO prevalence estimates of mental disorders in conflict settings: a systematic review and meta-analysis. Lancet 2019;394:240–8. https://doi.org/10.1016/s0140-6736(19)30934-1.

[26] Thapar A, Eyre O, Patel V, Brent D. Depression in young people. Lancet 2022;400:617–31.

[27] Tomlinson M, Kleintjes S, Lake L. South African child gauge 2021/2022: Children's institute. University of Cape Town; 2022.

[28] Osborn TL, Venturo-Conerly KE, Wasil A, Schleider JL, Weisz J 2019. doi:10.31234/osf.io/q5s63.

[29] Pengpid S, Peltzer K. Prevalence and associated factors of psychological distress among a national sample of in-school adolescents in Morocco. BMC Psychiatry 2020;20:475. https://doi.org/10.1186/s12888-020-02888-3.

[30] HBSC. Health behaviour in school-aged children WORLD health ORGANIZATION collaborative cross-national survey. Glasgow: University of Glasgow: World Health Organisation Collaborative Cross-National Study [Website]; 2021.

[31] Berhane Y, Canavan CR, Darling AM, Sudfeld CR, Vuai S, Adanu R, et al. The age of opportunity: prevalence of key risk factors among adolescents 10–19 years of age in nine communities in sub-Saharan Africa. Trop Med Int Health 2020;25:15–32.

[32] Bakesia GB, Abwalaba R. Effectiveness of guidance and counselling on depression among adolescents in schools in Kakamega County, Kenya. 2023.

[33] Kugbey N. Prevalence and correlates of substance use among school-going adolescents (11-18years) in eight sub-Saharan Africa countries. Subst Abuse Treat Prev Policy 2023;18:1–9.

[34] Nyundo A, Manu A, Regan M, Ismail A, Chukwu A, Dessie Y, et al. Factors associated with depressive symptoms and suicidal ideation and behaviours amongst sub-Saharan African adolescents aged 10-19 years: cross-sectional study. Trop Med Int Health 2020;25:54–69.

[35] Stansfeld SA, Rothon C, Das-Munshi J, Mathews C, Adams A, Clark C, et al. Exposure to violence and mental health of adolescents: south African health and well-being study. BJPsych Open 2017;3:257–64.

[36] Khuzwayo N, Taylor M, Connolly C. Changing youth behaviour in South Africa. Health SA 2020;25:1031. https://doi.org/10.4102/hsag.v25i0.1031.

[37] Pozuelo JR, Desborough L, Stein A, Cipriani A. Systematic review and meta-analysis: depressive symptoms and risky behaviors among adolescents in low-and middle-income countries. J Am Acad Child Adolesc Psychiatry 2022;61:255–76.

[38] Trosper SE, Buzzella BA, Bennett SM, Ehrenreich JT. Emotion regulation in youth with emotional disorders: implications for a unified treatment approach. Clin Child Fam Psychol Rev 2009;12:234–54. https://doi.org/10.1007/s10567-009-0043-6.

[39] Eisenberg N, Spinrad TL, Eggum ND. Emotion-related self-regulation and its relation to children's maladjustment. Annu Rev Clin Psychol 2010;6:495–525.

[40] Fritz J, de Graaff AM, Caisley H, Van Harmelen A-L, Wilkinson PO. A systematic review of amenable resilience factors that moderate and/or mediate the relationship between childhood adversity and mental health in young people. Front Psych 2018;9:230.

[41] Wille N, Bettge S, Ravens-Sieberer U. Risk and protective factors for children's and adolescents' mental health: results of the BELLA study. Eur Child Adolesc Psychiatry 2008;17:133–47.

[42] Lund C, Brooke-Sumner C, Baingana F, Baron EC, Breuer E, Chandra P, et al. Social determinants of mental disorders and the sustainable development goals: a systematic review of reviews. Lancet Psychiatry 2018;5:357–69. https://doi.org/10.1016/s2215-0366(18)30060-9.

[43] Hawton K, Saunders KE, O'Connor RC. Self-harm and suicide in adolescents. Lancet 2012;379:2373–82.

[44] Lund C, De Silva M, Plagerson S, Cooper S, Chisholm D, Das J, et al. Poverty and mental disorders: breaking the cycle in low-income and middle-income countries. Lancet 2011;378:1502–14. https://doi.org/10.1016/s0140-6736(11)60754-x.

[45] Nkuba M, Hermenau K, Goessmann K, Hecker T. Mental health problems and their association to violence and maltreatment in a nationally representative sample of Tanzanian secondary school students. Soc Psychiatry Psychiatr Epidemiol 2018;53:699–707. https://doi.org/10.1007/s00127-018-1511-4.

[46] Ward CL, Flisher AJ, Zissis C, Muller M, Lombard C. Exposure to violence and its relationship to psychopathology in adolescents. Inj Prev 2001;7:297–301.

[47] Heinze JE, Hsieh H-F, Thulin EJ, Howe K, Miller AL, Zimmerman MA. Adolescent exposure to violence and intimate-partner violence mediated by mental distress. J Appl Develop Psychol 2021;72:101215. https://doi.org/10.1016/j.appdev.2020.101215.

[48] Pinto AC, Luna IT, Sivla Ade A, Pinheiro PN, Braga VA, Souza AM. Risk factors associated with mental health issues in adolescents: a integrative review. Rev Esc Enferm USP 2014;48:555–64. https://doi.org/10.1590/s0080-623420140000300022.

[49] Lamela D, Jongenelen I, Pinto R, Levendosky A. Typologies of intimate partner violence-maternal parenting and children's externalizing problems: the moderating effect of the exposure to other forms of family violence. Child Abuse Negl 2018;81:60–73. https://doi.org/10.1016/j.chiabu.2018.04.020.

[50] University of Minnesota. Mental Health and Well-being: A socio-ecological model Center for Leadership Education in Maternal and Child Public Health School of Public Health. 2021.

[51] Pillay U, Roberts B, Rule SP. South African social attitudes: Changing times, diverse voices. HSRC press; 2006.

[52] Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med 2001;16:606–13. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.

[53] Johnson JG, Harris ES, Spitzer RL, Williams JB. The patient health questionnaire for adolescents: validation of an instrument for the assessment of mental disorders among adolescent primary care patients. J Adolesc Health 2002;30:196–204.

[54] Lovero KL, Adam SE, Bila CE, Canda ED, Fernandes ME, Rodrigues TIB, et al. Validation of brief screening instruments for internalizing and externalizing disorders in Mozambican adolescents. BMC Psychiatry 2022;22:549.

[55] Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med 2006;166:1092–7. https://doi.org/10.1001/archinte.166.10.1092.

[56] Gullone E, Taffe J. The emotion regulation questionnaire for children and adolescents (ERQ–CA): a psychometric evaluation. Psychol Assess 2012;24:409.

[57] Snider L, Dawes A. Psychosocial vulnerability and resilience measures for national-level monitoring of orphans and other vulnerable children: Recommendations for revision of the UNICEF psychological Indicator. Cape Town: UNICEF; 2006.

[58] DuBois DL, Felner RD, Brand S, Phillips RS, Lease AM. Early adolescent self-esteem: a developmental-ecological framework and assessment strategy. J Res Adolesc 1996;6:543–79.
[59] Wild LG, Flisher AJ, Bhana A, Lombard C. Psychometric properties of the self-esteem questionnaire for south african adolescents. South Afr J Psychol 2005;35:195–208.
[60] Essau CA, Sasagawa S, Frick PJ. Psychometric properties of the Alabama parenting questionnaire. J Child Fam Stud 2006;15:595–614.
[61] Ward CL, Wessels IM, Lachman JM, Hutchings J, Cluver LD, Kassanjee R, et al. Parenting for lifelong health for Young children: a randomized controlled trial of a parenting program in South Africa to prevent harsh parenting and child conduct problems. J Child Psychol Psychiatry 2020;61:503–12. https://doi.org/10.1111/jcpp.13129.
[62] Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. J Pers Assess 1988;52:30–41.
[63] Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. J Pers Assess 1990;55:610–7.
[64] Bruwer B, Emsley R, Kidd M, Lochner C, Seedat S. Psychometric properties of the multidimensional scale of perceived social support in youth. Compr Psychiatry 2008;49:195–201.
[65] Ruchkin V, Schwab-Stone M, Vermeiren R. Social and health assessment (SAHA): Psychometric development summary. New Haven: Yale University; 2004.
[66] Cluver L, Bowes L, Gardner F. Risk and protective factors for bullying victimization among AIDS-affected and vulnerable children in South Africa. Child Abuse Negl 2010;34:793–803. https://doi.org/10.1016/j.chiabu.2010.04.002.
[67] Mbanuzuru AV, Uwakwe R, Adogu PO, Nnebue CC, Udigwe IB, Mbanuzuru CM. Depressive disorders among in-school adolescents: how prevalent in Anambra state, Nigeria? Orient J Med 2021:33.
[68] Oderinde K, Dada M, Ogun O, Awunor N, Ahmed H, Tsuung A, et al. Prevalence and predictors of depression among adolescents in Ido Ekiti, south West Nigeria. Int J Clin Med 2018;9:187–202.
[69] Alinnor EA, Okeafor CU. Depression and associated factors among in-school adolescents in Nigeria. Asian J Soc Health Behav 2023;6:14.
[70] Roberts KJ, Smith C, Cluver LD, Toska E, Zhou S, Boyes ME, et al. Adolescent motherhood and HIV in South Africa: examining prevalence of common mental disorder. AIDS Behav 2021;26:1197–210.
[71] Abu Hamad BA, Jones N, Baird SJ, Abuhamad SH, Diab RA, Oakley E, et al. Exploring the gendered mental health experiences of adolescents in Gaza during the Covid-19 pandemic. Adv Global Health 2022;1:1730691. https://doi.org/10.1525/agh.2022.1730691.
[72] Mpango RS, Ssembajjwe W, Rukundo GZ, Salisbury TT, Levin J, Gadow KD, et al. Prevalence, risk factors, and negative outcomes of anxiety and depressive disorders among HIV-infected children and adolescents in Uganda: CHAKA study 2014-2017. Psychiatry J 2022;2022.
[73] Biswas T, Scott JG, Munir K, Renzaho AMN, Rawal LB, Baxter J, et al. Global variation in the prevalence of suicidal ideation, anxiety and their correlates among adolescents: a population based study of 82 countries. EClinicalMedicine. 2020;24:100395. https://doi.org/10.1016/j.eclinm.2020.100395.
[74] Nakie G, Segon T, Melkam M, Desalegn GT, Zeleke TA. Prevalence and associated factors of depression, anxiety, and stress among high school students in, Northwest Ethiopia, 2021. BMC Psychiatry 2022;22:1–12.
[75] McCurdy BH, Scozzafava MD, Bradley T, Matlow R, Weems CF, Carrion VG. Impact of anxiety and depression on academic achievement among underserved school children: evidence of suppressor effects. Curr Psychol 2022;1-9.
[76] Solmi M, Radua J, Olivola M, Croce E, Soardo L, Salazar de Pablo G, et al. Age at onset of mental disorders worldwide: large-scale meta-analysis of 192 epidemiological studies. Mol Psychiatry 2022;27:281–95.
[77] Leadbeater BJ, Ames ME, Linden-Carmichael AN. Age-varying effects of cannabis use frequency and disorder on symptoms of psychosis, depression and anxiety in adolescents and adults. Addiction. 2019;114:278–93.
[78] Hosseini S, Oremus M. The effect of age of initiation of cannabis use on psychosis, depression, and anxiety among youth under 25 years. Can J Psychiatry 2019;64:304–12.
[79] Stiles-Shields C, Archer J, Zhang J, Burnside A, Draxler J, Potthoff LM, et al. A scoping review of associations between cannabis use and anxiety in adolescents and young adults. Child Psychiatry Hum Dev 2021:1–20.
[80] Burrow-Sánchez JJ, R. Ratcliff B.. The influence of risk and protective factors on adolescent alcohol, cannabis, and electronic cigarette use. J Prevent 2022;43:801–21.
[81] Bozzini AB, Bauer A, Maruyama J, Simões R, Matijasevich A. Factors associated with risk behaviors in adolescence: a systematic review. Braz J Psychiatry 2020;43:210–21.
[82] Young KS, Sandman CF, Craske MG. Positive and negative emotion regulation in adolescence: links to anxiety and depression. Brain Sci 2019;9:76.
[83] Brumback T, Thompson W, Cummins K, Brown S, Tapert S. Psychosocial predictors of substance use in adolescents and young adults: longitudinal risk and protective factors. Addict Behav 2021;121:106985.
[84] Gross JJ. Emotion regulation: current status and future prospects. Psychol Inquiry 2015;26:1–26.
[85] Skeen S, Laurenzi CA, Gordon SL, du Toit S, Tomlinson M, Dua T, et al. Adolescent mental health program components and behavior risk reduction: a meta-analysis. Pediatrics. 2019;144.
[86] Colizzi M, Lasalvia A, Ruggeri M. Prevention and early intervention in youth mental health: is it time for a multidisciplinary and trans-diagnostic model for care? Int J Ment Health Syst 2020;14:23. https://doi.org/10.1186/s13033-020-00356-9.
[87] World Health Organization. Guidelines on mental health promotive and preventive interventions for adolescents: helping adolescents thrive: executive summary. 2021.