



Research article

Emotional intelligence and cognitive skills protecting mental health from stress and violence among Ghanaian youth

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ABSTRACT

This study investigates the protective mental health function of high emotional intelligence (EI), and cognitive skills (CS) among Ghanaian adolescents when exposed to stressful life-events and violence. It examines, first, how exposure to stressful life-events and violent experiences is associated with mental health, indicated by depressive and psychological distress symptoms, and, second, whether EI and CS could serve as possible moderators between stress, violence and mental health problems. Participants were 415 Ghanaian secondary education students. They reported about their depressive symptoms (Bireleson), psychological distress (Strength and Difficult Questionnaire, SDQ), and emotional intelligence (Trait Emotional Intelligence Questionnaire, TEIQue), cognitive skills (The Amsterdam Executive Function Inventory). They also reported their stressful life-events and violent experiences. Statistical analyses were conducted using structural equation modeling (SEM). As hypothesized, high level of stressful life events were associated with high levels of depressive symptoms and psychological distress. Yet violent experiences did not associate with mental health problems. Against hypothesis, high levels of EI and CS could not protect adolescents mental health from negative effects of stressful life events or violent experiences. A direct effects were found between low level of EI and CS and high level of mental health problems. The results are discussed in relations to psychological and cultural factors present in EI and CS in adolescence.

1. Introduction

Adolescents face multiple demands and stressors due to the biological and social changes that take place during this developmental period (Crone and Dahl, 2012), and also violent and traumatic experiences reach their peak in adolescence (Quinn et al., 2017). Adolescence is also a time of heightened risk for mental health problems, especially mood and anxiety disorders (Thapar et al., 2012). Psychological theories cast-off direct links between experiences of stress or violence and potential mental health problems. The Transactional Stress and Coping Theory (Lazarus and Folman, 1984) and The Conservative of Resource Theory (COR, Hobfoll, 2001) emphasize the importance of psychosocial resources and cognitive-emotional processes in determining mental health. Adolescents are dealing with strong, dramatic, and often negative emotions (Crone and Dahl, 2012) and tend to oscillate between positive and negative mood shifts (Bailen et al., 2019). Thus, an access to adequate emotional and cognitive resources and their successful integration is decisive for adolescent mental health (Davis et al., 2019; Silk et al., 2003; Zilanawala et al., 2017). The core tasks in their emotion development involve establishing a balance between emotion regulation and

expression, an accurate recognition of own and others emotions, and finding a good fit between emotions and situational demands (Domitrovich, Durlak, Staley and Weissberg, 2017; Gullone et al., 2010). Adolescents need increasingly sophisticated cognitive skills to accomplish these tasks as well as to master their intense, fluctuating and often novel socioemotional experiences (Crone and Dahl, 2012; Somerville, 2013). Thus, both emotional and cognitive processes are important in adolescence, but research commonly deals with them separately.

Researchers agree that the emotional intelligence (EI), involving capacity to effectively regulate, express and understand emotional responses, especially in times of stress, is crucial for adolescent mental health, social competence, and adaptation (Lea et al., 2019; Piqueras et al., 2019; Tromsdorff and Cole, 2011). Similarly, cognitive skills (CS), such as optimal attention, planning, and memory functions are pivotal to adolescents' mental health, as they attune impulsiveness and risk taking, and increase forecasting, and effective coping (Diamond, 2005, 2013; Zalla et al., 2004). The importance of both EI and CS in mental health are thus agreed, but research is lacking about their mutual or combined influences on adolescents' mental health and adaptation to stress and violence. The present study tests the protective mental health function of

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emotional intelligence (EI) and cognitive skills (CS) among Ghanaian adolescents when exposed to stressful life-events and violence.

1.1. Emotional intelligence and mental health

EI involves emotional, social and personal skills, competences, and motivations that help successful adaption in general and in the face of stress and violence in particular (Afolabi, 2013; Salovey and Grewal, 2005; Bar-On, 2010). In adolescence, emotional expression, recognition and regulation become more effective and sophisticated through increasing flexible planning, creative thinking, and motivation to form multiple social relationships (Rajappa et al., 2012; Davis and Humphrey, 2014). Ample evidence, shows that high EI is associated with a number of favourable indicators of health, mental health, social relationship, and adaptation to stress and hardships. Three meta-analyses established a significant association between a high EI and good physical, psychosomatic and mental health, indicated e.g., by low levels of depression, anxiety and psychological distress (Lea et al., 2019; Martins et al., 2010; Schutte et al., 2007) and low risks for suicidal behavior, involving ideation and attempts (Dominguez-Garcia and Fernandez-Berrocal, 2018). A further meta-analysis found that a high EI was significantly associated with subjective well-being, indicating resources, meaningfulness, and positive affectivity, rather than only lack of symptoms (Sánchez-Álvarez et al., 2016). For instance, a Lithuania follow-up study showed that students with a high EI showed decrease in depression and anxiety symptoms with time (Antinienė and Lekavičienė, 2017), and an multinational study confirmed that a high EI was positively associated with psychological wellbeing, indicated by high self-esteem, life satisfaction, self-efficacy, and self-acceptance (Bhullar et al., 2012). However, a well-covariating (personality and general intelligence) prospective study among Israeli adolescent found no significant association between high level of EI and subjective wellbeing, indicated by life-satisfaction or positive affect (Zeidner and Olnick-Shemesh, 2010).

Concerning social domain, a validation study found that young men, but not women with high EI showed better social competence, indicated by more constructive social interaction strategies and communication skills than those with low EI (Brackett et al., 2006). Further research confirmed that adolescents' high EI was associated with high social competence, evaluated by their peers (Méndez-Giménez et al., 2019; Bosacki and Wilde Astington, 1999), with prosocial behaviour (Fredrickson et al., 2012), and co-operation and fair leadership competences evaluated by peers (Mavroveli et al., 2007).

1.2. Emotional intelligence protecting in stress and violence

Ample research is available on direct associations between EI and mental health, whereas few studies have analysed the protective function. Access to psychosocial resources and adequate processing of stress and violence may explain protective role of high level of EI. Adolescents with high EI are capable to cope effectively and adaptively with stressful life-events as well as to give and receive apt social support when stressed, indicating access to apt psychosocial resources (Mavroveli et al., 2007; Zeidner et al., 2012). Or they typically appraise violence and stress as challenges rather than threats, indicating resourceful psychosocial processes (Fredrickson et al., 2012; Keefer et al., 2018; Schneider et al., 2013).

Yet, findings are not unanimous, showing both presence and absence of protective mental health function of emotional intelligence. Concerning stress, findings among Iranian adolescents confirmed the protective role of EI, as perceived high stress was associated with suicidal ideation only among those with low EI (Abdollahi et al., 2016). A study among British adolescents confirmed that high EI could attenuate the negative impact of stressors (stressful life-events, socio-economic adversity, and family dysfunction) on their mental health, indicated by depression and aggression (Davis and Humphrey, 2012a). The study further established that these adolescents with high EI used effective,

active coping strategies, which explained their better mental health (Davis and Humphrey, 2012b). Finally, an Australian study confirmed that among students with high EI (indicated by ability of accurate emotion perception) stressors (daily hassles and negative life events) were not associated with depression, hopelessness, and suicidal ideation (Ciarrochi et al., 2002). Concerning trauma and violence, a study found that high EI could moderate the negative impacts of childhood sexual abuse on suicidal ideation and suicide attempts among North American adolescent (Cha and Nock, 2009). Further, a Pakistani study among adolescents living in a politically unstable and dangerous area found that a high EI could protect their psychological wellbeing from negative impacts of fear of terrorism (Asad et al., 2018).

Concerning violent experiences, we could not detect studies on protective function of EI, but some studies showed beneficial impacts of emotional regulation and stability (subindicators of EI). A North American longitudinal study confirmed that effective emotion regulation strategies could protect mental health (low depressive symptoms) from impacts of severe community violence (Kliwer et al., 2004). Similarly, a study among students in Hong Kong showed that emotional stability protected their mental health negative impact of witnessing violence, i.e. violence was not associated with anxiety and depression among students with high emotional stability (Ho et al., 2013). A study among Kenyan adolescents found that effortful emotional regulation strategies (attention focusing and shifting) partially protected prosocial behaviour from trauma-deteriorating impact (Kithakye et al., 2010). Finally, Gaher and group (2013) found that high levels of adequate self-regulation and emotion recognition ability explained low risk for personality disorders among traumatized adolescents.

On the contrary, other studies found that high EI could not protect adolescent mental health from the negative impacts of stressful life-events or violent experiences. A longitudinal Canadian established that also among students with high EI daily hassles negatively impacted mental health, indicated by high burnout and psychological distress and low wellbeing (Day et al., 2005). A North-American study found that emotional-social intelligence could not improve psychological adjustment among adolescents living in low-income and violent neighbourhoods (Stokes and Jackson, 2014). The authors explained the inefficiency of emotional-social intelligence by describing how experiences of dreadful violence in community, such as shooting and killing, disrupted adolescents' vital coping resources and thus also neutralizing the protective potentials of EI.

1.3. Cognitive skills and mental health in stress

Adolescents' cognitive development displays the realization of a more fully conscious, self-directed and sophisticated mind, on one hand, and impulsiveness, risk taking, and unstable mood regulation, on the other (Crone and Dahl, 2012; Somerville, 2013). In the adolescent period, the brain undergoes relatively rapid development. Dual system theories explain the latter stormy behaviours by delayed maturation of frontal cortical neural systems, in tandem with highly active emotional and affective brain processes (Blakemore et al., 2010). Adolescents show increasing ability to manipulate and regulate their emotional experiences and stress by organizing their adaptive psychosocial resources and by attempting to make sense of the experiences, thus reflecting optimal development of cognitive skills and abilities (Sun and Hui, 2012).

Research confirms that cognitive abilities and skills, such as problem solving, abstract reasoning, accurate memory and verbal comprehension, can protect adolescent mental health from adverse effects of stress and violence. A British study established that poor socioeconomic conditions were not associated with psychological distress of emotional and conduct disorders among adolescents with a high cognitive skills (Bridger and Daly, 2018). Another British study revealed that adolescent girls with high cognitive skills (e.g. verbal and non-verbal reasoning) showed a low level of depressive symptoms when exposed to severe family risks (e.g., family dysfunction, parental depression or/and divorce) and community

hardships (e.g., economic disadvantages) (Riglin et al., 2016). Riglin and the group further tested whether effective coping strategies would explain the protective function of good cognitive skills in life stress, but results did not substantiate that assumption. Further, a longitudinal North American research confirmed that stressful life events (family conflicts and maternal depression) did not predict anxiety and depressive symptoms among children with high level of cognitive skills (e.g., verbal and mathematic ability and scholastic aptitude) (Weeks et al., 2014).

Research among children exposed to military violence show direct associations between high cognitive skills and good mental health. A longitudinal Palestinian study found that a good cognitive capacity, indicated by accurate attention and sophisticated reasoning in middle childhood predicted a low level of PTSD symptoms in adolescence (Qouta et al., 2007). An other Palestinian study revealed that apt and flexible cognitive functioning protected children's mental health from the negative impacts of war violence (Qouta et al., 2001). In Uganda, a study of war-affected adolescents revealed that the use of effective cognitive strategies, such as reconstructing and balanced emotional regulation were related with low levels of PTSD symptoms (Amone-P'Olak et al., 2007).

Research shows also protective function of high CS among adolescents exposed to violent living conditions, suggesting that adolescent with high cognitive skills are more capable to process painful experiences, which in turn associates with better mental health. A study among African American adolescents established that a high level of cognitive skills and low impulsivity moderated the association between exposure to community violence and aggressive behaviour (McMahon et al., 2013). Similarly, among African American girls living in poor neighborhoods, witnessing violence did not lead them to committing violent acts, if they showed a high level of prosocial cognitive skills (Brookmeyer et al., 2005). Effective cognitive coping strategies were found to moderated the association between violent victimization by peers and substance abuse among Mexican-American and European-American adolescents in USA (Brady et al., 2008).

On the contrary, some studies have failed to show a protective function of cognitive skills concerning adolescent mental health in the face of stress and violence. A national longitudinal survey of North American adolescents found that cognitive skills did not protect adolescent from committing severe aggression and violent acts in disadvantaged conditions of poverty and community violence (Bellair and McNulty, 2010). Similarly, findings among incarcerated North American adolescents did not confirm the hypothesis that severe family violence would not be associated with mental health problems (e.g., depression, anxiety, and aggression) among detainees who show high cognitive processing skills (e.g., executive functioning, metacognition and behavioral regulation) (Perkins et al., 2014).

1.4. Aims of the study

Earlier research has considered the protective mental health function of emotional intelligence and cognitive skills separately. Yet, in real life, emotional and cognitive processes concur, and in adolescence their combined impact is decisive for mental health (Crone and Dahl, 2012). Accordingly, the present study examined first, the main effects of adolescents' EI and CS on their mental health, indicated by depressive symptoms and psychological distress, and second high levels of EI and CS as possible protectors between stress, violence and mental health problems. The protective research hypotheses are that exposure to stressful life-events and violent experiences is not associated with mental health problems, indicated by depressive symptoms and psychological distress if, adolescents show a high level of EI and CS. EI is indicated by effective social emotional capability, regulation, recognition and mastering, and CS by apt attention, self-monitoring, planning, and initiation. The role of gender in the protective function of EI and cognitive skills are assessed, but due to the novel setting, no hypotheses are proposed.

2. Method

2.1. Participants

The participants were 415 Ghanaian boys (28.9%) and girls (71.1%) 14–17 years of age ($M = 16.51$, $SD = 0.76$). Two state-run senior high schools were chosen to the study located in Ashanti Akim central district of Ghana because of accessibility, time, resources and contain rich information such as ethnic diversity. The public education in Ghana is based on boarding school system and pupils in the two schools represent the ethnic diversity of the Ghanaian society, as their origins are Akan, Ewe, Ga-Adangbe and Mole-Dagbani the major ethnic groups in the country.

2.2. Study procedure

The Ghana Education Service reviewed and ethically approved the study procedures and measures, and permission to conduct the study at the schools was further requested from the regional Ghana Education director at Kumasi (Ref. No: 14/19/11). The researcher (1st author) together with the class teachers administered the questionnaires during mid-afternoon classes, around the second term of the last academic year. The students were duly informed of the purpose of the research, the study procedures, risks involved and benefits of the study. Informed consent was requested emphasizing that the participation in the study was voluntary and all responses to the questionnaire would remain confidential. The headmasters of the two schools undersigned the informed consent on behalf of students' whose parents lived faraway. This choice was based on agreement with parents had entrusted their children's protection and welfare to the school administrators.

2.3. Measures

2.3.1. Stressful life-events

To study stressful life-events we used the Multidimensional Scale of Stressful Life-Events (MSSLE; Newcomb et al., 1981). The 30-item scale covers significant domains of family, school and society, and experiences of losses, financial difficulties and encounters with law. Adolescents reported whether they had had each experience during the last three months (1 = yes; 0 = no). A sum variable was formed, with a higher number indicating higher exposure to stressful life-events.

2.3.2. Violent experiences

The 10 item Adolescent Exposure to Violence scale (Singer et al., 1995) was applied to assess violent experiences. It includes experiences of threats, knife attacks, and shootings. Participants reported whether they had had these experiences during the last three months (1 = yes; 0 = no). A sum variable was formed, with a higher number indicating a high level of violent experiences.

2.3.3. Depressive symptoms

The Bireleson Depression Self-Rating Scale for Children was used to assess the level of depressive symptoms (Bireleson et al., 1987). The 18-item instrument covers the affective, behavioural and cognitive dimensions of depression. Adolescents responded on a 3-point Likert scale (0 = never, 1 = sometimes, 2 = most of the time) how often they had experienced the described symptoms during the last month. A sum variable was constructed after omitting one item due to low correlation, yet, the total score showing low internal consistency (Cronbach's $\alpha = .63$, ordinal = .69). Positive items were reversed so that a higher score indicates more depressive symptoms. This scale has been validated in African context (Kaiser et al., 2019).

2.3.4. Psychological distress

The of 25 items scale of Strength and Difficult Questionnaire (SDQ, Goodman, 1997) was applied to measure psychological distress. It covers

four subscales of psychological difficulties: emotional problems, peer problems, conduct problems, and hyperactivity and one subscale indicating strength: the prosocial behavior. Each subscale dimension consists of five items. The adolescents evaluated on a 3-point Likert scale (0 = not true, 1 = somewhat true, 2 = certainly true) how well the descriptions fit themselves. A sum variable of psychological distress was constructed by summing the four subscales of psychological difficulties and by excluding prosocial behaviour. The total score of psychological distress had Cronbach's $\alpha = .70$, $\alpha_{\text{ordinal}} = .78$. The SDQ scale has been properly validated in the Ghanaian context (Asante, 2015; Doku, 2016; Mazzucato and Cebotari, 2017).

2.3.5. Cognitive skills

The Amsterdam Executive Function Inventory (AEFI; Van der Elst et al., 2012) was used to assess adolescents' cognitive skills. The AEFI is a 13-item self-report questionnaire covering dimensions of attention (e.g., "I am easily distracted"), self-control and self-monitoring (e.g. "It is difficult for me to sit still"), and planning and initiative taking (e.g. "I can make fast decisions"). Adolescents responded on a 3-point Likert scale how true the descriptions were for them (1 = not true; 2 = partly true, 3 = true). Before constructing a total score, items suggesting challenges in cognitive skills were reversed so that higher score indicates better cognitive skills. The internal consistency of the total score of cognitive skills was moderate, as Cronbach's $\alpha = .61$, $\alpha_{\text{ordinal}} = .68$. This scale was not validated in African context and reliability was moderate.

2.3.6. Trait emotional intelligence

Self-perceived EI was measured by using the Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF; Petrides et al., 2007). It consists of 30 brief statements, covering sociability (e.g., "It's easy for me to talk about my feelings to other people"; "I can make other people feel better when I want to), emotion recognition (e.g., "I pay a lot of attention to my feelings"; "I'm able to "get into someone's shoes" and feel their emotions"); self-control (e.g., "I find it hard to control my feelings"; "I can control my anger when I want to) and well-being (e.g., "I feel good about myself"; "I believe that things will work out fine in my life"). Participants estimated how well the statements fit them by using a five-point Likert scale (strongly disagree (1) to strongly agree (6)). A total score for emotional intelligence was calculated with the Cronbach's $\alpha = .80$, $\alpha_{\text{ordinal}} = .88$. Before that items indicating negative IE were reversed so that higher score indicates a higher level of EI.

2.4. Data analysis

We first calculated the means and standard deviations of all study variables and examined the zero-order bivariate correlations between them. We then analyzed the direct and interaction effects of stressful life events, violent experiences, EI, and CS on mental health using a structural equation modeling approach. We modelled mental health as a latent dependent variable with two observed indicators, depressive and psychological distress symptoms. We also planned to model cognitive skills and emotional intelligence as latent variables, with subscales of the TEIQue-SF and the AEFI acting as indicators. However, the low internal consistency of the subscales, and, in the case of the AEFI, low correlation between the subscales meant we could not identify satisfactory measurement models. Therefore, we used total sum scores on the TEIQue-SF and AEFI as observed exogenous variables instead. We likewise used total sum scores of the number of stressful life events and violent experiences as observed exogenous variables. All variables were mean-centered for further analyses.

We undertook a model building approach where latent mental health problems were first regressed directly on gender, stressful life-events, violent experiences, EI and CS. Then, in a stepwise manner, we tested possible interaction effects between stress and CS, stress and EI, violence and CS, and violence and EI, by adding corresponding interaction terms to the model one by one. If an interaction term was significant, it was

retained. As the resulting models were not nested, formal model comparisons using, e.g., χ^2 difference tests, could not be employed, but we do report model fit measures for all models. As there was only one latent variable with two indicators, separate measurement models were not estimated. We used maximum likelihood estimation and bootstrapped standard errors based on 5000 draws to account for possible non-normality. There were no missing data.

Our measures had 3–5 Likert-type response options. As estimates of reliability in terms of internal consistency, we therefore report "ordinal alpha", a standardized Cronbach's α based on polychoric correlations in addition to the more traditional regular α (Zumbo et al., 2007).

We carried out all data processing and analyses using R 3.4.3 (R Core Team, 2017) and the *lavaan* 0.6-3 R package (Rosseel, 2012). Input scripts are available upon request from the second author.

3. Results

3.1. Descriptive statistics

Table 1 presents demographic characteristics of the participating Ghanaian adolescents. Results show that they did have well-educated families, as almost third (27%) of fathers and (13%) of mothers had a university education. Majority of fathers worked at informal sector that includes professions like farmers, traders, food processors, artisans and craft-workers to mention but a few. Families were relatively large, as a fifth (22%) of participants reported six or more siblings. The participants were generally performed well at school as a half (50%) reported above average.

Table 2 presents the mean levels and standard deviations the zero-order bivariate correlations between the study variables. Results revealed that gender correlated with mental health and violence, but not with stressful life-events, EI and CS; girls reported more depressive symptoms and less violent experiences than boys. Both depressive and psychological distress symptoms positively correlated with stressful life-events and violent experiences, and negatively with emotional intelligence, and cognitive skills. Violent experiences correlated with low CS, and stress with both EI and CS.

3.2. Structural equation modeling

Table 3 presents the tested structural equation models with parameter estimates and fit measures, testing the main effects of violent experiences and stressful life-events on emotional intelligence (EI), cognitive skills (CS), and mental health. In a model including only direct effects (Model 1), female gender and number of stressful life-events significantly predicted a high level more than mental health problems, and higher emotional intelligence and cognitive skills significantly predicted a lower level of mental health problems. Violent experiences did not significantly predict level of mental health problems, although there was a trend-level association with more worse mental health.

Concerning the interaction effects between stress and violence and IE and CS, only the stressful life-events X cognitive skills interaction effect was found significant and retained (Model 2). Instead the interaction effects between Stressful life events X emotional intelligence (Model 3), violent experiences X cognitive skills (Model 4), or violent experiences X emotional intelligence (Model 5) were not found significant, and were not retained. Thus, interpretation of results is based on Model 2.

In this final model (Model 2, see Figure 1), female gender ($b = 0.91$, $SE = .30$, $p = .002$) and stressful life events ($b = 0.12$, $SE = 0.031$, $p < .001$) predicted more mental health problems, while better emotional intelligence ($b = -1.01$, $SE = 0.33$, $p = .002$) and cognitive skills ($b = -3.33$, $SE = 0.49$, $p < .001$) predicted less mental health problems. There was a significant stress X cognitive skills interaction ($b = 0.17$, $SE = 0.087$, $p = .05$) depicted schematically in Figure 2. Against to our hypothesis, good cognitive skills were not associated with lower level of mental health problems, when the level of stressful life-events was high.

Table 1. Demographic characteristics of the sample.

	%	
Place of residence		
City	40	166
Town	60	249
Ethnic origin		
Akan	74.7	310
Ewe	12.8	53
Ga-Adangbe	3.6	15
Mole-Dagbani	8.9	37
Disability		
Yes	2.7	11
No	97.3	404
Mother's education		
No Education	6.5	27
Primary School	11.6	48
Middle School	32.5	135
Secondary School	29.4	122
University	13.3	55
I don't Know	6.7	28
Father's education		
No Education	3.6	15
Primary School	6.3	26
Middle School	21.0	87
Secondary School	33.5	139
University	27.0	112
I don't Know	8.7	36
Family Order		
I am the only child	1.2	5
I am the first child	26.3	109
I am the second child	24.8	103
I am the third child	21.7	90
Family structure		
Single mother	31.8	122
Single father	5.8	24
Two parent family	53.0	200
Other	9.4	39
Absence School		
I haven't been absent from school	63.9	265
Not doing my homework	1.2	5
Harassed by other children in school	1.7	7
Harassed by teachers	1.9	8
The school day is too long	6.0	25
School Performance		
Below	2.9	12
Average	47.0	195
Above	50.1	208

The high CS could thus be beneficial for adolescent mental health only when stress was low. This model explained 51.4% of the variance in mental health problems.

4. Discussion

The aim of this study was to extend the knowledge about combined role of emotional intelligence (EI) and cognitive skills (CS) as possible moderators between stress, violence and mental health problems in adolescence. Against our hypothesis, neither higher EI nor CS could protect adolescent's mental health from the negative impact of increased stress or violence. Yet, high EI and CS were directly associated with lower levels of depressive symptoms and psychological distress, indicating good mental health. Interestingly, results showed that stressful life-

events, but not violent experiences, formed a risk for mental health problems.

Our findings thus contradict previous research that evidenced the role of high emotional intelligence (Asad et al., 2018; Ciarrochi et al., 2002) and high cognitive skills (Riglin et al., 2016; McMahon et al., 2013) in protecting mental health from social adversity, stress and violence. Instead our findings are similar to some studies among African American adolescents exposed to socio-economic adversity and community and gang violence (Day et al., 2005; Stokes and Jackson, 2014), which did not find a protective function of high EI for mental health. Also similarly to ours, the results by Bellair and McNulty (2010) show that high cognitive skills did not protect adolescents' mental health from negative impact of severe poverty, stress and community violence. Similar to Stokes and Jackson (2014), our results showed that good cognitive skills were associated with low mental health problems, but only when adolescents were exposed to low level of violence. Severe violent experiences thus neutralized the potential beneficial effect of cognitive resources on mental health.

One reason given to the lack of protective power of EI in mental health is that emotional intelligence is not independent from hardships, especially in conditions of severe community violence (Stokes and Jackson, 2014). Indeed, in our sample, stressful life-events correlated negatively with both EI and CS, and violent experiences negatively with CS. That might indicate that excessive stress deprived adolescents from their vital emotional and cognitive resources. Research has emphasized that the function of EI as a protector works in stress by accelerating beneficial coping strategies, supportive social resources, and dormant personality strengths (Brackett et al., 2006; Lea et al., 2019; Salovey et al., 2002). We need more culturally informed analyses of how emotional intelligence and cognitive skills evoke these necessary resources and psychosocial processes to fight against negative impact of stress and violence in African context. Ghana is a sub-Saharan country characterized by rapid social changes in socioeconomic, political, migration and urbanization domains. It is thus possible that traditional family commitments and support networks are in transition and may have diminished their power to provide social support and emotional sharing for adolescents. This in turn may be reflected in the ineffectiveness of EI in protecting adolescent mental health.

Some research considers the beneficial role of high general intelligence (IQ) and cognitive abilities universal, or even evolutionally modulated, in enhancing adolescents' adaptation, social success and recovery from hardships, stress and violence (Kanazava, 2010). Yet, others suggest that the association between IQ and wellbeing depends on availability and access to macrolevel environmental, cultural, political, social and historical resources (Ellison, 2007). Similar analyses on emotional intelligence are lacking, and therefore we can only suggest that cultural, historical and political preconditions for EI to protect good mental health from stress and violence should be the core issue in future studies.

It is commonly suggested that high parental and societal education and socio-economic status explain adolescents' academic achievement and good cognitive skills, such as strong initiative, taking, apt impulse control and innovative problem solving (Dubow et al., 2009; Fry et al., 2017). Some of parents of our Ghanaian participants worked at informal sector, as farmers, traders, food processors, artisans and craft-workers, which generally in Sub-Saharan Africa indicates low level of education, heavy physical labor, long working hours, and low wages. Yet, both parents in our data were highly educated, and a half of the participating adolescents reported higher than average school achievements, which can make us expect their CS to be effective also to protect their mental health from stress. Yet, our results confirmed only strong main effect, i.e. high cognitive skills was associated with low levels of depressive symptoms and psychological distress in general, and also when adolescents did not have many violent experiences.

Technically, it is possible that the lack of protective power of EI and CS was because the main effect model (Model 1) explained as much as

Table 2. Means, standard deviations, and bivariate correlations between mental health variables, life events, emotional intelligence, and cognitive skills.

Variable	M	SD	1	2	3	4	5	6
1. Female gender								
2. Depressive symptoms	12.86	4.08	.15**					
			[.06, .25]					
3. Psychological distress	12.26	5.49	.09	.47***				
			[-.01, .19]	[.39, .54]				
4. Violent experiences	2.17	2.24	-.25***	.11*	.20***			
			[-.34, -.16]	[.02, .21]	[.11, .29]			
5. Stressful life-events	6.52	5.06	-.01	.25***	.38***	.48***		
			[-.11, .09]	[.16, .34]	[.30, .46]	[.40, .55]		
6. Emotional intelligence	3.77	0.47	-.01	-.32***	-.30***	-.06	-.23***	
			[-.11, .08]	[-.40, -.23]	[-.38, -.21]	[-.15, .04]	[-.32, -.14]	
7. Cognitive skills	2.44	0.31	-.01	-.34***	-.50***	-.15**	-.37***	.35***
			[-.11, .08]	[-.42, -.25]	[-.57, -.42]	[-.24, -.05]	[-.45, -.29]	[.26, .43]

Note. M and SD represent mean and standard deviation, respectively. Values in square brackets indicate 95% confidence intervals. N = 415.

*p < .05. **p < .01. ***p < .001.

51% of the variation of latent mental health variable. We may thus think that the both emotional and cognitive resources were highly contributing to mental adolescents' health in our sample, which did not leave room for protection.

We could not detect research that would test simultaneously the protective role of both emotional and cognitive resources, as here EI and CS. A study reported correlations between stressful life events, emotional intelligence and cognitive skills, as well as depressive symptoms among Russian and Kyrgyz adolescents, but the study did not involve any further testing of the protective role of EI and CS (Belova et al., 2014).

Results on direct associations revealed that both high emotional intelligence and cognitive skills were associated with good mental health, indicated by low levels of depressive symptoms and psychological distress. The findings are thus consistent with abundant prior research on positive association between EI (Martins et al., 2010; Schutte et al., 2007)

or CS (Zilanawala et al., 2017) and adolescent wellbeing and mental health. A positive link is apparently due to the fact that adolescents with a high EI have positive self-awareness, rich and effective repertoire of coping strategies, a high capacity to positive and realistic appraisals of stress and violence and adequately to express emotions (Brady et al., 2008; Davis and Humphrey, 2012b), which contributes to good mental health. Social relations are especially important in adolescence and thus vital to the mental health (Crone and Dahl, 2012), and high EI is considered a precondition to affectionate and satisfying social relationships, as it incorporates apt recognition of own and others' feelings, ability to show empathy, and effective emotion regulation (Salovey et al., 2002; Frederickson et al., 2012). Adolescence is a prime period for creating new relationships with peers, friends, and intimate partners, where accurate emotional understanding and other adaptive interpersonal skills are highly relevant for mental health (Noble and McGrath, 2012).

Table 3. Structural equation models predicting mental health problems^a among adolescents.

	Model 1	Model 2	Model 3	Model 4	Model 5
Direct effects					
Gender (female)	0.17**	0.17**	0.18**	0.17**	0.17**
Violent experiences	0.11	0.10	0.11	0.10	0.1
Stressful events	0.20**	0.24***	0.27***	0.24***	0.25***
Emotional intelligence	-0.21**	-0.19**	-0.20**	-0.19**	-0.19**
Cognitive skills	-0.45***	-0.43***	-0.42***	-0.43***	-0.43***
Interaction effects					
Stress X CS		0.10*	0.06	0.09	0.10
Stress X EI			0.10		
Violence X CS				0.06	
Violence X EI					0.06
Mental health loadings					
Depressive symptoms	.60***	.60***	.60***	.59***	.60***
Psychological distress	.79***	.79***	.79***	.80***	.79***
Fit measures					
df	4	5	6	6	6
X2	11.07*	12.61*	13.01*	13.43*	12.65*
AIC	4668.41	4666.33	4665.02	4667.10	4666.98
BIC	4704.67	4706.61	4709.33	4711.41	4711.29
CFI	0.975	0.973	0.976	0.974	0.977
RMSEA	0.065	0.061	0.053	0.055	0.052
SRMR	0.022	0.020	0.018	0.019	0.018
Mental health R ²	0.509	0.514	0.523	0.514	0.517

Note. Fully standardized estimates reported. N = 415. *p < .05. **p < .01. ***p < .001.

^a Mental health is a latent dependent variable with two observed indicators of depressive symptoms and psychological distress.

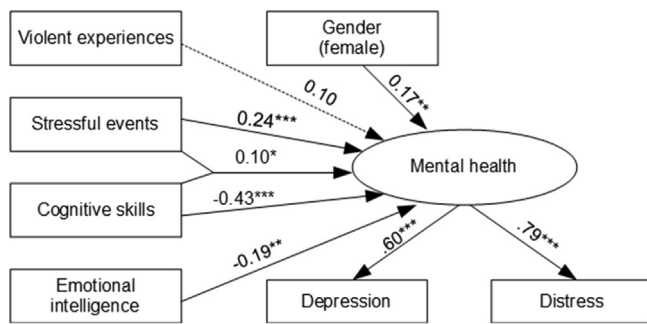


Figure 1. Final structural equation model (Model 2) of factors predicting mental health among Ghanaian adolescents. Fully standardized estimates reported. Solid lines indicate statistically significant effects, and a dashed line a statistically non-significant effect. Fused line indicates interactive effect. Residual variances and covariances omitted for clarity. N = 415. *p < .05. **p < .01. ***p < .001.

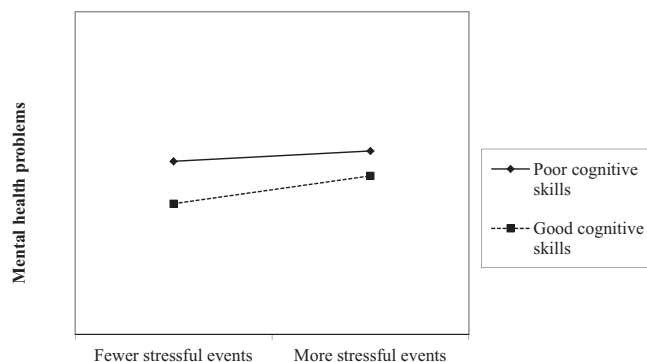


Figure 2. Schematic presentation of the interactive effect of stressful life events and cognitive skills on mental health problems. Note. ^aMental health is a latent dependent variable with two observed indicators of depressive and psychological distress symptoms.

Surprisingly, the results showed that stressful life-events, but not violent experiences, formed a risk for depressive symptoms and psychological distress. The result is counter-intuitive, as violence is usually highly traumatic and burdening to adolescents (Dubow et al., 2009). On other hand, chronic everyday stress, such as serious financial problems in the family, conflicts in close relationships or legal problems can be harmful, especially when accumulating (Day et al., 2005; Stokes and Jackson, 2014). One explanation for why encountering violence did not form a mental health risk may be that these experiences were mostly one-time events among the Ghanaian participants, and not an inherent character in their environment. A fifth of our participants had faced severe events such as being threatened by knife or people carrying weapon near them. In this sense, the nature of violence in our sample greatly differs from studies among African-American adolescents who repeatedly experience gang and community violence and other socio-political and racial adversities (Mrug and Windle, 2010). Similar to our results, in a study in Middle-Eastern war conditions the stressful life-events contributed more to adolescents' depressive and PTSD symptoms than traumatic and violent events (Diab, 2011). The authors explained that adolescents with high everyday stress do not receive as much social support or encouragement from their peers as those exposed to political and military violence, which phenomenon may, however, be unique to war conditions.

4.1. Limitations

Despite the relatively large sample representing Ghanaian adolescents from main ethnic groups across the country, the current study has

also considerable limitations. First, the study relied on self report measures of mental health which are vulnerable to various sources of biased responses and could partly explain the emergence of the direct, but not protective role of EI and CS in the association between stressful life events, and mental health. Using clinical interviews would have been a better and more objective solution. Similarly, assessing EI and CS by self-reports is open to criticism. Both involve complex mental, emotional and cognitive processes, and adolescents might not be fully aware or capable to make judgments about their own skills, motivations and perceptions, and therefore self-reports can be unreliable or biased.

Second, we conceptualized and assessed EI as one-dimensional sum-variable, which neglects the possible specific roles of subdimensions such as sociability, self-control or emotion recognition (Bar-On, 2010; Petrides and Furnham, 2001). Yet, as we did not have hypotheses about the specific roles of subscales, the usage of total score is legitimate. We could not find earlier research on EI among African adolescents, although emotion regulation that is one dimension of, EI has been studied among children and adolescents in Kenya (Kithakye et al., 2010) and Uganda (Amone-P'Olak et al., 2007). Our choice was to conceptualize the EI as adolescent traits, perceived by themselves as a stable personality characteristic. An alternative would be to conceptualize EI as an ability and assess it more objectively by using test procedures such as developed by Salovey and Grewal (2005). Personality or trait EI is, however, a better candidate for protector, as stress and violence can influence the EI ability. There is ample evidence that perceived EI is associated with different coping strategies than ability-based EI (Davis and Humphrey, 2012b). Yet, meta-analyses have confirmed that good mental health is characteristic to people with high EI, independent on the conceptualization or type of assessment (Martins et al., 2010; Schutte et al., 2007). Third, scales of depressive symptoms and cognitive skills were not sufficiently consistent (α -values ranging between .61-69), which warrants the validity of some of our conclusions.

5. Conclusions

To conclude, our findings confirmed that emotional intelligence and cognitive skills in adolescent are important to mental health. While high EI and CS could not protect adolescent from stress and violence, they were associated with low level of depression and psychological distress. Yet, more multicultural and sophisticated research is needed to understand emotional and cognitive resources when facing stress that is common in adolescence. These findings also add to the growing literature on the importance of EI and CS in promoting efficient mental health and wellbeing. They support the argument competencies and skills that affect the ability of the individual successfully overcomes the challenges of everyday life and struggles. The findings may also be important for governments, public health and education professionals to promote investing in programs and policies supporting emotional intelligence and cognitive skills as a part mental health actions. This is especially important in stressful events and daily hasles especially in Ghana and Africa as a whole.

Declarations

Author contribution statement

F. Nyarko: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

R. L. Punamaki-Gitai: Conceived and designed the experiments; Wrote the paper.

S. Kangaslampi: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

K. Peltonen: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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