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SEX DIFFERENCES IN RESILIENCE FACTORS AND EMOTIONAL HEALTH AMONG ADOLESCENTS DURING COVID-19

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ABSTRACT

The most prolific pandemic of the 21st century has caused people throughout the world to be physically and psychologically affected. Numerous factors have influenced a cascade of stressful situations due to COVID-19. The responses to a stressful or traumatic situation may not only differ due to the resources available to them, their personalities, and the level of exposure. It can also be dependent upon the biological sex of the individual. A survey was conducted for adolescents between the ages of 12-19 years where n = 74 males and n = 108 females. The data was collected during the first wave of the pandemic. The study was conducted to explore the Resilience Factors (RF) and their relationship with Emotional Health (EH); the calculation of levels of variables associated with RF and the levels of EH. Sex differences in RF and EH were also tested to assess their differences. The current study found that there were no significant differences between male and female adolescents in any RF. There were but significant differences in EH between them with males having higher levels than females. Individuals with high resilience are less likely to be affected than those with low resilience by the effect of 'stress exposure' symptoms of depression mediated by anxiety which results in better EH.

Keywords: *Resilience factors, Emotional Health, Stress, adolescence, sex differences*

Introduction

The COVID pandemic has had profound impacts worldwide, causing widespread disruption and unforeseen consequences. As the outbreak unfolded, the interconnected physical, social, and psychological dimensions of health were affected in individuals (World Health Organization, n.d.-b). This aligns with the biopsychosocial model of health and illness (Engel, 1977). To mitigate the impact of the virus, various countries, including Nepal, implemented emergency policies such as lockdowns, profoundly affecting individual lives. The isolation and fear associated with the pandemic have engendered numerous psychological problems

with children and adolescents being particularly vulnerable (Dhami et al., 2020; Poudel & Subedi, 2020; Sinha & Manna, 2020).

Adolescence is a developmental phase between the ages of 10 and 19 characterized by major physical, cognitive, psychological, and hormonal changes (Papalia et al., 2004; World Health Organization, n.d.-a). The tumultuous period of restricting freedom, fear, increased domestic abuse, and loss of lives could make adolescents extremely susceptible to various psychosocial and emotional problems (Usher et al., 2020). The ability and tools to combat these problems are understood as resilience factors having roots in the emotional health of an individual.

After puberty, there are significant changes in the psychological stress response with physiological development and hormonal changes resulting in an increased risk of behavioral and neurodevelopmental disorders in males and affective disorders in females (Bale & Epperson, 2015; Daughters et al., 2013). Traumatized girls entering puberty are more likely to engage in self-blame and avoidance, whereas traumatized boys tend to report intrusive or re-experiencing symptoms, and when non-traumatized children were exposed to fear conditioning in an experimental setting, girls, but not boys, showed generalized fear and lack of ability to discriminate a safety signal (Hodes & Epperson, 2019).

There are personality traits that make a person more resilient to adverse situations or stressful life circumstances which include self-esteem, personal control, and optimism (Major et al., 1998; as cited in Sarafino & Smith, 2012). Various studies have found that self-control was strongly, and negatively correlated with boredom proneness (Isacescu & Danckert, 2018; Martarelli et al., 2021; Mugon et al., 2020) with a higher level of boredom positively associated with depression and high risk-taking behavior resulting in addiction (Chou et al., 2018; X. J. Yang et al., 2020). Numerous studies suggest a strong negative correlation between self-esteem and loneliness (Ma et al., 2014; Szcześniak et al., 2020) with increased perception of social support resulting in increased self-esteem (Shaw & Gant, 2002).

The psychological factors of resilience according to the biopsychosocial model of resilience include cognitive reappraisal, optimism/ positive emotions, and self-efficacy (Feder et al., 2019). The personality resources are associated with better cognitive appraisal resulting in higher self-efficacy for coping (Major et al., 1998). Even though males show benefits from flexible choices of regulation, there are differences in brain regions occurring in male and female adolescents where higher cognitive reappraisal has been found in female adolescents (Vijayakumar et al., 2014; J. Yang et al., 2018). Studies suggest that cognitive reappraisal is associated with higher positive and lower negative moods with cognitive appraisal even working as a buffer against negative moods due to stressors (Bettis et al., 2019; Johnson et al., 2016). Optimism has been shown to significantly predict resilience;

having good expectations about the future results in better adaptation to new stressors (Antonio Zayas et al., 2018; Souri & Hasanirad, 2011). The biological link between optimism and imagery of future outcomes has been corroborated by numerous studies with male adolescents having higher levels of optimism compared to their female counterparts (Ji et al., 2017; Mavioğlu et al., 2015). Studies have also indicated vividness of imagining positive events has been found to predict optimism as well as self-efficacy (Pop & Tiba, 2019) and males have higher self-efficacy than females (McKay et al., 2014). Adolescents who perceive positive social support from family, peers, and school have higher optimism, self-esteem, and resilience with lowered feelings of loneliness (Chong et al., 2006; Dumont & Provost, 1999; Hombrados-Mendieta et al., 2013).

Studies have shown higher rates of psychological problems involving neurotic disorders in females than in males with poorer emotional well-being even though female adolescents tend to express their emotions and feelings more than male adolescents (Burke & Weir, 1978; Sweeting, 1995). Family connectedness has also been significantly and inversely associated with a broad range of serious behavioral and emotional health behaviors (Ackard et al., 2006).

A study in the UK found significant psychological parallels between lockdown and imprisonment (Dhami et al., 2020). During COVID-19, it was found that female adolescents have higher levels of stress and lower resilience compared to male adolescents resulting in significant levels of anxiety and depressive symptoms (Hawes et al., 2021; Yan et al., 2021). According to a study in China, optimism in children and adolescents as well as parent-child discussion and support mitigated depression, anxiety, and stress while boosting life satisfaction during COVID-19 (Tang et al., 2020). A study in the 'Journal of Adolescent Health' done in Nepal found deficient youth mental health services funding, social media use, a suddenly imposed lockdown, sudden work/student life charges abrupt postponement of SEE exams, and exposure to the devastating earthquake in 2015 to be the risk factors for the mental health of adolescents and young adults; whereas the protective factors are: cultural acceptance of facemasks, family structure, school space repurposing and availability of free counseling (Sharma et al., 2020).

Based on previous literature, the following objectives were proposed for the study.

General Objectives

- To identify and explore the various factors of resilience in adolescents, in response to various stressors and their impact on emotional health
- To assess the difference in the resilience factors and emotional health between male and female adolescents

Specific Objectives

- To calculate the level of variables associated with resilience factors in adolescents in response to various stressors of COVID-19
- To find the level of emotional health of adolescents during COVID-19
- To find out if there are significant differences between the resilience factors as well as the emotional health of male and female adolescents during COVID-19

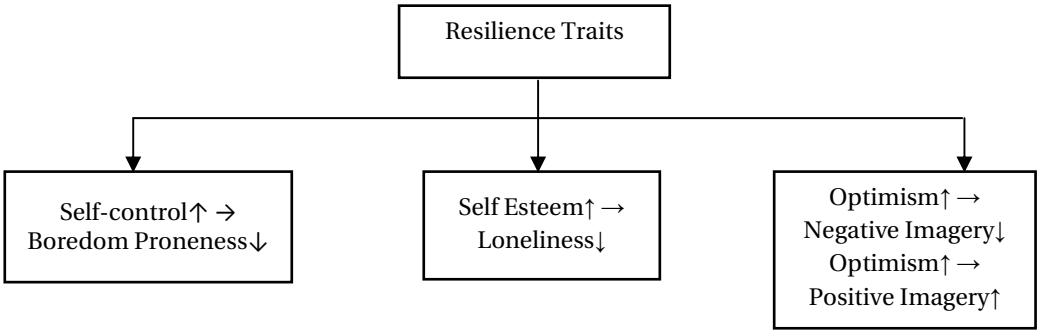

Figure 2. Framework for resilience traits

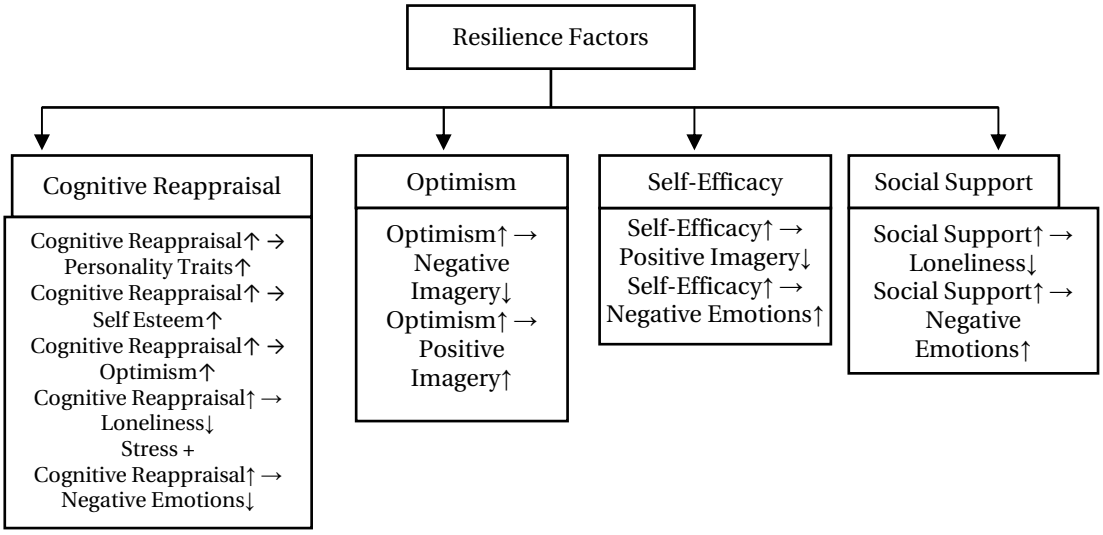

Figure 3. Framework for Resilience Factors

Methodology

Measures

During this study, the data obtained were used to calculate the resilience factors and emotional health. The psychological resilience factors to be calculated were optimism, self-efficacy, and cognitive reappraisal based on the literature. These

were calculated and explained via the use of a test battery, 'Listening to young peoples responses to COVID19 (UK)'. It constitutes a battery of tests incorporating the changed version of various tests that have been specially designed for adolescents impacted by COVID-19. The tests within the battery used for the measurement of variables associated with factors of resilience among adolescents consist of the Positive and Negative Affect Schedule (PANAS), the Prospective Imagery Task (PIT), UCLA Loneliness Scale (Version 3) (LSV3) and Function of Boredom (FoB)**,** whereas Warwick-Edinburgh Mental Wellbeing Scale (WEMWEBS) was used to measure the Emotional health of adolescents during COVID19. A scale also within the battery, on the information about how COVID-19 has impacted your daily routines was used as well.

Information about how COVID-19 has impacted your daily routines. The questionnaire within the battery, 'Listening to young people's response to COVID19 (UK) consists of 8 items kept on a 6-point ($\alpha = 0.587$) Likert scale kept within 'Block 3' under Q8. The total score for the measure is 48.

Positive and Negative Affect Schedule (PANAS). The original version of PANAS consists of 20 items with 10 positive and 10 negative affect, each response measured on a 5-point scale, and the mean standard score of $M = 17.4$ and $SD = 6.2$ (Watson & Tellegen, 1988). The battery, 'Listening to young people's response to COVID19 (UK) measures only negative effects consisting of all 10 items ($\alpha = 0.844$) and is kept under 'Block 6', Q21. The total score for the measure is 50.

Prospective Imagery Task (PIT). The original version of the Prospective Imagery Task (PIT) consists of 10 positive and 10 negative future scenarios measured on a 5-point scale (Liu et al., 2021; Morina et al., 2011), The questionnaire within the battery, 'Listening to Young people's response to COVID19 (UK) was reduced to 7 positive and 7 negative future scenarios with a total of 14 items ($\alpha = 0.570$) kept within 'Block 8' under 'Q44 Imagining future events'.

UCLA Loneliness Scale (Version 3) (LSV3). The original version of the UCLA Loneliness Scale (Version 3) (LSV3) consists of 20 items with each response measured on a 4-point scale with 10 of the items having reversed scaling (Russell, 1996). The questionnaire within the battery, 'Listening to young people's response to COVID19 (UK) was reduced to only 3 items ($\alpha = 0.773$) measured on a 3-point scale kept within 'Block 2' under 'Q17 Information about your social life'. The total score for the measure is 9.

Function of Boredom (FoB). The questionnaire within the battery, 'Listening to young people's response to COVID19 (UK) consists of 6 items ($\alpha = 0.601$) measured in a 7-point Likert scale kept within 'Block 4' under Q22. The total score for the measure is 42.

Edinburgh Mental Wellbeing Scale (WEMWEBS). The original version of WEMWBS consisted of 14 items with each response measured on a 5-point scale (Stewart-Brown & Janmohamed, 2008) which was shortened within the battery, 'Listening to young people's response to COVID19 (UK) to 7 items ($\alpha = 0.667$) which was kept within 'Block 2' under 'Q19 Information about your emotional health'. The total score for the measure is 63.

Research Design

The research used self-reported data with a survey design. Closed-ended questions were analyzed for the research using quantitative data from questionnaires.

Participants

For the study, adolescents from the ages of 11 to 19 years old were taken including both male and female participants. In this study, various schools in Kathmandu Valley were contacted to acquire the contact information of the students.

The samples were collected using non-probability sampling. Convenience sampling was used to approach the schools whereas volunteer sampling within the schools to collect participant data.

Data Collection

The students received a link to the consent form and questionnaires including both open and closed-ended questionnaires along with instructions to fill them out via email. The participants then had to fill out the questionnaires whose details were received by the professors of Tri-Chandra Campus and Tribhuvan University (TU) from the King's College database, which were provided to the students who worked on the data collection process. From all of the samples, only those samples in which the participants had completed the survey for all the questionnaires required in this research were selected. The samples from those participants who had failed to fill out all the questions for this research were dropped. The sample size of this study after omitting incomplete data is N=182 with 74 males and 108 females. The sample (N=182) had a mean age of 15.853 years with a standard deviation of 1.640. The mean age for male participants (N=74, 40.66%) was 15.883 with a standard deviation of 1.730 whereas for female participants (N=108, 59.34%) the mean age was found to be 15.832 with a standard deviation of 1.640.

Data Analysis

The study is done from a part of a Nepalese sample from a longitudinal study done by King's College using 'Listening to young people's responses to COVID19 (UK)' which included a battery of tests to measure emotional well-being and resilience factors. The analysis of the psychological factors of resilience was done using the relationship between impacts on daily routines and negative emotions for cognitive

reappraisal, and the relationship with the measure of imagining future events used to measure optimism and self-esteem. The social factor of resilience was measured using the 'measure for social life'. The personality factors for resilience were analyzed using the relationships with the measure of imagining future events for optimism, the measure of social life for self-esteem, and the inverse relationship with the measure of boredom for self-control. The analysis for emotional health on the other hand was done directly using a test tool for emotional health.

Results

Measure for Impacts of COVID-19 on daily routines

An independent-sample t-test was conducted to compare the measure for various avenues of daily routines impacted due to COVID-19 between male and female adolescents. There were no significant differences (t (180) = 0.152, p = 0.880) in the scores with the mean score for Males (M = 28.59, SD = 6.466) and Females (M = 28.45, SD = 5.943). The magnitude of the differences in means (mean difference = 0.141, 95% *CI:* -1.693 to 1.975) was not significant.

Relationship between impacts on daily routines and negative emotions

The Pearson Correlation between impacts on daily routines and negative emotions for the entire sample was found to be moderately positive and statistically significant (r = 0.353, p < 0.001). This implies that the increase in the stressors by the impacts of daily routines during COVID-19, increases the negative emotions in adolescents and the mediating factor for the regulation of these negative emotions is cognitive reappraisal(Troy et al., 2018; Troy, 2012). When calculated separately for sex difference though, the correlation for male samples was found to be very slightly positive and statistically insignificant (r = 0.204, p = 0.081) whereas for females it was found to be moderately positive and statistically significant (r = 0.468, p < 0.001).

The obtained values of r between male and female adolescents were tested for significance difference for which an independent-sample t-test was conducted to compare the measure between them. There were no significant differences (z (179) = 1.956, p <0.05) found between their correlations with mean z-score for Males (Z = 0.207) and Females (Z = 0.508). The results from the test suggest a lack of significant difference between the *cognitive reappraisals* of male and female adolescents.

Measure for imagining future events

An independent-sample test was conducted to compare the measure for *prospective future positive and negative events* between Male and Female respondents. There were no significant differences (t (180) = -1.171, p = 0.245) in the scores with the mean score for Males (M = 44.96, SD = 7.353) and Females (M =

46.19, *SD* = 6.725). The magnitude of the differences in means (mean difference = -1.235, 95% *CI:* -3.135 to 0.845) was not significant. The results from the test suggest a lack of significant differences in the *optimism* and *self-efficacy* of male and female adolescents during COVID-19 (Pop & Tiba, 2019).

Measure for Social life

During the measure of the *social life* of adolescents during COVID-19 based on the level of loneliness, the mean of the entire sample was found to be *M* = 5.48 with the standard deviation *SD* = 1.798. An independent-sample test was conducted to compare the measure between Male and Female respondents. There were no significant differences (*t* (180) = -1.719, *p* = 0.87) in the scores with the mean score for Males (*M* = 5.20, *SD* = 1.858) and Females (*M* = 5.67, *SD* = 6.725). The magnitude of the differences in means (mean difference = -0.464, 95% *CI:* -0.997 to 0.69) was not significant. The results suggest that there is no significant relationship between the *social support* received by male and female adolescents which also applies to their *self-esteem* (Herman-Stahl & Petersen, 1996; Vanhalst et al., 2013).

Measure for Boredom

An independent-sample test when conducted to compare the boredom between Male and Female respondents found no significant differences (*t* (180) = -0.945, *p 0*= 0.346) in the scores with the mean score for Males (*M* = 27, *SD* = 7.270) and Females (*M* = 28.04, *SD* = 7.034). The magnitude of the differences in means (mean difference = -1.037, 95% *CI:* -3.203 to 1.128) was not significant. The results found no significant difference in boredom between male and female adolescents which suggests no differences in the level of *self-control/personal control* between them (Martarelli et al., 2021).

Measure for emotional health

An independent-sample test was also conducted to compare the emotional health of Male and Female respondents. There were significant differences (*t* (180) = 2.017, *p* = 0.045) in the scores with the mean score for Males (*M* = 23.18, *SD* = 5.024) higher than Females (*M* = 21.77, *SD* = 4.329). The magnitude of the differences in means (mean difference = 1.407, 95% *CI:* 0.30 to 2.784) was significant.

Table 8
Independent sample t-tests

Scale		Mean	SD	T	df	p	CI	
							Lower	Upper
ICDL	Male (N=74)	28.59	6.466	.152	180	.880	-1.693	1.975
	Female (N =108)	28.45	5.943					
IFE	Male (N = 74)	44.96	7.353	-1.171	180	.243	-3.315	.845
	Female (N = 108)	46.19	6.725					
SE	Male (N =74)	5.20	1.858	-1.719	180	.087	-.997	.069
	Female (N = 108)	5.67	1.740					
B	Male (N = 74)	27.00	7.609	-.945	180	.346	-3.203	1.128
	Female (N = 108)	28.04	7.034					
EH	Male (N = 74)	23.18	5.024	2.017	180	.045	.030	2.784
	Female (N =108)	21.77	4.329					

Note: Impacts of COVID-19 on daily lives (ICDL), Imagining Future Events (IFE), Social Life (SE), Boredom (B), Emotional Health (EH)

Table 9
Pearson's correlation between impacts on daily routines and negative emotions

		Negative Affect	P value
Male (N = 74)	Stressors	0.204	0.081
Female (N =108)	Stressors	0.468**	0.000
Total	Stressors	0.353**	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion

The pandemic has caused upheaval in the lives of adolescents throughout the world with many consequences from the emergence of unexpected stressors that have come during these unprecedented times. These stressors have tested the resilience of the adolescents in Nepal with the potential for problems in their emotional health. In the study, psychosocial resilience factors were taken into consideration for the comparisons between male and female adolescents. These factors included cognitive appraisal, self-efficacy, optimism, and social support (Feder et al., 2019). The factors were not tested directly but explored from their relationships with other variables. The rationality behind this approach was because the test battery that was used, 'Listening to young peoples' responses to COVID 19 (UK)' was specially designed for the effects of COVID-19 on adolescents.

COVID-19 and lockdowns impacted various aspects of adolescents' lives causing significant stress. When comparing the level of impacts that have been caused within these areas between male and female adolescents, no significant difference was found. The short-term and long-term responses to these stressors could have differences in impact both physiologically and psychologically between the sexes

but long-term and more detailed studies are required to assess these impacts (Bale & Epperson, 2015; Daughters et al., 2013; Hodes & Epperson, 2019).

When personality factors (self-esteem, perceived control/self-control, and optimism) which also predict cognitive appraisal and self-efficacy were compared between male and female adolescents, there were no significant differences observed during the test for differences (Major et al., 1998). These personality factors were calculated using their inverse relationships with loneliness and boredom, and direct relationship with imagery of the future respectively (Ji et al., 2017; Martarelli et al., 2021; Szcześniak et al., 2020). The results for both resembled the same when cognitive reappraisal and self-efficacy were calculated separately using other relationships.

An increase in loneliness and boredom is associated with higher rates of depression and a reduction in depression is due to the introduction of positive imagery(Ji et al., 2017; Morina et al., 2011; Shaw & Gant, 2002; X. J. Yang et al., 2020). Boredom is also associated with a higher likelihood of risk-taking behaviors and addiction (Chou et al., 2018; Kılıç et al., 2020). A robust social support system increasing self-esteem along with optimism and personal control is essential for building up a resilient personality (Ackard et al., 2006; Dhami et al., 2020; Tang et al., 2020).

The difference in Cognitive reappraisal between male and female adolescents was observed using its mediating relationship between stressors and negative affect (Troy et al., 2018; Troy, 2012). The correlation between stressors and negative affect found a very low positive correlation with no significant relationship between the two for males and a low positive correlation with a significant relationship between the two for female adolescents. There were no significant differences between male and female adolescents, the results suggesting equivalent cognitive reappraisal among both sexes. Even though there was no significant relationship between stressors and negative affect found in males in the study, it was seen as significant in both the total sample as well as the female participants. This could be the result of a low number of male participants compared to female participants.

The personality traits involving self-esteem, self-control, and optimism which predict cognitive appraisal, when comparing adolescents of both sexes also resulted in appraising stressors as equivalently stressful (Major et al., 1998). Even though the level of appraisal of stressors is found to be similar in both male and female adolescents, the process involved during the appraising could likely be different (Vijayakumar et al., 2014; J. Yang et al., 2018).

When calculating the positive and negative imagination of future events in adolescents, there were no significant differences in male and female adolescents which implies both male and female adolescents imagine the potential of future

events in a similar manner. The imagination of potential future events is also able to predict optimism and self-efficacy again suggesting no significant differences in male and female adolescents (Pop & Tiba, 2019). There were also no significant differences in the level of social support received by male and female adolescents when calculated for their levels of loneliness (Herman-Stahl & Petersen, 1996).

The overall study showed no differences in the levels of resilience factors between male and female adolescents which is not in agreement with most literature and is seen as expressed differently among the sexes (Hawes et al., 2021; Hjemdal et al., 2011; Tardif-Grenier et al., 2021; Yan et al., 2021). The differences in emotional health between male and female adolescents on the other hand are significant with male participants (M = 23.88) on average having higher levels of emotional health compared to female participants (M = 21.77) which is congruent with the literature showing higher rates of neurotic problems and lower emotional well-being among male adolescents than in female adolescents (Burke & Weir, 1978; Sweeting, 1995).

Even though the current study suggests no differences in the resilience factors between male and female adolescents, various studies with brain studies have found that they experience stress and respond to stressful situations in different ways with higher experiential arousal for stressors in females (Hodes & Epperson, 2019; J. Yang et al., 2018). Higher levels of resilience in males compared to females have also been observed in other locations during COVID-19 (Yan et al., 2021). Higher levels of cognitive appraisal have been found in female adolescents but males other than females showed benefits from flexible choices of emotion regulation (i.e. emotional suppression as well as cognitive reappraisal) (Vijayakumar et al., 2014; J. Yang et al., 2018). When tested among adolescent twins, environmental factors were more influential for the optimism levels than genetic factors corroborated by another study which found lower optimism levels for females than males in rural youths (Mavioğlu et al., 2015; Puskar et al., 2010). The lower optimism levels for females found in various literature could be the result of higher cognitive and experiential sensitivity to negative stimuli in females (Souri & Hasanirad, 2011; J. Yang et al., 2018). Since the imagination of positive future events predicts both self-efficacy and optimism, the results for higher optimism in males than in females should apply to self-efficacy as well (Pop & Tiba, 2019). This has been corroborated by other studies suggesting higher self-efficacy for women in social support but lower in other domains (Colodro et al., 2010; McKay et al., 2014).

Girls exhibit higher levels of experiential arousal to stressful stimuli than boys even before puberty, with a decrease in pleasant moods in both sexes after puberty but a higher bias for negative stimuli in girls resulting in a higher incidence of affective disorder among female adolescents(J. Yang et al., 2018). The current study supports the findings of other studies in different locations that levels of emotional health are

higher in males than in females with those studies finding higher levels of anxiety and depressive symptoms in females during COVID-19 (Hawes et al., 2021; Tardif-Grenier et al., 2021).

These findings suggest that even though there is no significant difference between the resilience factors among male and female adolescents while dealing with stressors due to the pandemics, the use of resources to deal with said stressors has more impact on the emotional health of female adolescents i.e., they are psychologically more affected.

Limitations

The relationships with other factors that predicted the resilience factors were used in the analysis of the difference in the level of resilience factors among male and female adolescents instead of analyzing the actual factors. This coupled with the lower sample size for males compared to females could have caused the lack of significant difference in the resilience factors when compared to other literature elsewhere which suggests otherwise. The lower sample size could also be the result of the lack of significance in the relationship between daily stressors and negative affect for male participants. This was opposite and congruent with the literature with female participants as well as when considering the entire sample showing a significant relationship between the two variables. The samples were also taken via email with the questionnaire in the English language due to pandemics which could have affected the response. Further study which describes the actual resilience factors with a larger sample size is recommended for further research in the matter.

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