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Buffering effect of e-learning on Generation Z undergraduate students: A cross-sectional study during the second COVID-19 lockdown in Italy

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Abstract

Background: The massive adoption of e-learning in academic education during the coronavirus disease (COVID-19) pandemic may be beneficial to digitally skilled individuals, such as Generation Z (Gen Z) members. However, some studies have underscored its negative psychological impact on the mental health of the young adults. We aimed to examine the psychological impact of prolonged e-learning on emotional adaptation among undergraduate students. A secondary objective was to identify key components for preventive interventions targeted toward the academic community by investigating the buffering effect of e-leaning on the impact of negative life events experienced during the pandemic.

Methods: The participants were 529 Italian undergraduate students aged 18–26 years. We administered measures of personality traits, anxiety symptoms, peritraumatic dissociation, stress, and affinity for e-learning. This study examined emotional adaptation among Gen Z members who were subjected to prolonged academic e-learning during the 2nd COVID-19 lockdown in Italy.

Results: Dysfunctional anxiety was not a major issue among our participants. This is indicative of the adoption of effective anxiety management skills during the pandemic. Nevertheless, the findings also underscored the vulnerability of the Gen Z population. Further, coronavirus anxiety significantly predicted mental health through the mediating effect of personality traits.

Conclusions: Therefore, health care professionals should design and implement interventions and programmes that focus on coronavirus anxiety and psychological distress.

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1. Introduction

Members of Generation Z (also known as Gen Z, iGen, or centennials), whom researchers generally define as those born between the mid-to-late 1990s and early 2010s (Dimock, 2019), have been exposed to unique life experiences during the ongoing coronavirus disease (COVID-19) pandemic.

The impact of COVID-19 outbreak is widely investigated worldwide in real time: actual pandemic is affecting mental health of general population (Benassi et al., 2020; ; Gori et al., 2021; He et al., 2000; Moccia et al., 2021; Serafini et al., 2020; Settineri & Merlo, 2020); several studies started to detect the risk for mental health of health workers (Kang et al., 2020; Lai et al., 2019; Ranieri et al., 2020; Tahara et al., 2021) as well medical undergraduates and postgraduates and the ways to cope stress during pandemic (Bana & Sarfaraz, 2020; Giordano et al., 2020; Li et al., 2020; Somma et al., 2020). The findings underscore an increase in psychological distress, excessive fear of infection, pervasive anxiety, frustration and boredom, a high level of stress, and post-traumatic stress symptoms. With regard to the academic community, several studies have been conducted among life science students (undergraduate and postgraduate) (Bellani et al., 2021; Guo et al., 2021; Marcen-Roman et al., 2021), and few studies have focused on the interdisciplinary academic community. Indeed, the undergraduate community is composed of Gen Z members who constitute a social generation of digital natives who are technologically skilled. Their widespread exposure to technology accounts for their comfort with and strong knowledge of digital media. Furthermore, connectivity has become a major factor in their social interactions, education, work, friendships, and other relationships (Deal et al., 2010; Pinto et al., 2017). In pre-pandemic, the e-learning met many barriers and obstacles in academic programmes from students and teachers. In pandemic, the massive adoption of e-learning in academic education during the pandemic may have been a positive change for digitally skilled individuals, such as Gen Z members. However, some studies have underscored its adverse psychological impact on the mental health of the younger generation. Rens et al. (2021) found that the young people who participated in their study were experiencing high levels of mental distress during the COVID-19 pandemic because of a decrease in outings (e.g. going out for drinks or a meal) and physical activity and an increase in social media use. Liu et al. (2021) suggested the pandemic experience was unprecedented stressor to students: Authors found that White/European ethnicity was a significant negative predictor of psychological wellbeing.

This study aimed to identify the protective factors that were operating within the academic community during the implementation of social distancing guidelines as a part of the second lockdown in Italy (December 2020) by examining the adaptive behaviours of undergraduate students belonging to three academic disciplines: life sciences, physical and engineering sciences, and human and social sciences.

Aim of the present study was to detect the protective factor for academic community during social restriction for pandemic in 2nd Italian lockdown (December 2020) analysing the adaptive behaviour of undergraduate in n. 3 field panels of academic education (life sciences, physical and engineer sciences, human and social sciences). We aimed to determine the psychological impact of prolonged e-learning on emotional adaptation among undergraduate students. A secondary objective was to identify key components for preventive interventions targeted toward the academic community by investigating the buffering effect of e-learning in academic education on exposure to negative life events during the pandemic. According to the *Encyclopedia of Social Psychology*, a buffering effect is 'a process in which a psychosocial resource reduces the impact of life stress on psychological well-being' (Wills & Isasi, 2007).

2. Methods

2.1 Participants

The participants were 529 Italian undergraduate students aged 18–26 years (mean = 21.8, SD ± 1.97), following the Gen Z range age (Dimock, 2019). Further, 421 participants were women (79.6%), and 108 participants were men (20.4%). The participants were living in Northern (n = 109, 20.6%), Central (n = 201, 38%), and Southern Italy (n = 219, 41.4%). This distribution includes all the different kinds of living areas (rural and underground or metropolitan areas). The participants were divided into two groups based on their median age (22 years): younger Gen Z group (n = 311) and older Gen Z group (n = 218). The distribution of participants in age group by median group and not by university programme (bachelor, master) was based on the digital featuring by Gen Z.

Table 1 presents the socio-demographic characteristics of the participants.

Participants were recruited from a dedicated university community using social media platforms.

The inclusion criteria were as follows: (a) aged 18–26 years, (b) an undergraduate student, and (c) provision of informed consent.

Table 1. Socio-demographic characteristics of the participants

	Younger Gen Z group (n = 311)	Older Gen Z group (n = 218)	Total (N = 529)
Age (years): mean ± SD	20.56 ± 1.01	23.76 ± 1.39	21.8 ± 1.97
Sex: n (%)			
Female	265 (85.2%)	156 (71.55%)	421 (79.6%)
Male	46 (14.8%)	62 (28.45%)	108 (20.4%)
University degree: n (%)			
Bachelor's degree	267 (85%)	98 (44.95%)	365 (69%)
Master's degree	44 (15%)	120 (55.05%)	164 (31%)
Relationship status: n (%)			
Living with partner	154 (49.52%)	108 (49.55%)	262 (49.5%)
Single	157 (50.48%)	110 (50.45%)	267 (50.5%)
Residential status: n (%)			
On-campus student	157 (50.48%)	94 (43.12%)	251 (47.4%)
Off-campus student	154 (49.52%)	124 (56.88%)	278 (52.6%)
Academic discipline: n (%)			
Life sciences	108 (34.72%)	57 (26.14%)	165 (31.2%)
Physical and engineering sciences	83 (26.68%)	71 (32.56%)	154 (29.1%)
Human and social sciences	120 (38.6%)	90 (41.3%)	210 (39.7%)
Living arrangement during the 1st COVID-19 lockdown: n (%)			
	5 (1.60%)	12 (5.5%)	17 (3.22%)
Alone	291 (93.58%)	180 (82.55%)	471 (89%)
With family	8 (2.57%)	20 (9.18%)	28 (5.3%)
With partner	7 (2.25%)	6 (2.77%)	13 (2.48%)
With roommates			
Living arrangement during the 2nd COVID-19 lockdown: n (%)			
Alone	11 (3.55%)	13 (5.97%)	17 (3.22%)
With family	264 (84.9%)	169 (77.53%)	471 (89%)
With partner	11 (3.55%)	24 (11%)	28 (5.3%)
With roommates	25 (8%)	12 (5.5%)	13 (2.48%)
Place of residence: n (%)			
Northern Italy	60 (19.3%)	49 (22.48%)	109 (20.6%)
Central Italy	113 (36.33%)	88 (40.37%)	201 (38%)
Southern Italy	138 (44.37%)	81 (37.15%)	219 (41.4%)
Geographical location of the university: n (%)			
Northern Italy	66 (21.23%)	57 (26.15%)	123 (23.25%)
Central Italy	83 (26.68%)	65 (29.82%)	148 (28%)
Southern Italy	162 (52.09%)	96 (44.03%)	258 (48.75%)

Gen Z = Generation Z

COVID-19 = coronavirus disease pandemic

2.2 Measurements

The socio-demographic characteristics of the participants, namely, age, relationship status, university degree and course, student university condition, study area, and living arrangement during the 1st and 2nd lockdowns in Italy, were assessed using a socio-demographic form. We also assessed personality traits, anxiety symptoms, peritraumatic dissociation, stress, and affinity

for e-learning. The psychological battery consisted of 5 self-report measures, which assessed personality traits, anxiety, and distress. These measures were used to ascertain the presence of psychological symptoms and assess their severity. An ad hoc questionnaire was used to assess e-learning affinity.

2.2.1 Emotional measures

Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Carmassi et al., 2021; Marmar et al., 1997). This 10-item self-report questionnaire measures dissociation experienced during or immediately after a traumatic event. The PDEQ has well-established psychometric properties, and higher total scores indicate increased peritraumatic dissociation. A score > 15 is indicative of significant dissociation.

COVID-19 Student Stress Questionnaire (CSSQ; Zurlo et al., 2020). The CSSQ measures COVID-19-related sources of stress among undergraduate students. It consists of 7 items, which are rated on a 5-point scale that ranges from zero ('Not at all stressful') to four ('Extremely stressful'). The CSSQ consists of the following three subscales, which assess COVID-19-related stressors among students: (1) relationships and academic life (i.e. relationships with relatives, colleagues, professors, and academic activities), (2) isolation (i.e. social isolation and couple's relationship, intimacy and sexual life), and (3) fear of contagion. This scale also yields a global stress score, which can range from 0 to 28.

Coronavirus Anxiety Scale (CAS; Lee, 2020; Orrù et al., 2021). The CAS is a brief 5-item mental health screening tool that can be used to detect dysfunctional anxiety associated with the COVID-19 crisis. Each item assesses a unique manifestation of this particular form of anxiety. Specifically, it assesses the cognitive (i.e. rumination, worry, information processing biases, daydreaming, and planning), behavioural (i.e. dysfunctional activities, avoidance, and compulsive behaviours), emotional (i.e. fear, anxiety, and anger), and physiological (i.e. sleep disturbances, somatic distress, and tonic immobility) dimensions of coronavirus anxiety. Each item is rated on a 5-point scale that ranges from 0 (not at all) to 4 (nearly every day), and these ratings indicate the frequency with which the symptom has been experienced during the past two weeks. A total score ≥ 9 is indicative of dysfunctional anxiety.

2.2.2 Personality measure

Big Five Inventory-10 (BFI-10; Guido et al., 2015). The BFI-10 assesses five personality traits: openness, conscientiousness, emotional stability, extraversion, and agreeableness. Items are rated on a 5-point scale that ranges from 1 (strongly disagree) to 5 (strongly agree). Each dimension consists of two items.

2.2.3 e-learning affinity measure

Affinity for e-learning Questionnaire (AEQ). The AEQ is an experimental self-report measure that assesses affinity for e-learning. It is composed of 10 items, which are rated on a five-point Likert scale that ranges from 'Completely disagree' to 'Completely agree'.

It assesses self-confidence in relation to service access, convenience and flexibility, lesson attendance, involvement, and information technology skills. A pilot study was conducted using a sample drawn from the target population (not included in this study) to examine the reliability of the AEQ. The internal consistency of the scale was high ($\alpha = 0.8$).

2.3 Procedure

Participants were recruited using snowball sampling—a non-random sampling method. Participants were recruited from a dedicated university community using social media. This study was conducted between 18th and 30th December, 2020. Subsequently, the self-report questionnaire was linked to the post, and participants could access it after providing written informed consent. Informed consent was obtained from each participant, and this study adhered to the principles outlined in the Declaration of Helsinki. The online self-report questionnaire could be completed in approximately 15 minutes; after responding to the questionnaire items, the participants submitted their responses online. Data were stored in a dedicated server. Participation in the study was voluntary, and the submission of a signed informed consent form was mandatory.

2.4 Study design

An online cross-sectional survey was conducted among university students pursing degrees in life sciences, physical and engineering sciences, and social sciences in Italy. They were recruited using snowball sampling. Descriptive statistics and analysis of variance (ANOVA), homogeneity test (Levene's test) were used to examine their emotional dimensions and determine the impact of e-learning on the participating undergraduate students during the second COVID-19 lockdown in Italy. Pearson's correlation analysis was conducted to examine the relationships between the study variables. All statistical analyses were conducted using Statistical Package for the Social Sciences and the α-value was set as $p \leq 0.05$.

3. Results

3.1 Sample characteristics

The mean age of the participants (N = 529) was 21.8 years (SD = 1.97, range: 18–26), and 79.6% of them were women. Table 1 presents descriptive statistics. A majority of the participants were pursuing a bachelor's degree (69%).

Moreover, 52.6% of the participants were off-campus students, and there was no change in the percentage of students who were living with their family (89%) between the first (March 2020) and second (December 2020) lockdown.

Moreover, 52.6% were off-campus students, and living during lockdown in family (89%) showing no changing between first (March 2020) and second (December 2020) restriction rules. The academic disciplines to which the students belonged were as follows: human and social sciences = 39.7%, life sciences = 31.2%, and physical and engineering sciences = 29.1%. Finally, the participants were living in Southern (41.4%), Central (38%), and Northern Italy (20.6%), but they were attending universities in different geographical regions: Southern Italy = 48%, Central Italy = 28%, and Northern Italy = 20.6%. Table 2 summarises participant performance on the aforementioned psychological tests.

Table 2. Raw scores on measures of the study variables

	Younger Gen Z group ***Mean (SD)***	**Older Gen Z group** ***Mean (SD)***	**Total** ***Mean (SD)***
BFI-10			
Openness	7.1 (± 1.9)	6.9 (± 1.9)	7.0 (± 1.9)
Conscientiousness	6.7 (± 1.8)	7.0 (± 1.8)	6.8 (± 1.8)
Emotional stability	6.0 (± 1.1)	5.9 (± 1.2)	6.0 (± 1.1)
Extraversion	6.0 (± 2.1)	6.2 (± 1.9)	6.1 (± 2.0)
Agreeableness	6.4 (± 1.5)	5.9 (± 1.5)	6.2 (± 1.5)
PDEQ	29.36 (± 9.4)	26.4 (± 9.9)	28.1 (± 9.7)
CSSQ			
Global stress (Total score)	16.9 (± 4.9)	15.7 (± 5.8)	16.4 (± 5.3)
Relationships and academic life	8.8 (± 3.4)	7.7 (± 4.0)	8.4 (± 3.6)
Isolation	5.2 (± 1.9)	5.3 (± 2.2)	5.2 (± 2.0)
Fear of contagion	2.0 (± 0.3)	2.0 (± 0.2)	2.0 (± 0.2)
CAS	6.0 (± 4.9)	5.5 (± 4.5)	5.8 (± 4.7)
AEQ	28.2 (± 8.4)	31.9 (± 9.8)	29.7 (± 9.2)

Gen Z = Generation Z

BFI-10 = Big Five Inventory-10

PDEQ = Peritraumatic Dissociative Experiences Questionnaire

CSSQ = COVID-19 Student Stress Questionnaire

CAS = Coronavirus Anxiety Scale

AEQ = Affinity for e-learning Questionnaire

We conducted comparative analyses using grouped data. Table 2 presents the raw scores of the 2 groups created based on the median age of the participants (22 years): younger Gen Z group and older Gen Z group.

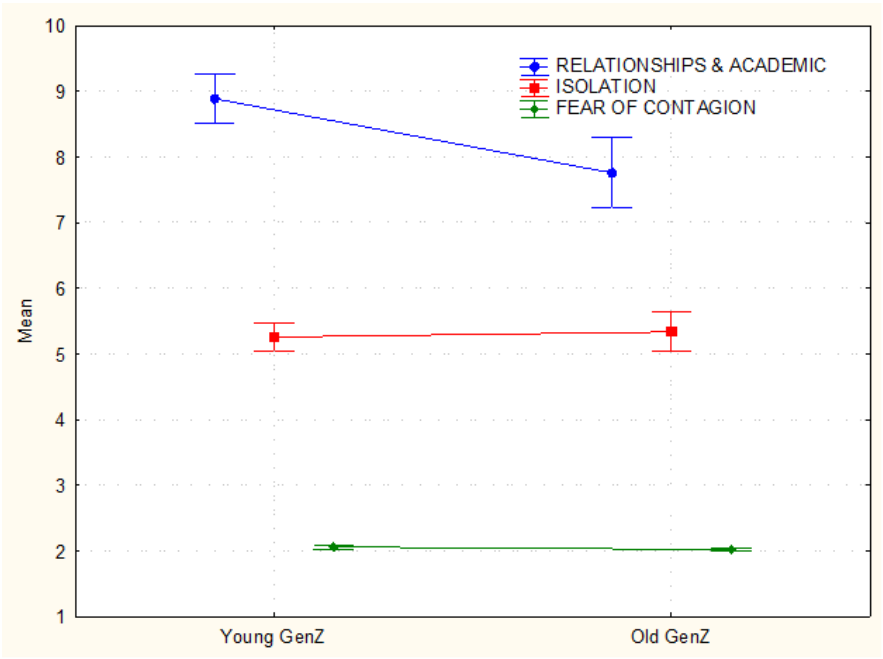
Stress and coronavirus anxiety among Gen Z undergraduate students during the second COVID-19 lockdown

First, we examined emotional adaptation among Gen Z undergraduate students by focusing on stress, anxiety, and psychological distress.

Their global stress (CSSQ) scores revealed that 58.9% (n = 312) of them had high levels of stress; 37% (n = 196) of them reported low stress levels. One-way ANOVA was conducted to examine age differences in global stress (younger Gen Z group and older Gen Z group). These group comparisons revealed that there was a significant difference between the younger and older Gen Z groups ($F(1, 527) = 6.60$, $\eta^2 = 0.01$, $p = 0.01$). Specifically, high stress levels were reported by the younger Gen Z group.

Next, multivariate ANOVA was conducted. The two age groups (younger and older Gen Z groups) were compared on the CSSQ indices (relationships and academic life, isolation, and fear of contagion). The younger Gen Z group obtained significantly higher scores on the relationships and academic life domain ($F(1, 527) = 12.2$, $\eta^2 = 0.02$, $p = 0.001$). There was no significant difference in isolation and fear of contagion between the two age groups.

Figure 1 summarises the scores that the younger and older Gen Z groups obtained on the CSSQ.



Gen Z = Generation Z

Figure 1. Global stress scores obtained by the younger and older Gen Z groups

With regard to dysfunctional anxiety (CAS) associated with COVID-19, 72.9% (n = 386) of the participants did not report high levels of anxiety. However, 27.1% (n = 143) of them reported

dysfunctional anxiety. The data distribution was indicative of effective management of coronavirus anxiety. However, some students were found to be in need of mental health support. There was no significant difference between the younger and older groups.

Finally, the PDEQ scores obtained by the participants were indicative of high risk for psychological symptoms across a long time period. Specifically, 88% (n = 466) of the participants reported significant dissociation from emotional wellness. One-way ANOVA revealed that there was a significant difference between the two age groups. The younger Gen Z group was more vulnerable to future psychological risks ($F(1, 527) = 11.78$, $\eta^2 = 0.02$, $p = 0.001$).

ANOVA was conducted to examine stress and anxiety levels as a function of the following variables: student residential status (on-campus vs. off-campus student), discipline (life sciences, physical and engineering sciences, and human and social sciences), and the geographical location of the university (Northern, Middle, and Southern Italy). None of the results was significant.

Relationship between stress, coronavirus anxiety, and personality traits

First, we examined the relationships between stress, coronavirus anxiety, and personality traits. As shown in Table 3, Pearson's correlation analysis revealed that there was a statistically significant and positive relationship between stress, coronavirus anxiety, and openness. Further, there was a negative relationship between stress associated with COVID-19 and conscientiousness.

Table 3. Pearson's correlation coefficients (*r*) for the relationships between stress, coronavirus anxiety, peritraumatic dissociative experiences, and personality traits

BFI-10 dimensions	PDEQ	CSSQ	CAS
Agreeableness	-.0155	-.0511	-.0390
	p = .722	p = .241	p = .371
Conscientiousness	-.1131	-.1474	-.0611
	p = .009**	p = .001**	p = .160
Emotional stability	-.0393	.0728	-.0026
	p = .367	p = .095	p = .953
Openness	.1326	.0910	.0897
	p = .002**	p = .036*	p = .039*
Extraversion	.0369	.0419	.0826
	p = .397	p = .336	p = .058

BFI-10 = Big Five Inventory-10

PDEQ = Peritraumatic Dissociative Experiences Questionnaire

CSSQ = COVID-19 Student Stress Questionnaire

CAS = Coronavirus Anxiety Scale

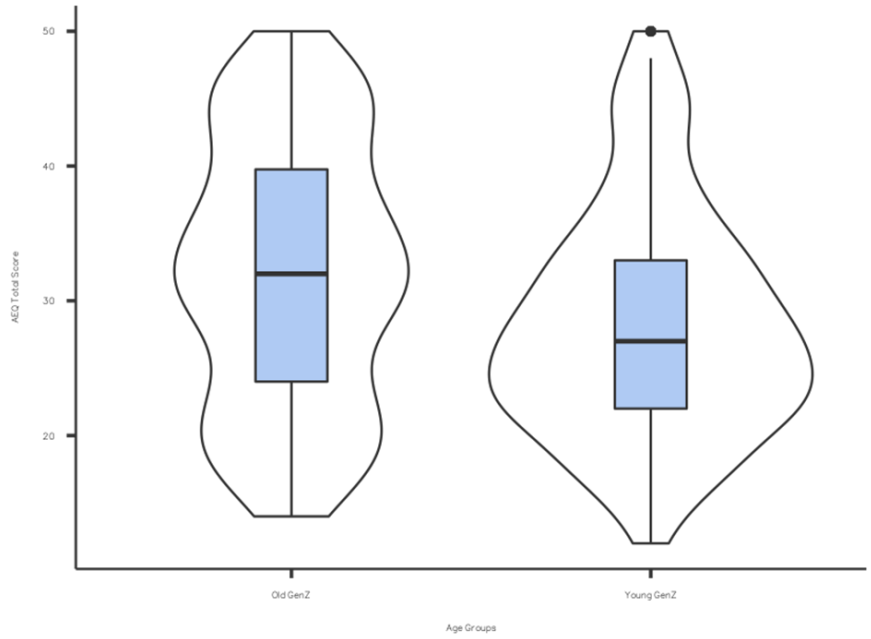
Positive effects are highlighted

**$p < 0.01$; *$p < 0.05$

With regard to the dimensions of stress, relationships and academic life and isolation were negatively correlated with conscientiousness, whereas relationships and academic life and fear of contagion were positively correlated with openness (r = 11.1, p = 0.01; r = 0.13, p = 0.002, respectively). Finally, there was a positive relationship between isolation and extroversion (r = 0.14, p = 0.001). Peritraumatic dissociative experiences were correlated with low conscientiousness and openness.

e-learning affinity among Gen Z undergraduate students

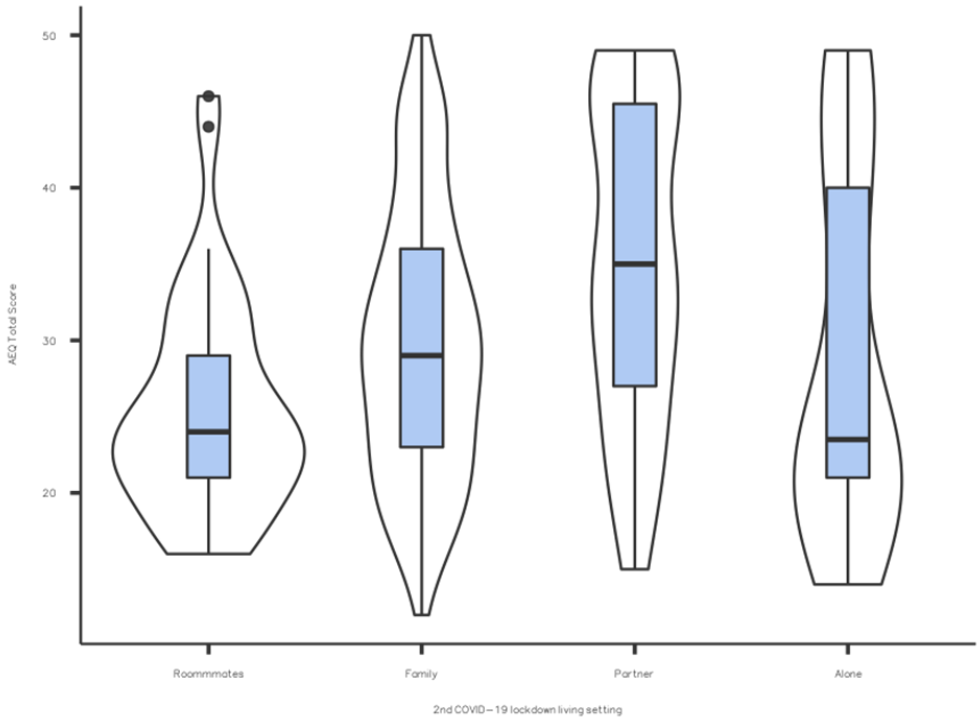
Socio-demographic differences in raw scores on the AEQ were analysed by conducting one-way ANOVA. Significant differences emerged between groups differing in age ($F(1, 527) = 21.09$, $\eta^2 = 0.03$, $p = 0.001$) and university location ($F(1, 527) = 11.78$, $\eta^2 = 0.02$, $p = 0.001$). Specifically, the younger Gen Z group ($p = 0.001$) and those attending universities in Central Italy ($p = 0.001$) obtained lower scores (i.e. lower affinity for e-learning). Finally, significant differences emerged between groups differing in their living arrangement during the 2nd COVID-19 lockdown ($F(1, 527) = 7.54$; $\eta^2 = 0.03$, $p = 0.001$). The highest e-learning affinity scores were obtained by those living with a partner, followed by those living with roommates ($p = 0.006$), those living with family ($p = 0.02$), and those living alone ($p = 0.04$) (see Figure 2 and Figure 3)



Gen Z = Generation Z

AEQ = Affinity for e-learning Questionnaire

Figure 2. Box plot of the total AEQ scores obtained by the younger and older Gen Z groups



COVID-19 = coronavirus disease

AEQ = Affinity for e-learning Questionnaire

Figure 3. Representation of Gen Z in affinity for e-learning ability

Finally, we examined the correlations between e-learning affinity and emotional indices. Pearson's correlation analysis revealed that there was a negative relationship between scores on the AEQ and CAS ($r = -0.19$; $p = 0.001$), the CSSQ global stress score ($r = -0.46$), and the dimensions of relationships and academic life ($r = -0.45$; $p = 0.001$) and isolation ($r = -0.31$; $p = 0.001$). There was no significant correlation between fear of contagion and AEQ scores.

4. Discussion and Conclusion

This study examined emotional adaptation among Gen Z members subjected to prolonged academic e-learning during the second COVID-19 lockdown in Italy. Dysfunctional anxiety was not a major issue among our participants. This is indicative of the adoption of effective anxiety management skills during the pandemic. Nevertheless, the findings also underscore the vulnerability of the Gen Z population. Our data confirmed results about mental health outcome among youth (see review: Cielo et al., 2021).

Our findings suggest that a majority of the university students did not develop dysfunctional anxiety or high stress during the 2nd COVID-19 lockdown in Italy. However, the younger Gen

Z group appeared to be less resilient. Specifically, they reported psychological distress associated with changes in their relationships and academic life. In contrast, the older Gen Z group appeared to be more motivated to regulate their emotions. Specifically, younger undergraduate students found it difficult to cope with the shift to e-learning. This change is a consequence of an emergency plan to protect their health, but it had exacerbated mental health problems among such students. In the review of Manivan et al. (2021) detected the psychological burden caused by COVID-19 among youth and high risk for increased social media using encouraging important issues and harmful behaviors.

Surprisingly, a lower affinity for e-learning was reported by the younger Gen Z group. Even though they were socially and digitally skilled, they were characterised by low self-confidence related to e-learning education. This effect is attributable to the negative emotional impact of changes in their social, academic, and community activities, which play an important role in the academic experience and growth of undergraduate students, especially junior students. Socio-demographic characteristics, student residential status (on-campus vs. off-campus students), study area, and the geographical location of the university did not exert a significant effect on stress. Camargo et al (2020) found students' perceptions could be influenced by age differences and personal technological abilities, and these perceptions can influence their satisfaction with the effectiveness of e-learning programs. Our finding reflects those suggestions and more reinforced the scenario of pandemic as catalytic effect in the shift to e-learning breaking down barriers and resistance from students.

Moreover, we sought to examine the relationship between emotional adaptation, personality resources for future challenges, and risk for mental health problems among Gen Z members. Interesting findings emerged. Gen Z members, who were dealing with the COVID-19 crisis, appeared to be sufficiently motivated to care for their own well-being. Their high level of conscientiousness (the tendency to be responsible, organized, hard-working, and goal-directed and to adhere to norms and rules) appears to have acted as a protective factor against high stress levels during the pandemic and post-traumatic symptoms in the long term, thereby helping them overcome the impact of the public emergency. In contrast, a high level of openness (open to experience, intellectually curious, open to emotions, sensitive to beauty, and willing to try new things) predicted high risk for psychological distress and anxiety during the lockdown period and post-traumatic symptoms in the long term. The positive correlation that emerged between openness and risk for delayed-onset mental health disorders is a very interesting finding.

Specifically, Gen Z members with high levels of openness may be unpredictable, lack focus, and be more likely to engage in risky behaviours.

Socio-demographic characteristics, such as age, geographical area, and living arrangement during the second lockdown, influenced self-confidence related to e-learning. Younger undergraduate students who were living in Central Italy and living with roommates or their family or living alone reported weaker affinity for e-learning (i.e. low daily course attendance and poor perceived quality of teaching, community service access, digital efficacy, and quality of learning). These outcomes may be attributable to a lack of experience of academic life among younger students (first- or second-year students), and this may have affected their management of lesson context, exams, and learning methods. With regard to the geographical location of the university, the findings may be attributable to the complexity of the adopted digital platform and familiarity with the e-learning system as a conventional mode of learning. Another interesting finding pertains to the effect of emotional adaptation on e-learning affinity. Specifically, higher levels of dysfunctional coronavirus anxiety and psychological distress may weaken affinity for e-learning among younger Gen Z members, even digital natives.

The present findings have several theoretical and practical implications. The present findings underscore the predictors of mental health among Gen Z undergraduate students by delineating the buffering effects of e-learning during the COVID-19 crisis and its significant role in the relationship between coronavirus anxiety, psychological distress, and mental health.

Recent studies have examined the emotional impact of the pandemic on the younger generation and undergraduate medical students who are involved in healthcare provision. The findings highlight the protective role of e-learning adoption and affinity in mental health promotion following exposure to public emergency stressors (Bana & Sarfaraz, 2020; Giordano et al., in press; Li et al., 2020). The present findings serve as direct evidence for the claim that Gen Z undergraduate students are equipped to effectively cope with challenging situations such as the COVID-19 pandemic. Conversely, the present findings also highlight the fragility of younger Gen Z undergraduate students who are beginning their academic journey amid the COVID-19 pandemic. The present findings have implications for future research because they underscore the need to further examine such mechanisms among Gen Z individuals. Recruiting diverse samples would be beneficial because individuals use different strategies, and the younger generation may be better equipped to cope with adversity than other groups.

With regard to clinical practice, the present findings suggest that, because coronavirus anxiety is a significant predictor of mental health through the mediating effect of personality traits,

health care professionals should design and implement interventions and programmes that focus on COVID-19-associated anxiety and psychological distress. Past researchers (Di Giacomo, 2020; Tanhan et al., 2020) have recommended the implementation of such COVID-19-specific interventions, which not only utilize the social media and digital skills of Gen Z individuals but also promote quick recovery. Health care professionals are also encouraged to implement psychological support interventions that strengthen one's ability to manage stressful situations and reinforce their status as a digital native. Consequently, they may realize the power of their personal strengths, which in turn may mitigate their anxiety when they deal with challenges, enhance their competence, and enable them to adopt effective coping strategies.

Author contributions

DDG conceptualised the study. JR and FG collected and analysed the data. CI, GN, RB, CM, CE, QA, NS, CL, and DA provided technical assistance with recruiting participants and conducting the survey.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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