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Patterns of COVID-19 related lifestyle disruptions and their associations with mental health outcomes among youth and young adults

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Abstract

The COVID-19 pandemic is a socionatural disaster that has disrupted the lives of individuals, families, and communities. Youth and young adults (YYA) were uniquely vulnerable to the proximal mental health effects of the pandemic; however, few studies have examined the long-term mental health effects of the pandemic. In the present study, we sought to (a) identity distinctive profiles of COVID-related lifestyle disruptions experienced by YYA, (b) investigate sociodemographic characteristics correlates of profile membership, and (c) examine the extent to which profile membership was prospectively associated with changes in depressive and anxiety symptoms. Hypothesis were tested using latent profile analysis with data from 1055 YYA collected across two time-points, 6-months apart. Results produced a three-class model: low- (11%), moderate- (61%), and high-levels of (28%) disruption. Members of the high levels of disruption group were more likely to identify as Black or Latinx American, bisexual/pansexual, or as transgender or gender diverse in comparison to the low levels of disruption group. Inclusion in the high levels of disruption group was associated with increases in depressive and anxiety symptoms from T1 to T2. YYA from multiple marginalize communities (i. e. those who identified as both racial/ethnic and sexual/gender minorities) experienced the greatest levels of lifestyle disruption related to COVID-19. Consequently, disruptive effects of the COVID-19 pandemic prospectively eroded their mental health. YYA are in urgent need of developmentally appropriate resources to effectively recovery from the pandemic.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi: 10.1016/j.xjmad.2023.100029.

Keywords

COVID-19; Mental health; Sexual and gender minorities; LGBTQ+; Stress

1. Introduction

The COVID-19 pandemic is a socionatural disaster that has comprehensively disrupted the daily lives of individuals, families, and communities in unprecedented ways. Robust evidence indicates that the pandemic has caused job loss, lack of peer contact, and increased risk for child maltreatment, all psychosocial impacts that disproportionately affect youth and youth adults (YYA; i.e., individuals aged 14–24) [1-3]. Changes in family structure due to the COVID-19 pandemic may have also disproportionately impacted the health and wellbeing of YYA, as over 200,000 youth under 18 years of age lost a caregiver during the pandemic [4]. As such, pandemic-related lifestyle disruptions may threaten YYA's developmental mental health trajectories, with potent lifelong effects. Prior research suggests positive associations between epidemic-related lifestyle disruptions, developmental delays, and persistent health issues, including substance use and related mental health disorders [5], [6]. Research into the longitudinal mental effects of the COVID-19 pandemic is urgently needed to mitigate long-term consequences for YYA, particularly as morbidity and mortality due to COVID-19 continue to affect large parts of the US [7].

Nascent research indicates that sexual and gender minority YYA (SGM-YYA) were uniquely vulnerable to the mental health effects of the COVID-19 pandemic. The COVID-19 pandemic may have caused significant levels of distress among SGM-YYA who were often forced to quarantine in unaccepting environments, or who lost access to SGM-affirming spaces [8-10]. Consequently, the pandemic likely amplified existing disparities in mental health outcomes for this population, especially among SGM-YYA who also identify as racial/ethnic minorities [9], [11]. Intersectional frameworks posit that interlocking social systems of discrimination (e.g., racism, heterosexism, cisgenderism) converge to further undermine SGM-YYA mental health trajectories [12], [13]. For instance, racial/ethnic minority youth experienced worsened mental health during the pandemic compared to their White counterparts, potentially due to increases in racism and trauma from an unequal public health response [14-16]. Of particular note, racial/ethnic minority youth were often more likely to know somebody who died or was hospitalized because of COVID-19. [17]. These factors coincide to produce a robust intersectional risk environment among YYA with multiple marginalized identities (i.e., those who identify as both a racial/ethnic and sexual and gender minority), who were at heighted risk of food and housing insecurity in comparison to their heterosexual, cisgender, and White counterparts [18-22]. These data highlight the need for scholars to consider how YYA's intersectional identities shaped their experience of the COVID-19 pandemic and its ongoing effects.

Despite evidence regarding the importance of COVID-19-related lifestyle disruptions on YYA's mental health, prospective studies are scarce. Understanding the persistence of the pandemic's impacts on YYA's mental well-being is critical for informing effective pandemic-recovery policies [23]. The estimated short-term mental health costs of the

pandemic in the US are $1.6 trillion [23]. The costs could be substantially higher if the impacts persist, as YYA's mental health may not naturally rebound as the pandemic eases.

1.1. The current study

In the present study, we sought to (a) identity distinct profiles of COVID-19-related lifestyle disruptions experienced by YYA, (b) investigate sociodemographic correlates of profile membership, and (c) examine the extent to which profile membership was prospectively associated with changes in depressive and anxiety symptoms from baseline to 6-month follow-up (see Fig. 1).

2. Material and methods

2.1. Procedure

Participants were recruited through paid social media advertisements, outreach to organizations that serve sexual and gender minorities, Indigenous, and Latinx youth, and an existing participant registry. To be included in the study, participants had to be between 14 and 24 years of age, reside in the US/US territories, have access to the internet, be willing to complete a follow-up survey in 6 months, and provide informed consent/assent. Participants who were interested in the study were screened for the criteria. Upon providing informed consent/assent, those found eligible were invited to complete a baseline survey. For participants under 18 years, the ability to understand study procedures and decisional capacity was first assessed, based on the UCSD Task Force on Decisional Capacity's procedures for the determination of decisional capacity in persons participating in research, using a modified version of the Evaluation to Consent Form. Participants received a digital $30 VISA card for completing the baseline and follow up survey. Study procedures were approved by Northwestern University's Institutional Review Board (IRB) through expedited review.

2.2. Participants

Baseline (T1) data from YYA were collected between February 2021 and March 2022 using Research Electronic Data Capture (REDCap). 6 month follow up (T2) data were collected between July 2021 and September 2022. In total, 10,059 participants completed the screener. Data cleaning procedures were implemented to ensure that all individuals within the final analytic sample were unique responses. Our initial round of cleaning excluded participants who were ineligible in the screener or provided invalid information, or invalid or duplicate email addresses. Our second round of cleaning excluded eligible participants who did not respond to the consent form. Our final round of cleaning excluded participants who did not complete the survey or pass the attention check questions, resulting in a final analytic sample of 1055 at T1. The sample at T2 was 823.

2.3. Measures

2.3.1. Depressive and anxiety symptoms—Participants completed the depressive and anxiety subscales of the Patient-Reported Outcomes Measurement Information System (PROMIS), which are highly reliable, precise measures of patient–reported health status [24]. The depressive symptoms subscale was comprised of 8-items, while the anxiety

symptoms subscale was comprised of 7-items. For each scale, respondents are asked how often in the past 7 days they have experienced specific depressive or anxiety symptoms, using a 5-point ordinal rating scale of “Never,” “Rarely,” “Sometimes,” “Often,” and “Always.” Example items on the depressive symptoms subscale include “I felt worthless” and “I felt helpless.” Example items on the anxiety symptoms subscale include “I felt fearful” and “I felt anxious.” Responses were summed to produce cumulative scores along each subscale; higher scores were indicative of increased depressive or anxiety symptoms. Cronbach’s alphas were as follows: depressive (T1 = .94; T2 = .95) and anxiety (T1 = .94; T2 = .95).

2.3.2. COVID-19-related lifestyle disruptions—The 7-item Coronavirus Impact scale was used to assess COVID-19-related stressors and changes in participants’ daily lives (e.g., routines and food access) [25]. Participants responded to the items using a 4-point ordinal rating scale of “No change,” “Mild,” “Moderate,” and “Severe.” The scale began with the statement “Rate how much the coronavirus pandemic has changed your life in each of the following ways,” and was followed by a life domain that may have been impacted by the COVID-19 pandemic. These life domains included: (1) routines, (2) family income/employment, (3) food access, (4) medical care access, (5) mental health treatment access, (6) access to extended family and non-family social supports, and (7) stress and discord in the family. Cronbach’s alpha was.81 at T1.

2.3.3. Age—Participants reported their continuous chronological age.

2.3.4. Tested positive for COVID-19—Participants were asked the yes/no question of “Have you ever tested positive for COVID-19.” Response options included (0) no and (1) yes.

2.3.5. Racial/Ethnicity identity—Data on participant’s racial/ethnic identity was collected via the following question: “How do you describe your race? [Choose all that apply].” Response options included 1) American Indian/Alaska Native, 2) Asian, 3) Black or African American, 4) Latinx, 5) Native Hawaiian or Other Pacific Islander, 6) Multiracial, and 7) Not listed. Participants who selected more than one option were categorized as Multiracial. Participants who responded “Yes” to being Latinx were categorized as “Latinx” regardless of how many other options they selected. Due to the low degree of representation and to avoid convergence issues only the following groups were included as covariates: Black Americans, Latinx Americans, Multiracial Americans, American Indian/Alaska Natives, and Asian Americans. White Americans and all other racial/ethnic identities were used as the reference group.

2.3.6. Sexual identity—Sexual identity was assessed at T1 by asking participants, “Which of the following best describes your sexual orientation at this time?” Response options included 1) Asexual or asexual spectrum, 2) Bisexual or pansexual, 3) Gay or lesbian, 4) Straight (heterosexual), 5) Queer, 6) Questioning my sexual orientation, 7) Not listed, and 8) Prefer not to respond. Due to the low degree of representation and to avoid convergence issues only identifying as Queer, Gay/Lesbian, and Bisexual were included as covariates.

2.3.7. Gender identity—Gender identity was assessed by asking, "Which of the following terms best describes your gender at this time?" Response options included 1) Woman/Girl, 2) Man/Boy, 3) Two-spirit, 4) Non-binary, 5) Agender, 6) Genderqueer, 7) Questioning my gender identity, 8) Not listed, and 9) Prefer not to respond. Due to the low degree of representation and to avoid convergence issues only identifying as Woman/Girl, Man/Boy, or Non-binary were included as covariates. All other gender identity categories were used as the reference group.

2.3.8. Gender modality—First, participants were asked "Some people use the term transgender to describe themselves when their gender does not align with the sex they were assigned at birth. Do you identify as transgender?" Response options included 1) Yes, 2) No, 3) Prefer not to respond, 4) I'm not sure if I identify as transgender, and 5) I'm not sure what this question is asking. Using responses to this question and the *Gender Identity* question, we constructed *Gender Modality* including 1) cisgender, 2) transgender or gender diverse, and 3) not sure. Specifically, individuals who reported their *Gender Identity* as "man/boy" and "women/girl" and did not report a transgender or gender diverse gender modality were categorized as cisgender. Due to the low degree of representation and to avoid convergence issues this question was dichotomized as 1 = identifies as transgender or gender diverse and 0 = not transgender or gender diverse.

2.3.9. Identity-based discrimination—Three indicators of identity-based discrimination were assessed and included in this analysis: racial discrimination, sexual discrimination, and gender discrimination. Each indicator was measured using adapted versions of the Experiences of Discrimination checklist, an 8-item, yes/no checklist of experiences of unfair treatment by others based on an aspect of one's social identity [26-28]. The measure begins with the stem "Have you ever experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in any of the following eight situations because of your…" and was followed by a social identity aspect (e.g., racial/ethnic identity, sexual orientation, gender identity). Participants were then asked about the context within which the unfair treatment took place. Context items included: "at school" and "at home" and were consistent across all three measures. Response options included (0) no and (1) yes. Responses were summed to produce cumulative scores; higher scores were indicative of increased exposure to a certain type of discrimination. Cronbach's alphas were as follows: racial discrimination (.81), sexual discrimination (.72), and gender discrimination (.81).

2.4. Data analysis

We conducted latent profile analysis (LPA) using Mplus 8.8 to identify distinct profiles of COVID-19-related lifestyle disruptions [29]. LPA is a person-centered analytic approach that aims to identify underlying patterns of covariance in the data structure to identify *profiles* or sub-groups of youth. LPA assumes that covariance between manifest indicators arises by their association with underlying profiles. LPA facilitates the extraction of distinct, meaningful subgroups based on the unobserved heterogeneity within a population and the similarity of their response profiles [30].

Since the appropriate number of profiles is not known a priori in LPA, different models with varying number of classes have to be examined and compared to one another with regard to statistical criteria, theoretical assumptions, and sample size, as well as interpretability and uniqueness of the classes [31]. Statistically, we evaluated the models' fit using four separate measures: the Bayesian Information Criteria (BIC), Akaike's information criteria (AIC), the parametric bootstrap likelihood ratio test (BLRT), and Entropy [32]. The BIC and AIC are interpreted as the lowest value being considered the best fit [32]. The BLRT provides comparisons between models, such that significant values indicate the model is an improved fit over the model with fewer profiles. This test is used to evaluate if, for example, a 3-profile model fits significantly better than a 2-profile model. Entropy is interpreted as the highest value being considered the best fit, as lower entropy values associated with a given model may indicate that the model does not illustrate groups with uniquely separate characteristics. The meaningfulness of the patterns of COVID-19-related lifestyle disruptions was also considered in the selection of the final profile structure.

LPA models yield two types of estimated parameters: (i) profile membership probabilities reflecting the relative size or prevalence of each profile, and (ii) profile-specific indicator means, reflecting the mean of a given indicator for individuals in a particular profile [32]. Youth are assigned their most likely profile membership profile-specific indicator means [33]. Retention status was not associated with any study variable. Little's MCAR test ($\chi^2(30) = 39.99$, $p = .11$), suggested that missing values were missing completely at random and were unrelated to the study variables [34]. Accordingly, missing data were managed using the robust maximum likelihood (MLR) estimator [35]. MLR tests hypotheses with all available data; no cases were dropped due to missing data [35]. We also used the following command: START= 1000 250; STITERATIONS= 500; LRTSTARTS= 2 1 50 10, where STARTS is number of initial stage starts and number of final stage optimizations, STITERATIONS is number of initial stage iterations, LRTSTARTS is number of initial stage starts and number of final stage optimizations for the bootstrapped likelihood ratio test (BLRT). Relatively large numbers of STARTS and LRTSTARTS were used to prevent local maxima, according to Mplus recommendations [29].

After identifying profiles of COVID-19-related lifestyle disruptions using LPA, we examined the degree to which certain sociodemographic and contextual factors were associated with adolescents' likelihood of profile membership using the automatic three-step method implemented in Mplus [36]. In this procedure, three steps are automatically conducted by Mplus. First, a latent profile analysis is conducted using all indicators, see above. In a second step, the most likely profile membership is established for each observation, in this case for each YYA, using the profile-specific indicator means obtained during the first step. In the third step, auxiliary variables (i.e., the predictor variables) are included; the profile memberships were fixed according to the previous step and used in multinomial logistic regression as dependent variables. Independent variables added were age, tested positive for COVID-19, racial/ethnic identity, sexual identity, and gender identity.

Next, we used path analysis to examine the extent to which inclusion in certain profiles of COVID-19-related lifestyle disruptions prospectively predicted meaningful changes in depressive and anxiety symptoms from T1 to T2. While Mplus has the capacity to

automatically model outcomes, like the process that is used to model predictors of profile membership, this procedure is limited by its inability to model longitudinal lagged effects. As such, we used the profile assignment estimate in the unconditioned LPA as a nominal predictor of change in our proximal outcomes (i.e., depressive and anxiety symptoms). This approach allowed the model to remain stable so that the proximal outcomes do not change the latent profiles, while controlling for the direct effects of the relevant sociodemographic and contextual factors on the proximal outcomes [37].

Finally, we compared the performance of our LPA to a more traditional, variable-centered approach using posthoc factor analysis. Due to a lack of psychometric information concerning the factorial structure of our measure of COVID-19-related lifestyle disruptions [25], we first conducted an exploratory factor analysis (EFA). EFA was executed using principal component analysis and the Varimax rotation method in SPSS 28. To examine whether the data collected were appropriate for factor analysis, both the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used [31]. KMO values of above 0.5 indicate that the data is suitable for further factor analysis testing [31]. Based on the information obtained in the EFA, we then conducted a confirmatory factor analysis (CFA) in Mplus 8.8 to measure the content validity along with the construct validity of the best fitting factor model. The CFA was evaluated with several model fit indices including the comparative fit index (CFI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and chi-square test where a CFI above 0.90, a RMSEA below 0.06, a SRMR value below 0.08, and an insignificant chi-square value were indicators of good fit [32]. The AIC and BIC were used to compare the performance of our CFA and optimal LPA models with lower values being indicative of a better fitting model. Although not directly comparable to effect sizes, standardized coefficients were reported to increase interpretability and facilitate comparisons between the CFA and the LPA.

3. Results

3.1. Descriptive statistics

Table 1 presents descriptive information for all study participants. The mean age of the sample was 20.13 years (SD = 2.60). More than one-third of the sample was Latinx (33.0%), followed by White (22.3%), Black (17.6%), multiracial (9.8%), American Indian/Alaska Native (9.4%), and Asian (7.1%). Over one-third of participants identified as bisexual/pansexual (33.8%), followed by gay/lesbian (21.9%), straight (21.8%), and queer (14.4%). Less than 10% of participants identified as asexual (5.3%) or questioning (2.2%). Most participants identified as woman/girl (49.3%), followed by man/boy (26.7%) and non-binary (16.1%). About 63.4% of participants were cisgender and 32.3% were transgender and gender diverse.

3.2. LPA model development and characterization

In Table 2, we provide the indices of model fit for one- to six-profile solutions. Across the top row are the fit and usefulness indices. In the first column are the numbers of the profiles. A three-profile solution fit the data best for the LPA. Information criteria decreased

with additional profiles up to a six-profile solution. While a four-class model produced greater entropy, the inclusion of this fourth class provides no additional interpretative value (see Supplement Fig. 1). Based on the combined information from the statistical criteria and interpretability, we retained a three-profile solution as our final model. The LPA determined the means of each indicator for the following three profiles: (1) Highly Disrupted (28%, characterized by high levels of lifestyle disruption across all indicators), (2) Moderately Disrupted (61%, characterized by high levels of lifestyle disruption across at least 3 indicators), and (3) Mildly Disrupted (11%, characterized by low levels of lifestyle disruption across all indicators). Fig. 2 provides a visual depiction of the indicator means per profile.

3.3. Predictors of Profile Membership

Results of the conditioned LPA model, with predictors of profile membership, are presented as odds ratios (AORs) and 95% confidence intervals (CIs) in Table 3. Members of the Highly Disrupted group were more likely to be older (AOR = 1.13; 95% CI: 1.01, 1.26), identify as American Indian/Alaska Native (AOR = 2.43; 95% CI: 1.02, 5.79), identify as bisexual or pansexual (AOR = 2.16; 95% CI: 1.17, 3.99), and report having experienced higher levels of racial (AOR = 1.13; 95% CI: 1.07, 1.19) and sexual (AOR = 1.12; 95% CI: 1.04, 1.20) discrimination than YYA in the Mildly Disrupted group. In comparison to YYA in Moderately Disrupted group, members of the Highly Disrupted group reported having experienced higher levels of racial (AOR = 1.15; 95% CI: 1.02, 1.30), sexual (AOR = 1.38; 95% CI: 1.07, 1.78), and gender (AOR = 1.39; 95% CI: 1.04, 1.85) discrimination. YYA in Mildly Disrupted group were more likely to have tested positive for COVID-19 (AOR = 2.78; 95% CI: 1.28, 6.03), identify as Black American (AOR = 8.54; 95% CI: 1.55, 47.11) or identify as American Indian/Alaska Native (AOR = 5.58; 95% CI: 1.05, 29.68) in comparison to YYA in the Moderately Disrupted group.

3.4. Links to depression and anxiety

Next, we investigated the degree to which profile membership was associated with changes in depressive and anxiety symptoms from T1 to T2 (see Table 4). The model fit the data as follows: $\chi^2(40) = 146.12$, $p < .001$, RMSEA = .05, CFI = .93, and SRMR= .04. Using Mildly Disrupted as a reference group, our results demonstrated that inclusion in the Highly Disrupted group was associated with increases in depressive ($\beta = .12$, $p < .05$) but not anxiety symptoms ($\beta = .09$, $p = .061$) from T1 to T2. Conversely, no significant results emerged among the Moderately Disrupted.

3.5. Posthoc factor analysis

Finally, we compared the performance of our LPA to a more traditional, variable-centered approach using, first, exploratory factor analysis and, second, confirmatory factor analysis. Bartlett's test of sphericity (with a value of $\chi^2 = 1382.29$, df = 21, $p < .001$) and KMO statistic calculated as.781. Consquently, the KMO and Bartlett's results suggest that factor analysis may be a suitable alternative model for the data. EFA results indicated that a two factor model fit the data best with the factor loadings of larger than 0.40 and the Eigen values of the two COVID-19-related lifestyle disruptions factors being larger than 1 (consecutively as 2.757; 1.075; see Supplement Tables 1 and 2). Based on these EFA

results, a CFA was performed. The model fit the data as follows: $\chi^2(11) = 61.67$, $p < .001$, RMSEA = .07, CFI = .96, SRMR= .03; Log likelihood = −8857.65; AIC = 17763.30; and BIC = 17882.37 (see Supplement Fig. 2). Compared to the fit indices for the 3-profile LPA solution, the 2-factor CFA solution showed poorer fit (ΔAIC = −48.94, ΔBIC = −19.17) indicating that our 3-profile LPA solution fit the data best.

4. Discussion

Scholars have expressed concern about the potential negative effects of the COVID-19 pandemic on the mental health of young people, leading to widespread discussions on its psychological impact since the end of widespread lockdowns in the United States. Our study contributes to growing research articulating the long-term mental health consequences of the lifestyle disruptions initiated by the COVID-19 pandemic. We investigate the degree to which youth and young adults' sociodemographic characteristics (e.g., racial identity, sexual identity, gender modality) were associated with distinctive profiles of COVID-19-related lifestyle disruptions. We also investigated the degree to which distinctive profiles of COVID-19-related lifestyle disruptions were related to longitudinal changes in depressive and anxiety symptoms among youth and young adults. Our results demonstrated that longitudinal changes in depressive symptoms from T1 to T2 were only present among those classed into the Highly Disrupted Group and that this group experienced significant increases in depressive symptoms. Our findings indicate that (a) certain marginalized groups were highly vulnerable to COVID-19-related lifestyle disruptions, and (b) the mental health consequences initiated by these disruptions continue to erode youth and youth adults' long-term mental health and wellbeing.

Our results demonstrated that youth who identified as American Indian/Alaska Native, bisexual or pansexual, or reported having experienced higher levels of racial and sexual discrimination were more likely to be classed into the Highly Disrupted Group, which was characterized by high levels of disruption across all lifestyle indicators, including daily routines, food access, medical healthcare access, access to social supports, stress in family, family income/employment, and access to mental health treatment. Prior research has demonstrated how American Indian/Alaska Native individuals were uniquely vulnerable to the impacts of the COVID-19 pandemic due to pronounced pre-exisiting social and economic vulnerabilies such as limited resources, lack of data, and years of neglect and discrimination [38]. Hathaway demonstrated how all tribal geographic regions had higher percentages of poverty, unemployment, and lower per capita income compared to US averages (15.6%, 5.8%, and $27,036, respectively) with percentage living in poverty ranging from 19.2% (Oklahoma Area) to 40.2% (Navajo Nation) [39]. Consquently, when the pandemic began affecting people's daily lives, already struggling communities were among the first to feel its effects. Similar issues have been noted among sexual and gender minority individuals, as many in the community already find it difficult to establish successful careers and comfortable lifestyles due to extreme social isolation and stigma [40], [41]. Findings from prior research demonstrated a greater negative impact of COVID-19 among SGM youth compared to non-SGM youth [9], [42], [43]. Our findings added evidence of disruptions of lifestyles on both individual level and community level among youth who identified as bisexual or pansexual compared to straight individuals.

Consistent with prior research, our study demonstrated how exposure to racial, sexual, and gender discrimination influenced participants' mental health over and above their identity statuses, indicating that the COVID-19 pandemic has exposed and exacerbated existing social and health disparities that disproportionately affect racial/ethnic, sexual, and gender minority populations [44-46]. Our results suggest that being a part of a marginalized group is not the root cause of health disparities but instead one's exposure to inequality and inequity due to their identities matters most. In other words, for example, being trangender or gender diverse does not convey innate health risk; however exposure to persistent discrimination due to that identity can and will be harmful. These inequities, rooted in historical and structural oppression, have left certain marginalized communities more vulnerable to the impacts of the pandemic. For instance, YYA who identify as a racial/ethnic, sexual, or gender minority often live in or move to densely populated areas to build and maintain connectivity to their respective identity-groups [47], [48]. However, living in densely populated areas frequently provides inadequate access to quality education, healthcare, and economic opportunities which may result in many racial/ethnic, sexual, and gender minority individuals perpetually living in precarious positions, which may have increased the likelihood of the COVID-19 pandemic being highly disruptive to their daily lives [49], [50]. Our findings highlight the need for targeted culturally and contextually competent interventions aimed at ensuring equitable access to quality healthcare, improving economic opportunities, and addressing housing and environmental disparities among racial/ethnic, sexual, or gender minorities in preparation for preventing future crises from triggering similar disparities.

Our findings demonstrated that only the Highly Disrupted group experienced longitudinal increases in depressive symptoms from T1 to T2. In accordance with prior research, our study demonstrates that the persistent uncertainty, grief, and fear caused by high degree of lifestyle disruption initiated by the COVID-19 pandemic may persist among a distinctive group of YYAs, particularly among those who identify as a racial/ethnic, sexual, or gender minority [51-53]. The speed at which YYAs were able to deal with and overcome these disruptions may explain the longitudinal increases in depressive and anxiety symptoms evidenced in our analysis. For instance, it is common for YYA employees to be among the *first fired* during economic downturns since these workers frequently hold entry-level positions or work in service-oriented industries [54-56]. While robust literature indicates that the US economy has slowly returned to a state of normality since the end of the lockdown, many industries that employ YYAs are still experiencing high levels of underemployment and unemployment [54], [57]. In this way, some YYAs, those who experienced moderate to low levels of lifestyle disruption, may have been able to quickly recover from the economic consequences of the COVID-19 pandemic, while others may not have. The long-term mental health consequences of disruptions in employment and other lifestyle factors due to the COVID-19 pandemic among YYAs are still being identified [58-60]. However, to ensure the effects of the COVID-19 pandemic are acute for all YYAs, not just those who are privileged enough to resist changes to their daily lifestyle, this process of identification must be accompanied by a robust iterative development of mental health resources tailored to their developmental needs.

4.1. Limitation

Several limitations need to be noted regarding the present study. First, because of the study's nonprobability sampling design, we are not able to generalize conclusions to broader populations or draw broad causal conclusions from the data, although the longitudinal design of our study does lend support to our conclusions. Second, this study adopted a self-report data collection methodology, which can lead to recall and social desirability biases. Third, due to the low degree of representation, we included limited groups of demographics in the analyses. This is especially significant given the known mental health disparities among YYA with multiple marginalized identities. Replication studies of this analysis would benefit from a greater degree of representation in certain racial/ethnic, sexual, and gender minority groups.

5. Conclusion

The aims of the current study were to (a) identity distinct profiles of COVID-19-related lifestyle disruptions experienced by YYA, (b) investigate sociodemographic characteristic correlates of profile membership, and (c) examine the extent to which profile membership was prospectively associated with changes in depressive and anxiety symptoms from Time 1 to Time 2. Results identified 3 distinct profiles (i.e., Mildly Disrupted, Moderately Disrupted, and Highly Disrupted), with YYAs who identified as American Indian/Alaska Native, bisexual, or pansexual, or reported having experienced higher levels of racial and sexual discrimination being most likely to be grouped in the Highly Disrupted group. Furthermore, our results suggested that those in the Highly Disrupted group experienced increases in depressive symptoms from T1 to T2. These results provide important insights into whom among YYAs in need of targeted culturally and contextually competent interventions that address the lifestyle disruptions that were initiated by the COVID-19 pandemic.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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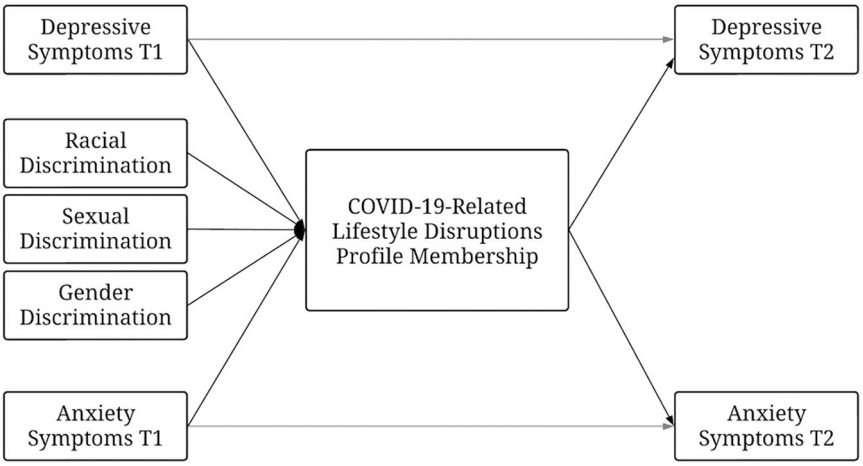

Fig. 1.
Conceptual model of study hypotheses.

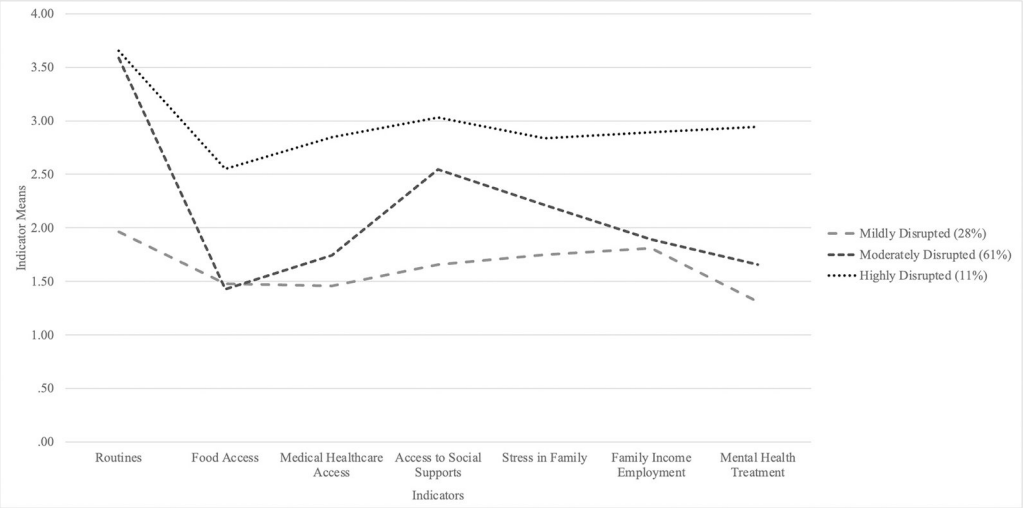

Fig. 2.
Latent profile plot of COVID-19-related lifestyle disruptions.

Table 1

Participant Demographics.

		n	%
Age			
	14	15	1.4%
	15	40	3.8%
	16	51	4.8%
	17	71	6.7%
	18	133	12.6%
	19	111	10.5%
	20	120	11.4%
	21	144	13.6%
	22	146	13.8%
	23	115	10.9%
	24	109	10.3%
Tested Positive for COVID			
	No	670	63.5%
	Yes	119	11.3%
	Missing	266	25.2%
Race/Ethnicity Identity			
	Asian	75	7.1%
	Black	186	17.6%
	Latinx	348	33.0%
	Multiracial	103	9.8%
	Native American/American Indian or Alaska	99	9.4%
	Native Hawaiian or Other Pacific Islander	5	0.5%
	White	235	22.3%
	Not Listed	4	0.4%
Sexual Identity			0.0%
	Asexual	56	5.3%
	Bisexual/Pansexual	357	33.8%
	Gay/Lesbian	231	21.9%
	Not Listed	2	0.2%
	Prefer not to respond	1	0.1%
	Queer	152	14.4%
	Questioning	23	2.2%
	Straight	230	21.8%
	Missing	3	0.3%
Gender Identity			0.0%
	Woman/Girl	520	49.3%
	Man/Boy	282	26.7%
	Agender	10	0.9%

		n	%
	Gender Queer	29	2.7%
	Missing	4	0.4%
	Non-binary	170	16.1%
	Not Listed	3	0.3%
	Questioning	31	2.9%
	Two-spirit	6	0.6%
Gender Modality			0.0%
	Cisgender	669	63.4%
	Transgender and Gender Diverse	341	32.3%
	Not Sure	41	3.9%
	Missing	4	0.4%

Table 2

Latent Profile Model Fit Summary.

									Class 1		Class 2		Class 3		Class 4		Class 5		Class 5	
Model	**Log Likelihood**	**Free Parameters**	**AIC**	**BIC**	**SABIC**	**Entropy**	**BLRT p-value**	**BLRT meaning**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
1	−10478.861	14	21055.18	21055.18	21010.71															
2	−9951.412	22	19946.82	20055.97	19986.10	.78	.000	2 > 1	713	.68	342	.32								
3	−8827.18	30	17714.36	17863.20	17767.92	.80	.000	3 > 2	647	.61	117	.11	291	.28						
4	−8367.92	38	16811.85	17000.37	16879.68	.94	.000	4 > 3	343	.33	160	.15	126	.12	426	.40				
5	−9157.002	46	18406.00	18634.22	18488.12	.92	.000	6 > 5	126	.12	237	.22	423	.40	163	.15	106	.10		
6	−9107.19	54	18322.39	18590.30	18418.78	.75	1.000	5 > 6	24	.02	171	.16	396	.38	184	.17	170	.16	110	.10

Table 3

Multinomial logistic regression results predicting Latent Profile Memberships.

	High vs Low				Moderate vs Low				High vs. Moderate			
			95% CI				95% CI				95% CI	
	AOR	S.E.	Lower	Upper	AOR	S.E.	Lower	Upper	AOR	S.E.	Lower	Upper
Covariates												
Age	1.13	.06	1.01	1.26	1.13	.10	.95	1.34	1.00	.09	.83	1.20
Tested Positive for COVID	1.78	.68	.84	3.75	2.78	1.10	1.28	6.03	.64	.29	.26	1.56
Racial/Ethnic Identity												
Black American	1.57	.63	.71	3.44	8.54	7.44	1.55	47.11	.18	.17	.03	1.07
Latinx American	1.25	.41	.66	2.39	3.59	2.72	.81	15.88	.35	.27	.08	1.63
Multiracial	1.04	.51	.40	2.73	2.11	2.22	.27	16.63	.49	.55	.06	4.34
American Indian or Alaska Native	2.43	1.08	1.02	5.79	5.58	4.76	1.05	29.68	.43	.38	.08	2.36
Asian American	.28	.21	.06	1.25	1.69	1.63	.26	11.18	.17	.20	.02	1.76
Sexual Identity												
Queer	1.47	.69	.59	3.70	.78	.80	.11	5.85	1.88	1.95	.24	14.42
Gay/Lesbian	.74	.31	.32	1.68	1.68	.83	.63	4.45	.44	.26	.14	1.39
Bisexual/Pansexual	2.16	.68	1.17	3.99	1.84	1.06	.59	5.69	1.18	.71	.36	3.86
Gender Identity												
Woman/Girl	1.11	.51	.45	2.74	1.37	1.59	.14	13.24	.81	.97	.08	8.38
Man/Boy	.79	.37	.32	1.97	1.97	2.30	.20	19.44	.40	.49	.04	4.29
Non-binary	.67	.32	.26	1.71	2.04	2.79	.14	29.82	.33	.46	.02	5.07
Gender Modality												
Transgender or Gender Diverse	1.13	.44	.52	2.44	3.75	2.81	.87	16.25	.30	.24	.06	1.42
Discrimination												
Racial Discrimination	1.13	.03	1.07	1.19	.98	.06	.87	1.10	1.15	.07	1.02	1.30
Sexual Discrimination	1.12	.04	1.04	1.20	.81	.10	.63	1.04	1.38	.18	1.07	1.78
Gender Discrimination	1.06	.05	1.00	1.13	.76	.11	.58	1.01	1.39	.20	1.04	1.85

Notes: AOR = Adjusted OR; 95% CI = 95% confidence interval.

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Table 4

Results of the longitudinal path model.

		T2 Depression						T2 Anxiety					
					95% CI						95% CI		
Dependent	**Predictor**	**b**	**S.E.**	**p**	**Lower**	**Upper**	**β**	**b**	**S.E.**	**p**	**Lower**	**Upper**	**β**
Class Membership													
	Moderate Class *	1.16	.76	.124	−.342	2.616	.07	.78	.73	.285	−.646	2.173	.05
	High Class *	2.11	.86	.015	.374	3.778	.12	1.56	.83	.061	−.087	3.108	.09
Covariates													
	T1 Depression	.57	.03	.000	.513	.626	.58						
	T1 Anxiety							.60	.03	.000	.548	.656	.59
	Age	−.11	.08	.193	−.279	.049	−.04	−.12	.08	.118	−.269	.028	−.04
	Tested Positive for COVID	−.90	.80	.263	−2.464	.667	−.04	−.46	.66	.483	−1.775	.827	−.02
Racial/Ethnic Identity													
	Black American	−1.02	.83	.215	−2.578	.635	−.05	.07	.72	.927	−1.383	1.387	.00
	Latinx American	.10	.63	.876	−1.155	1.285	.01	1.10	.58	.057	−.017	2.262	.07
	Multiracial	.32	.78	.679	−1.249	1.812	.01	1.67	.75	.026	.197	3.120	.06
	American Indian or Alaska Native	−.10	1.03	.920	−2.101	1.929	.00	2.19	.95	.021	.328	4.133	.08
	Asian American	−.69	.88	.438	−2.414	1.080	−.02	−.27	.81	.742	−1.878	1.268	−.01
Sexual Identity													
	Queer	−.92	.72	.199	−2.316	.511	−.04	.64	.69	.354	−.748	1.989	.03
	Gay/Lesbian	−.31	.64	.626	−1.581	.919	−.02	−.45	.59	.450	−1.609	.710	−.02
	Bisexual/Pansexual	1.07	.61	.076	−.096	2.309	.06	.84	.52	.110	−.186	1.868	.05
Gender Identity													
	Woman/Girl	−2.01	.78	.010	−3.489	−.403	−.13	−.95	.77	.219	−2.465	.538	−.06
	Man/Boy	−1.80	.81	.026	−3.405	−.234	−.10	−.92	.79	.245	−2.452	.637	−.05
	Non-binary	−.80	.90	.375	−2.594	.943	−.04	.28	.85	.742	−1.387	1.953	.01
Gender Modality													
	Transgender or Gender Diverse	−.03	.71	.966	−1.402	1.406	.00	−.84	.65	.199	−2.091	.474	−.05
Discrimination													
	Racial Discrimination	.10	.06	.087	−.015	.211	.07	.14	.05	.005	.042	.239	.10

		T2 Depression						T2 Anxiety					
					95% CI						95% CI		
Dependent	Predictor	b	S.E.	p	Lower	Upper	β	b	S.E.	p	Lower	Upper	β
	Sexual Discrimination	.00	.06	.963	−.127	.127	.00	.08	.06	.159	−.031	.192	.05
	Gender Discrimination	.02	.06	.726	−.098	.139	.02	−.01	.05	.893	−.107	.094	−.01

Note. *Low Class used as reference group;