Changes in Attachment to Parents and Peers and Relations With Mental Health During the COVID-19 Pandemic

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Abstract
Using a longitudinal design, we examined changes in parent and peer attachment among college students, and their predictive and protective roles in relation to mental health problems during the COVID-19 pandemic. College students (N = 106) rated their parent and peer attachment, and self-reported anxiety, loneliness, and depressive symptoms 1 year before and during the pandemic. Participants also rated the impact of COVID-19 related stressors (CRS). Results demonstrate significant increases in loneliness and depression and a decrease in peer attachment security during the pandemic. Increases in parent attachment security were negatively correlated with loneliness during the pandemic. Parent attachment buffered the relationship between the impact of CRS and mental health problems during the pandemic. Guided by the integrated framework from attachment theory and life course theory, the current study discussed findings and practices regarding the important role of attachment for college students and their adjustment to the pandemic.

Keywords
COVID-19 pandemic, parent attachment, peer attachment, mental health, emerging adults

Emerging adulthood is a distinct transitional period between adolescence and adulthood marked with significant life transitions (Arnett, 2000). This period of life is marked by changes in roles, responsibilities, and interpersonal relationships, which are all vital to the development of independence, careers, intimate relationships, and identity (Arnett, 2015; Mattanah, 2016). At the same time, this transitional period can be marked by instability and struggle (Arnett, 2015). For emerging adults (EA), such as college students, the COVID-19 pandemic has caused significant challenges, such as disruptions in schooling (e.g., leaving the campus and moving back home with parents), relationships, and disrupted expectations regarding milestones (e.g., graduations). Recent studies have started documenting the consequences of these changes on EA’s well-being (e.g., Wang et al., 2020), but longitudinal evidence comparing college students’ adjustment before and during the COVID-19 pandemic is scarce. The first aim of the study is to examine changes in anxiety, loneliness and depression in emerging adults from before to during the pandemic.

In addition to the potential impact of the pandemic on psychological adjustment, the disruptions in schooling (e.g., returning home from living on campus) and recommendations for social distancing have likely led to changes in parent and peer relationships. As attachment to parents and peers constitute crucial social support for emerging adults to cope with life transitions (e.g., Lane & Fink, 2015), examining the extent to which the pandemic affected these relationships, and the role of these relationships in predicting adjustment remains an urgent, yet uncharted area of study. In the current paper, we presented longitudinal data on changes in EA’s adjustment, and in their parent and peer attachment from prior to and during the COVID-19 pandemic. We also examined the relative contribution of parent and peer attachment to college students’ adjustment during the pandemic and their potential protective roles.

Finally, given that our sample has a significant number of Asian American students, we also examine potential ethnic differences. During the COVID-19 pandemic, Asian Americans experienced increased levels of anti-Asian sentiment,

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discrimination and crime, due to the wide-spread perception that the SARS-CoV-2 virus, the cause of COVID-19, likely originated from China (e.g., Shah et al., 2021). A national survey with 8500 adults aged 18 and above demonstrated that Asian immigrants and Asian Americans were about twice as likely as Whites to report having COVID-19-related acute discrimination from March 2020 to September 2020 (Wu et al., 2020). Hahm and colleagues (2021) also reported that young adults between 18 and 30 reported to witnessing or hearing about increased occurrences of anti-Asian discrimination. In the backdrop of increasing anti-Asian incidents, it can be informative to investigate whether attachment may be particularly beneficial to Asian’s mental health adjustment during the pandemic as attachment theory underscores the importance of attachment bonds in times of stress (e.g., Bowlby, 1980). Considering that attachment to parents and peers have been demonstrated to play an important role in Asian American’s wellbeing (e.g., Ying & Lee, 2007; Han & Lee, 2011), potential ethnic differences between Asian American and White college students in the relationship between attachment and mental health adjustment were also explored.

**Development of Attachment to Parents and Peers**

Parent-child attachment describes the close link a child forms to his or her primary caregiver (e.g., Bowlby, 1980). Attachment theory argues that interactions between children and their caregivers determine the development of the parent-child emotional bond, which sets the foundation for future interpersonal relationships and coping in times of distress across the lifespan (Bowlby, 1982). Based on their attachment experiences, children develop “internal working models” or a set of beliefs about the self and others’ availability to address their needs (e.g., Main et al., 1985). Because of the relatively stable nature of the internal working model, attachment security level generally remains stable over time (e.g., Fraley, 2002) and across relationships (e.g., Shaver et al., 1996).

While attachment with the primary caregiver (typically parents) develops first, as children’s social network expands with age, peer relationships (e.g., friendships) become increasingly important (e.g., Fraley & Shaver, 2000). According to the attachment component transference model proposed by Hazan & Zeifman (1994, 1999), attachment functions shift from parents to peers beginning in adolescence and evolving throughout adulthood. With regards to peer attachment among emerging adults, data suggests that in college students peer attachment security remains stable or increased (Lapsley et al., 1990). The stable or upward changes in college students’ attachment relationships may suggest that college students are able to manage, maintain and even enhance their interaction quality with significant others. At the same time parent-child relationships also appear to change during EA. Data suggest that compared to the adolescent period, relationships between the parent and youth improve during EA (e.g., Arnett & Schwabb, 2012). A similar trend was found in college students who leave home for college (Levitt et al., 2008).

**Relations Between Parent/Peer Attachment and Well-Being**

Both parent and peer attachment are associated with beneficial outcomes among EA. Attachment to peers is associated with socioemotional competence and mental health problems, such as internalizing problems (e.g., Gorrese, 2016), self-esteem (Laible et al., 2004), and prosociality and lower physical aggression (Carlo et al., 2011). Attachment to parents is also important for positive adaptation (e.g., Lane, 2016; see Allen & Tan, 2016 for a review). Parental support during EA years have been found to be associated with the EA’s development of identity and autonomy as well as better mental health outcomes (e.g., Inguglia et al., 2015; Koepke & Denissen, 2012).

Attachment quality to parents and peers, in terms of trust, communication, and alienation, have been found to make differential contributions to adolescents’ mental health and psychological well-being (e.g., Armsden & Greenberg, 1987; Oldfield et al., 2016), and are perceived to impact adolescent development in a complementary rather than competing manner (see Allen & Tan, 2016 for a review). For example, both parent and peer attachment security were found to be significantly related to adolescents’ psychological well-being (Armsden & Greenberg, 1987). When the contributions of parent attachment and peer attachment were compared in the same analysis models, secure parental attachment but not peer attachment had unique associations with low levels of conduct problems and emotional difficulties, whereas secure peer attachment but not parental attachment had a unique association with prosocial behavior (Oldfield et al., 2016).

Similarly, a longitudinal study (Holt et al., 2018) with college students found that positive changes in parent attachment and peer attachment during college years made unique and independent contributions to college students’ psychological functioning. Specifically, the transition from lower to higher parent attachment security was associated with decreased level of college students’ emotional problems, and transition from lower to higher peer attachment was associated with an increase in social functioning. A recent study (McGinley & Evans, 2020) on emerging adults demonstrated that maternal attachment and peer attachment were both negatively related to internalizing symptoms, but only peer attachment was related to prosocial behaviors. Furthermore, peer attachment mediated the relationship between maternal attachment and outcomes including internalizing symptoms and several aspects of prosocial behaviors. The study provided evidence on the continued importance of parent and peer attachment on emerging adults’ socioemotional development.
and mental health, while peer attachment appears to exhibit more direct influences than parent attachment.

Taken together, the extant literature shows that college students’ attachment to parents and peers is generally stable yet evolving, providing protective roles in helping college students regulate stress and adapt to life transitions. Moreover, both parent and peer attachments matter for the well-being of EA. However, those studies were done in the context of normative developmental changes during college years. We know little about the impact of an unprecedented socio-historical event, such as the COVID-19 pandemic, on college students’ attachment to parents and peers and how such changes in their attachment security may be associated with college students’ well-being and adjustment.

**COVID-19 as a Socio-historical Event and the Life Course Theory**

The life course perspective includes a set of principles that direct the investigation of intersections between socio-historical events and human development course, which incorporates various processes such as time, human relationships, and stratification system (Elder, 1998; Elder & Giele, 2009). Key life course principles, “developmental timing and trajectories”, “linked lives”, and “social and economic stratification”, are especially relevant for the current study (Benner & Mistry, 2020). We introduce each of the key principles, followed by further description of how attachment may pertain to the specific principle and the implications on emerging adults’ adjustment to the pandemic.

The “developmental timing and trajectories” principle postulates that the impact of socio-historical events depends on the developmental stages during which individuals experience the social-historical events (Elder et al., 2003). Unquestionably, the COVID-19 pandemic is global socio-historical event given its sweeping threats to almost every aspect of human lives across the world. The outbreak of COVID-19 started at the end of 2019. Initiating in China, it quickly escalated to a global pandemic. The U.S. government declared a state of emergency on March 13, 2020. As a consequence, almost all universities and colleges adopted lock down practices to curtail the spread of the virus. Many students, studying away from home were asked to abruptly leave dorms and campuses, with all classes moving online. Even in the fall semester, starting in August 2020, most universities and colleges had not been back to all in-person instruction, and most classes were online or hybrid.

Along with numerous studies examining the COVID-19-related impact on social and psychological problems in general population (e.g., Wang et al., 2020), emerging studies have begun to document such impact on college students. For example, during the initial stage of the COVID-19 outbreak in China (from January 31 to February 11, 2020), Chinese college students reported on COVID-19 related stressful experiences and these reports were found to be associated with the students’ acute stress disorder symptoms (Ye et al., 2020). Most Chinese college students who were surveyed after the outbreak of COVID-19, but before the start of new spring term (February 15–17, 2020), reported higher anxiety levels as compared to the national norm (Wang & Zhao, 2020). Similar patterns of mental health impairment during the COVID-19 pandemic were found in college students in UK (e.g., Savage et al., 2020) and in the U.S. (e.g., Son et al., 2020).

Furthermore, the pandemic set in motion abrupt changes in college students’ interpersonal lives that are in opposition from the normal developmental progression of emerging adulthood. Instead of achieving more autonomy and individuation from parents while establishing more connections with peers during emerging adulthood (e.g., Inguglia et al., 2015; Koepke & Denissen, 2012), many college students were forced to move back home. Public health mandates discouraged close physical contact with individuals outside the household, hindering their opportunities and abilities to connect and interact with their peers. These transitions not only limit opportunities for high quality in-person interactions, but may also cause frequent miscommunications and disruptions in their daily interactions with parents and peers, which can potentially have adverse effects on their attachment security to both parents and peers.

Another relevant principle is the “linked lives” principle, which posits that the implications of socio-historical events do not simply pertain to separate individuals, but rather operate through webs of interpersonal interactions and relations. Accordingly, an individual’s experience of intimate relationships during the socio-historical events may be closely related to his or her well-being adjustment, and more importantly, serve as an important protective factor to adverse impact of social-historical events. In fact, Chi and colleagues (2020) found that Chinese college students’ levels of attachment anxiety, (e.g., worry about being abandoned, unloved, and rejected), were positively associated with PTSD symptoms, anxiety and depression. Moreover, college students also reported relying on communication with families and friends as the main mechanism to cope with stress and anxiety during the pandemic (Son et al., 2020). While these studies provide some evidence for the deleterious impact of COVID-19, they are limited in that there were no studies with baseline data collected before the COVID-19 outbreak. Thus, it is unclear the extent to which the rates of adjustment problems are directly related to the pandemic. Additionally, no study assessed attachment to parents and peers, respectively, among college students. Considering the abrupt transition from living at school to moving back home, it is particularly prevalent to examine the changes in attachment to parents and peers, and how changes of attachment might be associated with adjustment, as well as moderate the adverse impact of COVID-19 related stressors (CRS).

The principle of “social and economic stratification” speaks to the importance of examining group standing (e.g., age, sex,
ethnicity) in the stratification system, as those factors may shape how individuals receive and respond to socio-historical events. Ethnicity is one potential factor among others that may affect college students’ wellbeing adjustment to the COVID-19 pandemic. Asian Americans were found to experience equivalent levels of mental health problems as other ethnic groups, with perceived and experienced racial discrimination being one of the main contributors (e.g., Hwang & Goto, 2008). During the COVID-19 pandemic, Asians have been targeted even more with reported anti-Asian hatred and crime (e.g., Shah et al., 2021). Moreover, Asian American’s well-being has been found to be positively impacted by attachment to parents and peers (e.g., Ying & Lee, 2007; Han & Lee, 2011). Considering the rise of incidents targeting Asian American communities during the COVID-19 pandemic and the rippling effect from the social media coverage (e.g., Croucher et al., 2020), the pandemic may pose significant risks to Asian’s well-being, making them more susceptible to changes in their intimate relationships.

In sum, due to a significant lack of longitudinal studies, it is unclear the extent to which the pandemic is causing changes or increases in mental health problems in emerging adults over time. Few studies have also been able to examine how the pandemic may affect changes in attachment. Furthermore, several studies have demonstrated that, rather than the expected increase in mental health risks during the pandemic, there is significant variability with many young adults not experiencing mental health problems (e.g., Cost et al., 2021; Shanahan et al., 2020) while some ethnic groups may experience more and worsened mental health concerns (e.g., Shah et al., 2021), underscoring the importance of addressing ethnic group differences.

**The Present Study**

As a useful lens to examine the impact of large-scale socio-historical events, the life course theory advocates that any investigation of the impact of the COVID-19 pandemic on development should consider developmental timing and trajectories, human relations, and stratification system (Benner & Mistry, 2020). Drawing from this perspective and attachment theory, the current study focused on college students who are in the emerging adulthood phase, investigating their wellbeing adjustment and the intertwined forces of COVID-19 pandemic, attachment to parents and peers, as well as their individual-unique backgrounds. Our study contributes to understanding the pandemic’s effects on college students, in terms of their well-being adjustment and attachment security to both parents and peers, as well as mechanisms that may buffer the negative impact from CRS. We also explore whether individual’s ethnic background may further modify the aforementioned interrelations between CRS, attachment security, and well-being adjustment.

First, we hypothesized that there would be an increase in mental health problems during the COVID-19 pandemic. Specifically, we expected that college students would experience increased anxiety, loneliness, and depression after the outbreak of COVID-19, as compared to before the outbreak. Second, based on recent work (Prime et al., 2020) postulating that the pandemic poses a significant threat to family functioning and relationship well-being, we hypothesized that parent and peer attachment security would decrease during the COVID-19 pandemic. Third, we hypothesize that changes in attachment security with parents and peers would be associated with changes in psychological adjustment. Fourth, we hypothesize that changes in attachment security would moderate the relationship between CRS and adjustment problems. Given that healthy attachments help individuals to cope with life stressors (e.g., Collins & Feeney, 2000), we hypothesized that the positive association between CRS and mental health problems would be significant only for college students with low or moderate decreases in parent and peer secure attachment, but not for those with high increases in attachment. Whereas some researchers argue that attachment functions shift from parents to peers (e.g., Zeifman & Hazan, 1997), others argue that parent and peer attachment are both important for emerging adults (e.g., Holt et al., 2018). Considering that the COVID-19 pandemic significantly disrupted the school context where most emerging adults are likely to have built their peer relationships, and social distancing recommendations that emphasized interacting in person only with immediate family members were followed, it is unclear the relative contribution of parents versus peers, thus these analyses are exploratory. Finally, we explore whether ethnicity would moderate the relations involving attachment change and adjustment problems.

**Method**

**Participants**

College students were recruited from southern California (Mage = 19.36 years, SD = 1.07; 68.9% biologically female) as part of a larger study on college student health and resilience. Because the original study was intended to have a 1-year follow-up, only freshman, sophomores, and juniors were qualified to participate. Only participants who reported their attachment to parent and peers during both the baseline and follow-up portions of the larger study were included in the present study. The sample included 106 college students, which was ethnically diverse with 31.1% identifying as White, 36.8% as Asian, 4.7% as African American, 5.7% as Hispanic or Latinx, 17% as biracial, and 4.7% as more than two or other. One participant did not report parental educational level which was replaced with the series mean.

**Procedure**

All study procedures and materials were approved by the Institutional Review Board. Eligibility was limited to first,
second, and third-year students and they were recruited through psychology courses as a convenient sample and given course credit for their participation. After providing consent, participants were guided through a 2-hour laboratory visit that included online questionnaires and observational data. Approximately 1-month to 1-year after participating in the laboratory visit, participants who provided assent received an online invitation email to take part in a virtual COVID-19 study. Interested participants followed a link, where they completed a written consent form followed by a set of 30-minute-long online questionnaires on attachment, mental health problems, and demographic information. Students completed the same set of online surveys twice, once before (April 1, 2019–March 10, 2020) and once during the COVID-19 pandemic (April 14, 2020–June 10, 2020).

Measures

**Attachment.** We measured attachment using the Inventory of Parent and Peer Attatchment (IPPA; Armsden & Greenberg, 1987). The IPPA is a 75-item questionnaire that is broken down into three equal subsets that ask about the participants’ relationship with their mother, father, and friends, respectively. In order to address the diverse and complex nature of modern family dynamics, we replaced the traditional binary labels of “mothers” and “fathers” by asking one set of 25 questions about the “adult who most influenced you as you were growing up”. These items are rated on a scale of 1 (“Almost never or never true”) to 5 (“Almost always or always true”) and are broken into three dimensions: degree of mutual trust (e.g., “I trust my friends”), quality of communication (e.g., “I tell my parent about my problems and troubles”), and extent of anger and alienation (e.g., “I get upset a lot more than my parent know about”). The reliability for both the parent and peer sections were strong during both the baseline (Parent Cronbach’s alpha = .95, Peer Cronbach’s alpha = .92) and follow-up portions (Parent Cronbach’s alpha = .96, Peer Cronbach’s alpha = .94).

**Anxiety.** Anxiety was measured with the Generalized Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006). This measure asks about anxiety symptoms over the past 2 weeks and consists of 7 items (e.g., “Not being able to stop or control worrying”), with an additional question that asks about how difficult these symptoms have been. Participants rate the symptoms on a 4-point scale (0 - “Not at all sure”, 3 - “Nearly every day”). Reliability for this measure was good during both time points (Cronbach’s alpha baseline = .88, follow-up = .92).

**Loneliness.** The UCLA Loneliness scale (ULS; Russell et al., 1978) was used to measure participants’ loneliness. This scale is rated from 0 (“I never feel this way”) to 3 (“I often feel this way”) and consists of 20 items (e.g., “I am no longer close to anyone”). The Cronbach’s alpha for this scale was strong during baseline (.96) and during the follow-up (.95).

**Depression.** Depression was measured using the Beck Depression inventory (BDI-II; Beck et al., 1996). The BDI-II consists of 21 items (e.g., “Pessimism”, “Self-Dislike”) that are rated on a scale of 0 (e.g., “I am not discouraged about my future”) to 3 (e.g., “I dislike myself”). Given our inability to address suicidal concerns appropriately during the data collection process, the suicide item was removed from the scale before administration. Reliability for this measure was strong with a Cronbach’s alpha of .90 at baseline and .93 at the follow-up.

**Impact of CRS.** The Adolescent Life Events Questionnaire (ALEQ; Hankin & Abramson, 2002) was used to measure and control for the number of stressors that the participants experienced during the initial peak of the COVID-19 pandemic. This scale consists of 29 items (e.g., “You had trouble concentrating on your schoolwork”) and participants answered each item with a dichotomous “Yes/No” response to indicate whether or not each event happened to them. An additional item was added to account for any “other” life events that occurred during the pandemic. For each item the participants endorsed, they were then asked how negatively it impacted them on a 3-point scale (1 - “Not really negatively”, 3 - “Very negatively”). The negativity rating was averaged across all rated items. Cronbach’s alpha for this measure was .83.

**Demographic Information.** Participants also completed questions on demographic information, including their birthdays, year in school, biological sex, parents’ education and income levels, and family structure in the first set of online questionnaires. Based on their birthdays, ages at the time of initial online assessment were calculated. Participants rated their parents’ education on a 11-point scale (1 = “eighth grade or less”, 11 = “PhD, Ed.D., MD, JD, DDS, LLB or other professional degree”) and their parents’ yearly income on a 33-point scale (1 = “< $5000”, 33 = “> $500,000”). Participants identified their family structure as one of the following: “lived with both parents”, “lived with mother”, “lived with mother & step parent”, “lived with father”, “lived with father & step parent”, “split time between families”, “lived with grandparents”, and “others”. In the first set of online questionnaires, participants also reported their living arrangement as either “lived in dorm or campus-affiliated apartments”, “lived off campus with friends”, or “other”. Participants also reported their housing during the pandemic in the second set of online questionnaires.

As previous studies demonstrated that adolescents fared better in families with both biological parents than other family arrangement types (e.g., Hoffman, 2006), we dummy coded family structure as “lived with both parents” as 0 and the other categories as 1. We also created dummy coded variable for living arrangement during the pandemic with “home” coded as 0 and other living arrangements as 1, given that one main focus of our study was to examine the distinct roles of parent and peer attachment.
Results

Preliminary analyses showed that both parents’ educational levels were highly correlated with each other and the average of both parents’ educational levels had the strongest correlations with other study variables among parent demographic variables. So, we used the average parental educational level as the indicator of family SES. Participants whose parents had higher education levels had higher attachment security with parents, and lower levels of loneliness and depression during the pandemic. Significant sex differences were found in that females reported higher peer attachment security during the pandemic, higher anxiety and higher depression before the pandemic, and higher negative impact of CRS than men. Participants living with both biological parents (80.2%) had higher parental attachment security before and during the pandemic as compared to participants living in other family structures (19.8%). Participants living at home during the pandemic (77.4%) experienced more severe impact from CRS but reported higher parent attachment security before the pandemic than those with other living arrangements (22.6%). Therefore, participants’ biological sex, parental education level, family structure, and living arrangement during the pandemic were controlled in all subsequent analyses. As expected with participants from a residential college, there was little variability in living arrangements prior to the pandemic, with 94.3% of participants having reported to living in the dorm or campus affiliated apartments. Year in school and age were considered as possible covariates, but they were not correlated to any variables of interest ($rs < .15$, $ps > .12$). As such, these variables of living arrangement prior to the pandemic, year in college, and age were not included in any follow up analyses. Descriptive data and correlations between all study variables are presented in Table 1.

To examine the change in participants’ mental health during the pandemic, a repeated-measure (time: pre-pandemic vs. during-pandemic) MANCOVA analysis was conducted predicting anxiety, loneliness, and depression. Results showed that participants’ reported increases across the three types of adjustment problems during the pandemic, $F(3, 99) = 4.80, p = .004$. ANCOVAs on each mental health problem revealed significant increases in loneliness ($M_{pre-pandemic} = 0.88, SD = 0.06; M_{during-pandemic} = 1.11, SD = 0.07; F(1, 101) = 7.03, p = .009$) and depression ($M_{pre-pandemic} = 0.38, SD = 0.04; M_{during-pandemic} = 0.66, SD = 0.05; F(1, 101) = 8.82, p = .004$) during the pandemic. There was no significant difference in participants’ anxiety level during the pandemic ($M = 1.00, SD = 0.07$) as compared to before the pandemic level ($M = 1.31, SD = 0.08; F(1, 101) = 0.672, p = .414$).

A 2 (attachment type: parent vs. peer) x 2 (time: pre-pandemic vs. during-pandemic) repeated-measure MANCOVA analysis was used to test the changes in attachment security before and during the pandemic. In line with our first hypothesis, results revealed that attachment security during the COVID-19 pandemic decreased at a trend level when compared to their pre-pandemic level, $F(2, 100) = 2.68, p = .073$. Separate ANCOVAs on each attachment security demonstrated significant decrease in peer attachment security ($M_{pre-pandemic} = 4.07, SD = 0.05; M_{during-pandemic} = 4.05, SD = 0.06; F(1, 101) = 4.30, p = .041$) and lowered security in parent attachment at a trend level ($M_{pre-pandemic} = 3.88, SD = 0.07; M_{during-pandemic} = 3.75, SD = 0.08; F(1, 101) = 2.97, p = .088$) during the pandemic. Together, these results suggest that participants experienced more adjustment problems and lower attachment security during the pandemic.

In connection with our third hypothesis, to test the relations between changes in attachment and adjustment problems, we constructed three step-wise regression models predicting anxiety, loneliness, and depression during the pandemic, respectively. Participants’ sex, parental average education level, family structure, living arrangement during the pandemic and mental health problems before the pandemic were entered in the first step. The impact of CRS was entered in the second step. Parent attachment and peer attachment during the pandemic were regressed onto their pre-pandemic data. Standardized residuals from the regressions were used as attachment security change scores and entered in the last step. The use of standardized residual approach accounts for the influence of baseline levels on during-pandemic scores, and the change scores reflect the extent of change in attachment from the pre-pandemic baseline to the during-pandemic score relative to the sample baseline. As shown in Table 2, peer attachment change was negatively associated with loneliness during the pandemic ($t = -3.04, p = .003$). Unexpectedly, change in peer attachment security was not associated with anxiety or depression, and change in parental attachment security was not significantly associated with any mental health problems during the pandemic.

Next, we tested the extent to which changes in attachment to parents and peers would moderate relations between the impact of CRS and participants’ anxiety, loneliness and depression using SPSS PROCESS macro model 1 (Hayes, 2013). In the first set of models which respectively predicted anxiety, loneliness, and depression, the impact of CRS, parent attachment change, and the interaction term of the two variables were included. Participants’ mental health problems before the pandemic and peer attachment change were also controlled as covariates. As demonstrated in Table 3, the interaction between the impact of CRS and parent attachment change was significant when predicting anxiety ($F(1, 96) = 4.83, p = .030$) and depression ($F(1, 96) = 6.00, p = .016$). Simple slopes analyses suggest that the impact of CRS was only associated with anxiety and depression at low ($b_{\text{anxiety}} = 1.32, se = .30, t = 4.43, p < .001$; $b_{\text{depression}} = 0.76, se = .17, t = 4.35, p < .001$) and medium ($b_{\text{anxiety}} = 0.84, se = .23, t = 3.74, p < .001$; $b_{\text{depression}} = 0.45, se = .13, t = 3.42, p < .001$) levels of parent attachments change. Relations were insignificant at high levels of parent attachment change ($b_{\text{anxiety}} = 0.49, se = .29, t = 1.72, p = .089; b_{\text{depression}} = 0.22, se = .17, t = 1.33$, $p < .15$).
Table 1. Descriptive statistics and correlations of study variables.

|   | Mean | SD     | Min-Max | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12  | 13  | 14  | 15  |
|---|------|--------|---------|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 1 | PaAtt pre | 3.88   | 0.71    | 1.52–5.00 | 0.26** | 0.70** | .25** | .29** | .25** | .20* | .26* | .23* | .09 | .06 | .17 | .06 | .05 |
| 2 | PaAtt Dur | 3.75   | 0.79    | 1.32–5.00 | 0.26* | .37** | .27** | .34** | .31** | .34** | .33** | .38** | .36** | .24* | .21* | .23* | .12 |
| 3 | PrAtt pre | 4.07   | 0.50    | 2.80–5.00 | 0.26** | .23* | .04 | .07 | .18 | .17 | .13 | .20 | .10 | .06 | .06 | .04 | .04 |
| 4 | PrAtt Dur | 4.05   | 0.61    | 2.12–5.00 | 0.26  | .23  | .04 | .07 | .18 | .17 | .13 | .20 | .10 | .06 | .06 | .04 | .04 |
| 5 | Anx pre | 1.00   | 0.73    | 0.3–3.00  | –     | 0.46** | .36** | .57** | .45** | .42** | .44** | .43** | .47** | .43** | .47** | .36** | .32** |
| 6 | Anx Dur | 1.00   | 0.73    | 0.3–3.00  | –     | 0.46** | .36** | .57** | .45** | .42** | .44** | .43** | .47** | .43** | .47** | .36** | .32** |
| 7 | Lone pre | 0.88   | 0.64    | 0.2–2.90  | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 8 | Lone Dur | 1.11   | 0.68    | 0.2–2.65  | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 9 | Dep pre | 0.66   | 0.52    | 0.1–1.70  | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 10 | Dep Dur | 0.66   | 0.52    | 0.1–1.70  | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 11 | CRSI | 2.17   | 0.37    | 1–2.92   | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 12 | Sex | 0.69   | 0.47    | 0–1      | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 13 | PaEdu | 7.83   | 2.50    | 0–11     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 14 | FS | 0.20   | 0.40    | 0–1      | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |
| 15 | LA Dur | 0.23   | 0.42    | 0–1      | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     | –     |

Note. PaAtt = Parent Attachment; PrAtt = Peer Attachment; Pre = Pre-pandemic; Dur = During-pandemic; Anx = Anxiety; Lone = Loneliness; Dep = Depression; PaEdu = Parent Education; CRSI = COVID-19-related Stressors Impact. Sex: 0 = male; 1 = female. FS = family Structure (0 = lived with both parents; 1 = other); LA Dur = Living Arrangement during the pandemic (0 = lived at home; 1 = other). *p < .05, **p < .01.
The interaction term was not significant in predicting loneliness. The second set of models predicting mental health problems with the impact of CRS, peer attachment change, and the interaction of the two variables as predictor variables did not reveal significant effects of the interaction term.

Finally, to explore the potential ethnic difference, we created an ethnicity variable with White coded as 0 and Asian coded as 1. Ethnicity and two interaction terms (i.e., ethnicity x parent attachment change; ethnicity x peer attachment change) were added as step 4 to models presented in Table 2. The interaction term of ethnicity x parent attachment change was significantly related to college students’ loneliness during the pandemic at a marginal significant level ($b = .29$, $se = .16$, $t = -1.87$, $p = .066$). Separate sample analysis revealed a trend that increase in parent attachment security was associated with lower levels of loneliness during the pandemic only for Asian college students ($b = .24$, $se = .14$, $t = -1.75$, $p = .091$) but not for White ($b = .10$, $se = .11$, $t = 0.88$, $p = .39$).

In order to explore whether ethnicity would further modify the moderating effects of attachment security in the relations between the CRS’ impact and wellbeing, we added ethnicity as a secondary moderator variable to models involving the interaction of CRS’ impact with parent attachment change or peer attachment change with SPSS PROCESS macro. However, no significant interaction involving the ethnicity variable was found.

**Discussion**

To the best of our knowledge, this is the first study that investigated changes in parent attachment, peer attachment, and adjustment problems among U.S. college students before and after the initial outbreak of COVID-19. We also tested whether changes in attachment to parents and peers made independent associations with changes in adjustment problems, as well as their moderating effects on the associations between CRS and adjustment problems. Results revealed that college students

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**Table 2. Step-wise regression model predicting mental health problems during the COVID-19 pandemic.**

|                      | Anxiety Dur | Loneliness Dur | Depression Dur |
|----------------------|-------------|----------------|----------------|
|                      | $b$  | $se$ | $\Delta R^2$ | $b$  | $se$ | $\Delta R^2$ | $b$  | $se$ | $\Delta R^2$ |
| **Step 1**           |     |     |            |     |     |            |     |     |            |
| Sex                  | .09 | .17 | .05        | -05 | .12 | .01        | .01 | .10 |            |
| Parent education     | .01 | .03 | .03        | -03 | .02 | .03        | .03 | .02 |            |
| Family structure     | -.16| .19 | -.02       | .02 | .13 | -.03       | -.03| .02 |            |
| Living arrangement   | .10 | .18 | -.06       | .06 | .13 | -.09       | -.09| .11 |            |
| Outcome pre          | .40***| .11 | .19***     | .58***| .08 | .35***     | .51***| .12 | .22***     |
| **Step 2**           |     |     |            |     |     |            |     |     |            |
| CRSI                 | .89***| .23 | .12***     | .49***| .16 | .05**      | .48**| .13 | .09**      |
| **Step 3**           |     |     |            |     |     |            |     |     |            |
| Parent attachment change | -.05| .09 | .01        | -.01| .06 | -.01       | -.01| .05 |            |
| Peer attachment change |-.07| .09 | .01        | -.18**| .06 | .07**      | -.08| .05 | .03        |

Note. Pre = Pre-pandemic; Dur = During-pandemic; CRSI = COVID19-related Stressors’ Impact. $**p < .01$, $***p < .001$.

**Table 3. Regression models predicting mental health problems during the pandemic from the interaction of parent attachment change and COVID19-related stressors’ impact.**

|                      | Anxiety Dur | Loneliness Dur | Depression Dur |
|----------------------|-------------|----------------|----------------|
|                      | $B$ coeff  | $se$ | $B$ coeff  | $se$ | $B$ coeff  | $se$ |
| Sex                  | .09         | .17 | -.05       | .12 | .01         | .10 |
| Parent education     | .00         | .03 | -.03       | .02 | -.03*       | .02 |
| Family structure     | -.16        | .18 | -.02       | .13 | .01         | .11 |
| Living arrangement   | .11         | .18 | -.06       | .13 | .10         | .10 |
| Outcome pre          | .42***      | .10 | .58***     | .08 | .53***      | .12 |
| Peer attachment change |-.10| .08 | -.18**     | .06 | -.11*       | .05 |
| CRSI                 | .89***      | .22 | .49***     | .16 | .48***      | .13 |
| Parent attachment change | .99*| .48 | .02        | .34 | .67*        | .28 |
| Parent attachment change x CRSI |-.46*| .21 | -.00       | .15 | -.30*       | .12 |

Note. Pre = Pre-pandemic; Dur = During-pandemic; CRSI = COVID-19-related Stressors’ Impact. $*p < .10$, $*p < .05$, $**p < .01$, $***p < .001$. 

$p = .19$ (See Figures 1 & 2). The interaction term was not significant in predicting loneliness.
experienced significant decreases in attachment security and increases in their adjustment problems during the COVID-19 pandemic as compared to before the COVID-19 outbreak. Changes in peer attachment security was negatively associated with changes in adjustment problems. Changes in parent but not peer attachment buffered the impact of CRS on adjustment problems. The associations of CRS’ impact to anxiety and depression were not significant for college students with increasing parent attachment security after the outbreak of COVID-19.

As predicted, there were increases in loneliness and depression and a decrease in attachment security, particularly with peers, among the college students after the outbreak of COVID-19. The results were consistent with the findings from Chinese college students with regards to increasing adjustment problems (e.g., Ye et al., 2020) and the finding of decreasing security in attachment with romantic partner during the COVID-19 pandemic (Pietromonaco & Overall, 2020). The outbreak of COVID-19 in the U.S. and safety measures in universities and colleges have brought about significant changes that are leading to increased distress among emerging adults. Disruptions in schooling as well as other aspects of college students’ life, such as employment and graduation uncertainty, and transition to online distance learning appear to
have consequences on both relationships and psychological adjustment.

Decreases in peer attachment was associated with college students’ heightened levels of loneliness and depression, even when the effect of stressors and parent attachment change were controlled. This result suggested that the compromised security of peer attachment, as compared to that of parent attachment, may exert greater impact and may be an additional direct source contributing to college students’ difficulty in adjustment during COVID-19. These results are in accordance with previous research demonstrating the shift of attachment functions from parents to peers since adolescence (e.g., Nickerson & Nagle, 2005; Zeifman & Hazan, 1997). Emerging adults have a need to establish their own social interactions and social network with peers (e.g., Arnett, 2015), a process which has been greatly hindered by lockdown measures and the shift from college campus to home. The decrease of peer interactions and deteriorating quality in the social support from their peers (e.g., Arnett, 2015; Ye et al., 2020) may drive college students into the states of loneliness and distress.

In contrast, we did not find any significant association of parent attachment change in predicting college students’ adjustment to COVID-19, after parsing out the effects of peer attachment change and CRS’ impact. This may be likely due to the fact that parent attachment may be more stable. Rather than a direct source of distress, parent attachment change was found to moderate the impact of CRS. When parent attachment security increased after the outbreak of COVID-19, the impact of CRS was not significant in predicting college students’ anxiety or depression during the pandemic. Results are consistent with previous studies which found that parents continue to provide emotional and psychological support to emerging adults even though they desire autonomy (e.g., Lane & Fink, 2015). We speculate that college students tended to resort to parents when CRS occurred. As safe havens, parents who strengthened their relationship with college student children may therefore be able to give effective support, easing their children’s adjustment to CRS. On the other hand, peer attachment change did not moderate the relationship between the impact of CRS and adjustment problems. The finding was in contradiction to the postulation that peers gradually replace parents in providing attachment functions to individuals during college years (e.g., Hazan & Zeifman, 1994). It was unexpected that peer attachment did not appear to help college students better adjust to those challenges. This may suggest the precedence of parent over peers as a social support for college students to deal with major challenges during the COVID-19 pandemic. Another possible reason may be attributed to the physical distance between college students and their peers due to lockdown or quarantine measures which made peers less accessible to provide support.

Taken together, these results would imply that attachment security and social support are crucial factors towards an individual’s mental health. With students transitioning back to school, colleges should consider promoting peer social connectivity and networking in an effort to improve or repair social support and attachment security. In terms of addressing distress caused by the pandemic, mental health professionals should consider the impact of the individuals’ relationship with their peers, in addition to their parents. The pandemics’ forced isolation may have tested these, sometimes new and fragile, relationships which may have resulted in individuals feeling less secure with their friends. Additional research should examine relationships post-pandemic to see if there are long lasting effects on peer-to-peer relationship quality as well as their mental health adjustment returning from the pandemic. Future research may adopt intervention designs to investigate whether practice programs that strengthen attachment to parents and peers may result in unique contributions to emerging adults’ adjustment to the pandemic in the long term.

Exploratory analyses revealed that parent attachment decrease was marginally correlated with pandemic loneliness only for Asian college students but not for Whites. This result suggested attachment to parents may be slightly more relevant to Asian American’s feelings of loneliness during the pandemic as compared to peer attachment, which may be explained by Asian American college students’ emphasis on family interdependence (e.g., Han & Lee, 2011). However, no other ethnic differences were found between Asian and White college students in the results. One possible explanation can be the small, restricted sample of college students recruited from psychology courses. Furthermore, we did not assess college students’ collectivist values in the present study. Therefore, our student sample was limited and may not fully represent the cultural diversity of the population. Future studies should employ larger and ethnically diverse samples and measure their cultural values in order to elucidate potential ethnic and cultural differences.

There are several other limitations that need to be noted. First, we assessed college students’ attachment and mental health outcomes only once after the COVID-19 outbreak in the U.S. and the intervals between the baseline and follow-up measure varied among participants. The effects of COVID-19 may not be observed in participants who completed the follow-up portion shortly after the baseline portion. Future studies may adopt multiple follow-up assessments into the prolonged stages of the pandemic so that more significant change in attachment and mental health problems may be tracked. Second, the current study assessed attachment and mental health outcomes at the same time points and their relationships were correlational in nature. Therefore, interpretations of causality are limited. Additionally, the sample was homogenous, most of which were college students from intact two-parent families, living in the dorm or campus affiliated apartment before the pandemic, and moving back home during the pandemic. Future work should employ a larger and more diversified sample, further unpacking the comprehensive and potentially positive social interactions that impact well-being in emerging adults from various backgrounds.
Despite these limitations, with the strengths of integrating both attachment theory and life course theory and employing the longitudinal design, the current study provides insight into the comprehensive impact of the pandemic as a socio-historical event on emerging adults who are embedded in social relationships and the stratification system within the U.S. society. Findings shed light on the unique roles of parent and peer attachment change in accounting for additional variances in mental health after controlling for CRS, as well as the buffering effects of parent attachment change on the association between CRS/impact and mental health problems. An emerging trend regarding the ethnic difference in the role of parent attachment in Asian and White college students’ well-being adjustment was also observed.

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**Open Practices**

1. The raw open data is not openly available for download but is available upon request.
2. The analysis code/syntax is not openly available for download but is available upon request.
3. NA
4. All materials are not openly available for download but are available upon the permission of authors who developed the materials.
5. No, this study did not include a pre-registration plan for data collection or analysis.

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