

Adolescent coping and social media use moderated anxiety change during the COVID-19 pandemic

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Abstract

Introduction: Adolescence is a sensitive period during which stressors and social disruptions uniquely contribute to anxiety symptoms. Adolescent's coping strategies (i.e., avoidance and approach) during the coronavirus disease 2019 (COVID-19) pandemic may be differentially related to anxiety symptom changes. Further, social media use (SMU) is ubiquitous and may serve as an avenue to deploy avoidant and/or approach coping.

Method: Participants included 265 adolescents (ages 12–20 years; 55.8% female, 43.8% male) and one parent per adolescent. At two time points separated by ~6 months, adolescents reported on SMU and coping strategies, and parents and adolescents reported demographic information and adolescents' anxiety symptoms. Data were collected online in the United States, from summer 2020 through spring 2021.

Results: Increases in avoidant coping predicted increasing anxiety, particularly when approach coping decreased. Decreases in both avoidant coping and SMU coincided with decreasing anxiety. Older adolescents showed decreasing anxiety when avoidant coping declined and SMU increased.

Conclusion: Coping strategies and SMU predicted patterns of adolescent anxiety symptom change across 6 months during the COVID-19 pandemic. Results highlight that coping and SMU should be contextualized within the time course of stressors.

KEYWORDS

adolescence, anxiety, coping, COVID-19 pandemic, social media

1 | INTRODUCTION

Adolescence is a period of dramatic social, cognitive, and emotional change during which elevated anxiety symptoms commonly emerge (Kessler et al., 2007; Kim-Cohen et al., 2003; Rapee et al., 2019). As we continue to navigate the years after pandemic onset, adolescents have been experiencing the uncertainty, health concerns, school and social disruptions that accompany the pandemic throughout significant transitions and milestones in their development. Such historic events provide opportunities to examine the critical questions of how adolescents' coping strategies relate to anxiety symptom changes during major life stressors, particularly when unpredictable and uncontrollable (Carleton, 2012; Korte et al., 2022). Limitations to in-person interactions necessitated by the pandemic have made technologies like social media essential threads to maintain social connection. However, frequent social media use (SMU) presents psychological costs and benefits, which have been widely debated in both research and public forums (Hamilton et al., 2021; O'Keeffe & Clarke-Pearson, 2011; Odgers & Jensen, 2020; Orben & Przybylski, 2019). Thus, it is essential to test how individual differences in coping strategies and SMU frequency relate to anxiety symptoms over time during the coronavirus 2019 (COVID-19) pandemic. Better

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understanding these connections will allow researchers and clinicians to identify adolescents at highest risk and target processes or behaviors amenable to change for interventions.

1.1 | Adolescent anxiety symptoms

Adolescent anxiety symptoms have been a significant concern since well before the pandemic. Anxiety disorders are the most common mental health diagnoses among adolescents (Merikangas et al., 2010), with an estimated lifetime prevalence of 31.9%, and concurrent prevalence rates of ~11% (Ghandour et al., 2019; Tiirikainen et al., 2019). Research on the impact of the COVID-19 pandemic on adolescent mental health is rapidly emerging. There is accumulating evidence that many adolescents are experiencing internalizing symptoms at either elevated (i.e., subclinical or clinical) levels or increasing in severity since the pandemic onset (Guessoum et al., 2020; Hawes et al., 2021; Magson et al., 2021; Racine et al., 2020; Smirni et al., 2020; Waselewski et al., 2020).

In a recent systematic review of 61 publications investigating symptoms of psychopathology (Panchal et al., 2021), 49.5% of children and adolescents reported anxiety symptoms during COVID-19 lockdowns in the early phase of the pandemic (i.e., Spring 2020). In comparison with school-aged children (6–12 years old), adolescents (13–15 years old) showed a greater negative mental health impact (Panchal et al., 2021), potentially due to disruptions in peer social contact essential during this developmental period (Ellis & Zarbatany, 2017). In a meta-analysis examining 29 studies of adolescent internalizing disorders from January 2020 to March 2020 (Racine et al., 2020), concurrent anxiety symptoms within the clinical range were estimated at 20.5%, approximately double compared with before the pandemic (Ghandour et al., 2019; Tiirikainen et al., 2019). Elevated anxiety was even more common later in the time frame examined, consistent with findings from another adolescent study (Metherell et al., 2021) showing that between summer of 2020 and spring of 2021, mental health difficulties peaked among 10- to 15-year-olds in approximately December 2020. Taken together, these patterns highlight the need to examine trends in symptoms over time as the phases of the pandemic unfold.

Importantly, the impact of the pandemic on mental health has been ubiquitous, but not monolithic. Rather, the detrimental effects of the pandemic vary based on individual differences in social-emotional functioning that may serve as vulnerabilities or protective factors (Nikolaidis et al., 2022; Panchal et al., 2021). Specifically, the likelihood of experiencing symptoms of psychopathology during the pandemic was greater among those with pre-pandemic mental health difficulties. This continuity, or potentiated risk, suggests that enduring difficulties with managing stress and accompanying unpleasant emotions may contribute to greater increases in anxiety symptoms during the pandemic.

1.2 | Adolescent coping and anxiety symptoms

Coping includes a range of self-regulatory processes deployed during periods of psychological stress, which constitute attempts to manage emotional responses, change the situation, and/or modulate one's behavior (e.g., Compas et al., 2001, 2017; Eisenberg et al., 1997). The cognitive and affective processes underlying coping abilities undergo maturation during adolescence, and this period is a critical time during which strategies for coping with stress may become ingrained and continue into adulthood (e.g., Compas et al., 2017).

In line with theoretical foundations of stress and coping (Folkman & Lazarus, 1991; Lazarus & Folkman, 1984, 1991), decades of research has delineated avoidant versus approach coping (Compas et al., 2001; Garcia, 2010; Herman-Stabl et al., 1995; Litman, 2006). Avoidant coping includes a range of strategies (e.g., denial, self-distraction, behavioral disengagement) used to manage responses to stressors by moving attention away from the stressor and associated thoughts and feelings. In contrast, approach coping involves orienting responses toward stressor-related circumstances or emotions (e.g., seeking instrumental and emotional support, positive reframing, planning). There is evidence for developmental changes in coping strategies such that avoidant coping becomes less frequent in adolescence (i.e., ages 11 years and up) as compared with childhood (Eschenbeck et al., 2018), as adolescents become more proficient in using emotion- or problem-focused coping strategies, and increasingly able to select strategies which fit situational demands as cognitive capacity matures (e.g., Zimmer-Gembeck & Skinner, 2011). Sex-related differences in coping strategies have also been documented, with adolescent girls showing more active (i.e., social support seeking) and less avoidant coping compared with boys (Eschenbeck et al., 2007). The effectiveness of avoidant coping may also differ based on sex or gender, with girls showing positive associations between greater avoidance and mental health difficulties, with no such association for boys (Wilson et al., 2005). Together, these patterns highlight the need to consider age- and sex-related effects when examining coping strategies and anxiety symptoms.

Although avoidant coping has been associated with greater anxiety symptoms in adolescents (Gomez, 1998; Gomez et al., 1998; Richardson et al., 2021) and young adults (e.g., Blalock & Joiner, 2000), the appropriateness and effectiveness of these strategies likely depend on context, consistent with transactional models of coping and stress (Folkman, 2014;

Lazarus & Folkman, 1984). In particular, avoidant coping remains commonly used among adolescents and adults in situations that are highly emotionally intense and/or uncontrollable (Jensen et al., 2013). Further, in situations appraised as having an external locus of control (i.e., determined by forces outside the person's control, or unchangeable), according to the goodness-of-fit model (Folkman & Lazarus, 1991), an avoidant coping response is thought to have high fit, resulting in less experienced distress (Kim & Duda, 2003; Lazarus & Folkman, 1984; Zakowski et al., 2001).

Sheppes (2020) suggests that regulatory approaches that divert attention away from an emotion tend to be effective for high intensity emotions in the short term, but ineffective in the long term. Without re-experiencing and/or reprocessing, negative emotions likely will be encountered again at the same degree of unpleasantness. In contrast, approach strategies that serve to engage with, attempt to change, or reinterpret the meaning of an emotional experience are thought to be less effective when intensity is high, but more effective in the long-term as stressors persist.

1.3 | Coping and anxiety during large-scale stressors

In the context of major life stressors caused by prior disaster events, greater use of avoidant coping was associated with elevated distal affective symptom severity (Bistricky et al., 2019). In the evolving literature regarding COVID-19 pandemic-related coping, several trends have emerged regarding concurrent or predictive links with anxiety and general well-being (Eden et al., 2020; Mariani et al., 2020; Pigaiani et al., 2020; Wang et al., 2021; Waselewski et al., 2020). From data collected in March–April 2020, Pigaiani et al. (2020) found that the majority of adolescents engaged in strategies that changed their behavior, including those which directed attention away from thoughts of the pandemic such as pursuing new interests and planning daily routines, as well as strategies that served to maintain social connection. Further, adolescents who coped by eliciting support from their school and family showed benefits in terms of subjective well-being. Another study (Wang et al., 2021) showed that adolescents' use of coping strategies characterized by adapting to a stressor (e.g., via cognitive restructuring, acceptance, positive thinking and/or distraction), and receiving social support, predicted within-person increases in positive affect.

In adults, keeping a routine, avoiding COVID-related news, and following expert mitigation advice were associated with lower levels of affective symptoms including anxiety (Fullana et al., 2020; Gerhold, 2020), whereas greater use of avoidant coping was associated with poor mental health generally (Eden et al., 2020) and high anxiety specifically (Mariani et al., 2020). Common threads among these recent findings are that, at least early on in the pandemic (e.g., lockdown periods), avoidance strategies were consistently associated with mental health and well-being, although with mixed findings regarding directionality. Importantly, receiving social support or maintaining social connections were uniformly beneficial. Age-related differences in the mental health consequences of avoidant and approach coping strategies during the pandemic have not yet been documented. However, given developmental trajectories in these coping strategies (i.e., declining avoidance and increasing approach with age), interactions between age and coping should be explored as predictors of anxiety symptom change.

1.4 | SMU, coping, and anxiety

SMU among adolescents is highly prevalent, with the majority of adolescents between 12 and 20 years old using social media on a daily basis (e.g., Anderson & Jiang, 2018; Rideout & Fox, 2018; Rideout et al., 2021). Over the past 2 years, several studies have been published examining SMU during COVID-19, mostly using data collected in the first months of the pandemic onset in the United States (i.e., March–April 2020). Unsurprisingly, adolescents reported an increase in the amount of time they spent using SM, with one study (Ellis et al., 2020) finding that nearly half (48%) of 14- to 18-year-olds surveyed spent 5 or more hours per day online, a more than fourfold increase compared with prepandemic estimates at this frequency of use.

Associations between mental health and SMU have been under investigation since well before the pandemic and recent reviews (Keles et al., 2020; O'Day & Heimberg, 2021; reviews) suggest that SMU relates to both social-emotional costs and benefits. Theory in the fields of communication science and media highlight the unique affordances provided by SM platforms (e.g., availability, controllability, and synchronous and asynchronous engagement), which allow users to readily explore their self-expression and social interactions and self-identity in ways that are qualitatively different than face-to-face contexts (Courtois et al., 2012; Crone et al., 2022; Navarro & Tudge, 2022; Nesi et al., 2018a, 2018b; Valkenburg, 2022).

Thus, SM offers opportunities to establish and maintain social connections and seek emotional support, particularly when in-person support is insufficient or unavailable (Myruski et al., 2020; Nick et al., 2018; O'Keeffe & Clarke-Pearson, 2011), suggesting that adolescents may use SM as a tool to actively cope with unpleasant emotions following a stressor. Indeed, maintaining social connections has been a protective factor against the detrimental impact of the pandemic on mental health. Recent publications focused on the first few months of the pandemic showed that anxious adolescents use SM to cope with worries and uncertainty (Cauberghe et al., 2021), and that high general media use (including SMU, television, movies), as

well as high social connectedness, related to lower feelings of loneliness and stress (Marciano et al., 2022), as well as decreasing anxiety (Magson et al., 2021).

In contrast, SMU has been associated with elevated anxiety symptoms in the prepandemic literature (e.g., Barry et al., 2017; Seabrook et al., 2016; Tsitsika et al., 2014; Yan et al., 2017; Yen et al., 2012), perhaps due to SM contributing to feelings of burden (Dhir et al., 2018), social comparisons (Hanna et al., 2017), unsatisfactory social connectedness (Lu et al., 2014), or unpleasant online interactions, including cyberbullying (Kowalski et al., 2014). Research on prior pandemics and epidemics have shown that anxiety symptoms may emerge or be exacerbated with increased media use, a pattern that has been replicated during COVID-19 (Gao et al., 2020; Marciano et al., 2022; Panchal et al., 2021; Politte-Corn et al., 2022). In adults, SMU during the early pandemic predicted elevated anxiety, potentially due to increased exposure to the suffering of others (Liu & Liu, 2020), and/or unsatisfactory social support received online (Politte-Corn et al., 2022). Recent studies of adolescents (Zhang et al., 2021) and young adults (Zhang et al., 2020) showed that greater online engagement, particularly regarding content with a negative tone (e.g., anxiety, sadness), was associated with an increase in anxiety symptoms pre- versus postpandemic (i.e., January 2020 vs. May 2020). Sex-related differences are evident in SMU and its associations with well-being both before and since the onset of the pandemic. Compared with boys, girls have been shown to use most forms of SM more frequently (e.g., Nick et al., 2022; Vannucci & Ohannessian, 2019), as well as show significantly greater associations between SMU and poor well-being (Keles et al., 2020; McCrae et al., 2017; Nilsson et al., 2022; Vall-Roqué et al., 2021). Thus, it is important to consider sex and its interactions with predictors of the SMU–anxiety link.

Further, adolescents may use SM as an avenue to deploy avoidant coping by self-distracting from negative emotions (McNicol & Thorsteinsson, 2017; Stockdale & Coyne, 2020). Tillman (2020) found that putatively maladaptive SMU, conceptualized as compulsive behaviors comparable to behavioral addictions (Van den Eijnden et al., 2016) (e.g., SMU as escapism), predicted elevated stress. Indeed, avoidant coping has been implicated as a potential mechanism underlying the association between elevated psychological distress and internet addiction (Cheng et al., 2015; McNicol & Thorsteinsson, 2017). The added strain of the pandemic may exacerbate the detrimental impact of online behavior, particularly when SM is used as a form of avoidance. Others have suggested that elevated SMU may serve as a coping strategy for adolescents to manage not only stress, but boredom associated with the pandemic and related closures and restrictions (Nilsson et al., 2022). In parallel with the avoidant coping literature, the directionality in links between SMU and anxiety symptoms may depend on when elevated SMU occurs in relation to a major stressor and the endurance of these behaviors over time. Longitudinal studies are needed that account for environmental context and examine SMU and symptoms of psychopathology in tandem.

Finally, it is important to consider how the social-emotional correlates of SMU may change across adolescence as social and cognitive skills mature. Developmental theories emphasize adolescence as a period marked by a profound shift toward reliance on peers versus parents for social support (e.g., Birkeland et al., 2014), as well as using SM to diversify and expand friendship networks (e.g., Brown & Larson, 2009; Sarmiento et al., 2020). For instance, middle and late adolescents (15–17 years) place greater importance on in-depth or intimate personal peer relationships (Yau & Reich, 2018) compared with younger adolescents (<15 years). Perspective taking skills mature across adolescence, increasing adolescents' ability to thoughtfully consider how their posts and online interactions may be interpreted by others (Yau & Reich, 2018). Thus, adolescents may become increasingly well-equipped to leverage SM for positive social experiences as they approach the transition to adulthood.

1.5 | Current study

The current study uses a 6-month longitudinal design spanning from August 2020 (start of a new school year) to Spring of 2021 (soon after vaccines became available), through periods of dips and surges in positive case frequency and fluctuating removal and re-instatement of restrictions (e.g., remote or hybrid schooling, isolation recommendations). Target measures (i.e., coping, SMU, anxiety symptoms) for the current study were reported at the first and last time point (i.e., T1 and T6).¹ We focused on adolescents (ages 12–20 years) due to the prevalent emergence of anxiety symptoms, rapid maturation of regulatory capacity underlying coping skills, and ubiquitous SMU characteristic of this period of development.

Whereas avoidant coping has been shown to be effective for managing responses to high intensity and uncontrollable stressors, approach coping may not be compatible with the uncontrollability and uncertainty of the early pandemic phase. In contrast, avoidant coping strategies tend to be ineffective in the long-term, due to a lack of emotion processing depth (e.g., reframing, problem solving, support seeking, and so on), whereas approach strategies may become more viable and

¹Measures not used in the current study were collected at approximately 1 month increments between T1 and T6. The current study uses only measures collected at the initial survey (T1) and 6 months later (T6), and the notations T1 and T6 are used here to maintain consistency across the multiple studies using this data set.

effective over time as stressors become more controllable or less intense. Similarly, regarding SMU, as in-person opportunities for social contact were especially limited earlier in the pandemic, high frequency SMU early on may reflect adaptive attempts to maintain social connections, whereas sustained or increasing SMU over time potentially reflects a failure to re-engage with in-person opportunities. Thus, we expect that avoidant coping, approach coping, SMU, and the interactions among these variables, will moderate anxiety symptom change over time. Specifically, consistent with coping theories emphasizing context (e.g., stressor intensity, controllability), we hypothesized that (H1) adolescents reporting increasing levels of avoidant coping and decreasing use of approach coping strategies over 6 months will show coinciding increases in anxiety symptoms, whereas the opposite pattern (i.e., decreasing avoidance and increasing approach) is expected to predict decreases in anxiety symptoms. Next, as prior research (e.g., Stockdale & Coyne, 2020) has indicated that SMU may reflect attempts to avoid unpleasant emotions, we expect avoidant coping and SMU patterns to show similar relations with anxiety. We hypothesized that (H2) sustained or increasing levels of avoidant coping and SMU would both predict increasing levels of anxiety. Finally, given the age- and sex-related changes in coping strategies and SMU across adolescence, we explored whether relations among these variables vary by age and sex.

2 | METHODS

2.1 | Participants

Recruitment was conducted via Facebook advertisement and through invitations to families who participated in prior studies in our laboratories. Data collection occurred online via Qualtrics surveys from August 2020 through May 2021. Given the online format, families were geographically dispersed but primarily resided in central and south-central Pennsylvania. Parents completed a screening questionnaire before participation and were excluded if the parent or adolescent did not speak English, or if the adolescent had been diagnosed with any neurological or developmental disorders. This research was approved by the institutional review board of the Pennsylvania State University.

In total, 295 families were recruited to participate. Of these, 30 families provided no adolescent-report measures at both T1 and T6 were therefore excluded from analyses. Thus, the current sample consisted of 265 adolescents aged 12–20 years old ($M_{\text{age}} = 15.56$, $SD = 1.81$; 55.8% female, 43.8% male, 0.4% preferred not to answer). Adolescent race was reported as follows: 89.6% White, 5.0% more than one race, 4.2% Black/African American, <0.4% Asian, and 0.8% reported “other.” Five percent identified as Hispanic or Latinx descent and 95% identified as non-Hispanic or Latinx descent. Caregivers (95.4% mothers, 4.2% fathers, 0.4% grandmother) reported their highest level of education as follows: 36.7% had a graduate degree, 5.4% had graduate training, 39.4% had a college degree, 15.1% had completed technical school or some college, and 3.5% had a high school degree. Sixty-one percent of caregivers reported being employed full time, 22.4% were employed part time, and 16.6% were unemployed. The majority of families (78.3%) had an annual income that was \$60,000² or more in 2019. Caregivers reported their marital status as follows: 82.2% married, 12.7% divorced, 4.2% unmarried or never married, and 0.8% widowed.

At T6, 240 families participated, with 25 families lost to attrition. Analyses revealed no associations of attrition status with adolescent age, race, and ethnicity, parental marital status, employment status, and education, and family income in 2019. However, a χ^2 test of independence revealed that attrition status was related to adolescent sex, $\chi^2 = 11.67$, $p = .003$. Posthoc analyses revealed that families who remained in the study at T6 were more likely to have females than families who discontinued participation.

2.2 | Procedure

Participants completed questionnaires via Qualtrics once per month, over the course of ~6 months (Min = 3.93 months, Max = 9.28 months, $M = 5.90$, $SD = 1.13$) within the first year of the COVID-19 pandemic. Measures relevant for the current study were collected during the first and sixth month of each participants' enrollment. The first time point (T1) was completed from August through November of 2020 ($M_{\text{start date}} = \text{September 22, 2020}$; $SD = 31$ days) and T6 was completed from January through May of 2021 ($M_{\text{end date}} = \text{March 15, 2021}$; $SD = 38$ days). The average time elapsed between each time point (T1–T6) was 5.58 months ($SD = 0.95$).

To contextualize the study within the time course of the pandemic, T1 began ~2 weeks before the start of the 2020–2021 school year and T6 data collection began ~2 weeks after the start of the Spring 2021 school semester. The first doses of the

²This benchmark was used as it represents above 200% of the federal poverty level for a household of 4+ members.

COVID-19 vaccine became available to some adults in Pennsylvania during December 2020, which was between T1 and T6 data collection periods.

2.3 | Materials

2.3.1 | SMU

Adolescents reported their SMU during the COVID-19 pandemic as part of the adapted CoRonavIruS Health Impact Survey (Nikolaidis et al., 2021). Specifically, adolescents indicated how much time per day they spent using social media (e.g., Facetime, Facebook, Instagram, Snapchat, Twitter, Tiktok, and so on) on a five-point scale as follows: (1) none, (2) under 1 h, (3) 1–3 h, (4) 4–6 h, and (5) 6 or more hours. These questions were asked twice at T1, once anchored to the time frame of “in the 3 months before COVID-19 pandemic onset” and again anchored to “since the onset of the COVID-19 pandemic.” The response anchored to “since the onset of COVID-19” was used in the current study, as this captured more recent behavior, increasing the likelihood of recall accuracy, and was also more consistent with the time frame asked about at T6. At T6, participants responded based on their habits in the “past month.”

2.3.2 | Adolescent anxiety symptoms

At T1 and T6, parents³ completed the Screen for Child Anxiety Related Disorders (SCARED; Birmaher et al., 1997, 1999), which consists of 41 items regarding adolescent anxiety symptoms experienced in the last 3 months, answered on a response scale from (0) not true or hardly ever true to (2) very true or often true. This measure yields one total anxiety score and five subscales corresponding to Diagnostic and Statistical Manual of Mental Disorders anxiety disorder classifications (generalized anxiety disorder, separation anxiety disorder, social anxiety disorder, significant school avoidance, and panic disorder or significant somatic symptoms). The total anxiety scale exhibited good internal consistency (T1: $\alpha = .95$; T6: $\alpha = .95$).

2.3.3 | Adolescent coping

The Brief-COPE (Carver, 1997) was originally validated as a measure of coping strategies during a stressful life event. Prior research examining coping in response to wide-scale stressors (i.e., natural disasters; Glass et al., 2009) has extracted two subscales from this measure which respectively capture avoidant and approach coping.⁴ The 10-item avoidant coping subscale assesses participants efforts to shift attention away from or disengage from stressors (e.g., “I’ve been giving up trying to deal with it” and “I’ve been refusing to believe that it has happened”). The 18-item approach coping subscale assesses participants efforts to navigate responses to stressors via attempts to change behaviors, thoughts, and emotional experience or expression related to stressors (e.g., “I’ve been getting help and advice from other people”; “I’ve been saying things to let my unpleasant feelings escape”). Adolescents responded regarding how they have been coping with recent stress, using a scale from 1 (*I haven’t been doing this at all*) to 4 (*I’ve been doing this a lot*). Subscale scores were computed as means, with higher scores reflecting a higher use of coping strategy categories. The avoidant and approach coping subscales have been established to have acceptable internal consistency (Glass et al., 2009), which was confirmed with the current sample (T1: $\alpha_{\text{avoidant}} = .73$; T6: $\alpha_{\text{avoidant}} = .78$; T1: $\alpha_{\text{approach}} = .83$; T6: $\alpha_{\text{approach}} = .84$).

2.4 | Analytic plan

2.4.1 | Power analysis

We conducted sensitivity power analysis using G*Power 3.1.9.2 for linear multiple regression. To test our hypotheses with three predictors (avoidant coping, approach coping, and SMU), two covariates (age and sex, see results for rationale), and all interactions within the multiplicative moderation model (see below), an α level of .05 and a sample size of 259 was sufficient to detect effect sizes of $f^2 = 0.10$ and greater at 80% power.

³Parent report, rather than adolescent report, of anxiety symptoms was used as, due to an error, adolescent report of the SCARED was not collected at T1.

⁴We use the term approach coping to encompass items pertaining to problem-focused and emotion-focused strategies.

2.4.2 | Missing data

The pattern of missing data was tested by conducting Little's test, which revealed data was likely missing completely at random ($\chi^2(380) = 404.28, p = .19$). Missingness ranged from 1% to 24.5%, thus multiple imputation was completed via SPSS using 25 iterations and subsequent analyses were conducted with pooled data. Results were also replicated using the original data set using available-case analysis. The significance level of effects (i.e., p 's < .001, .01, .05) did not differ between analyses conducted with nonimputed and imputed data.

2.4.3 | Main analyses

To test our hypotheses, we conducted moderation for two-instance repeated-measures analyses via the MEMORE (Mediation and Moderation analysis for Repeated measures designs, version 2.1) macro for SPSS (Montoya & Hayes, 2017; Montoya, 2019), a procedure which tests whether moderators predict a significant difference in the outcome measure across two time points (i.e., change over time), as well as at each individual time point (Judd et al., 2001; Kenny, 2018). This technique allows assessment of conditional (± 1 SD and mean) effects of the moderators on the change in outcome to detect not only directionality of the relation between predictors and outcome, but at what levels (decrease, maintenance, increase) of the predictors the degree of change in outcome is statistically significant. The MEMORE macro has been used in prior studies investigating moderators of change in symptoms of psychopathology during COVID-19 (Magson et al., 2021). We used Model 3 (multiplicative moderation) to examine moderation of anxiety change from T1 to T6. In this single model, moderation main effects are tested individually for each predictor (avoidant coping, approach coping, and SMU), as well as moderation by interactions between predictors.⁵

To capture how individual differences in coping and SMU change (decrease, maintain, increase), we computed difference scores (T6 minus T1) to subsequently examine how coping and SMU changes coincided with anxiety changes. As T1 and T6 measures were significantly correlated within each construct (i.e., coping, SMU), difference scores allowed us to avoid issues with multicollinearity that would arise with inclusion of individual time point coping and SM measures within the same model. Further, our use of subtraction difference scores maintains consistency between how predictors (i.e., coping, SMU change scores) and the outcome (i.e., anxiety symptom change) was evaluated by the MEMORE procedure.⁶

3 | RESULTS

3.1 | Preliminary analyses

3.1.1 | Age and sex effects

Independent samples t tests revealed significant differences between females and males regarding all target variables (Table 1). Females reported experiencing significantly greater anxiety at both T1 and T6. Females also reported greater SMU, avoidant coping, and emotion-focused coping at both time points. Finally, females versus males reported greater use of approach coping at T6, but not at T1.

At both T1 and T6, age was positively correlated with avoidant coping (T1: $r = .22, p < .001$; T6: $r = .19, p = .002$) and approach coping (T1: $r = .19, p = .002$; T6: $r = .25, p < .001$). Age was also positively correlated with SMU at T1 ($r = .16, p = .009$) but not T6 ($r = .08, p = .179$). There were no significant correlations between age and adolescent anxiety (T1: $r = -.04, p = .480$; T6: $r = -.07, p = .272$).

3.1.2 | Correlations between anxiety, SMU, and coping

Partial correlations with age and sex as covariates showed that anxiety, avoidant coping, and SMU were positively correlated (Table 2). Notably, anxiety was positively correlated with avoidant coping at T1 ($r = .26, p < .001$) and T6 ($r = .31, p < .001$), and with SMU at T6 ($r = .16, p = .008$). SMU was also positively correlated with avoidant coping at T1 ($r = .22, p < .001$) and

⁵The MEMORE procedure Model 3 tests all possible interactions, thus correction for multiple comparisons may obscure significant results by being overly stringent. To bolster confidence in our results, we also conducted a multiple regression including only moderators detected as significant in the MEMORE model, and all effects remained significant when applying the Benjamini-Hochberg correction to account for multiple comparisons in this approach.

⁶We also confirmed using multiple regression as described in footnote 4 that significant effects remained unchanged when residual change scores were used to quantify T1-T6 anxiety symptom change.

TABLE 1 Sex differences.

	Females (<i>n</i> = 148) <i>M</i> (SD)	Males (<i>n</i> = 116) <i>M</i> (SD)	<i>t</i> (df)	<i>p</i>
Adolescent anxiety				
T1	17.81 (12.59)	12.40 (12.31)	3.50 (262)	.001
T6	16.63 (12.85)	12.25 (10.94)	2.93 (262)	.004
SMU				
T1	3.59 (1.10)	2.86 (1.27)	4.97 (262)	<.001
T6	3.33 (1.15)	2.60 (1.15)	5.16 (262)	<.001
Avoidant coping				
T1	1.89 (0.44)	1.66 (0.39)	4.37 (262)	<.001
T6	1.85 (0.47)	1.63 (0.36)	4.29 (262)	<.001
Approach coping				
T1	2.39 (0.50)	2.28 (0.45)	1.85 (262)	.066
T6	2.34 (0.44)	2.20 (0.46)	2.58 (262)	.010

Abbreviation: SMU, social media use.

TABLE 2 Partial correlations between main study variables with age and sex as covariates.

Variable	1	2	3	4	5	6	7	8
1. T1 anxiety	1.00	.66***	.08	-.03	.26***	.15*	-.05	-.11
2. T6 anxiety		1.00	.15*	.16**	.24***	.31***	-.04	-.05
3. T1 SMU			1.00	.49***	.22***	.23**	.01	-.03
4. T6 SMU				1.00	.05	.15*	-.11	-.11
5. T1 avoidant coping					1.00	.56***	.38***	.27*
6. T6 avoidant coping						1.00	.21***	.29***
7. T1 approach coping							1.00	.64***
8. T6 approach coping								1.00

Abbreviations: SMU, social media use; T1, Time 1; T6, Time 6.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

T6 ($r = .15$, $p = .016$). There were no significant associations between approach coping and anxiety or SMU at either time point (p 's > .083).

3.1.3 | Change in anxiety, SMU, and coping

To examine patterns of change in the main study variables, repeated-measures analyses of variance were conducted with Time (T1, T6) as the within-subject variable, and adolescent age and sex as a covariates. No significant main effects of Time emerged for anxiety [$F(1, 261) = 1.46$, $p = .228$], SMU [$F(1, 261) = 0.54$, $p = .583$], avoidant coping [$F(1, 261) = 0.36$, $p = .361$], or approach coping [$F(1, 261) = 0.92$, $p = .338$].

3.2 | Main analyses

Full model statistics are presented in Table 3. The overall model, including sex, age, avoidant coping change, approach coping change, and social media change, and their interactions, as moderators of anxiety symptom change from T1 to T6 was significant [$R^2 = .18$, $F(31, 233) = 1.67$, $p = .018$]. Variance Inflation Factors (VIFs) were examined to assess multicollinearity

TABLE 3 Main analysis regression output (MEMORE procedure).

Model summary	R	R ²	MSE	F	df	p
Outcome						
T1 anxiety symptoms	.39	.15	155.09	1.35	31, 233	.110
T6 anxiety symptoms	.37	.14	145.91	1.22	31, 233	.202
T1 to T6 anxiety symptom change	.43	.18	93.91	1.67	31, 233	.018
Predictors						
	Coeff	SE	t	p	LLCI	ULCI
Main effects						
Constant	-.27	.64	-0.42	.673	-1.54	1.00
Sex	-.74	1.29	-0.57	.568	-3.28	1.80
Age	-.32	.37	-0.88	.380	-1.05	.40
Avoidant Coping	5.65	1.73	3.27	.001	2.24	9.07
Approach Coping	-.01	1.78	-0.01	.994	-3.53	3.50
SMU	1.32	.59	2.25	.026	0.16	2.48
Two-way interactions						
Age*Sex	-.58	.75	-0.77	.444	-2.06	.90
Age*Avoid	-.41	1.05	-0.39	.698	-2.49	1.67
Age*Approach	.62	1.14	0.55	.585	-1.62	2.87
Age*SMU	.08	.33	0.25	.806	-0.57	.74
Sex*Avoid	5.34	3.46	1.54	.125	-1.49	12.16
Sex*Approach	-1.71	3.67	-0.47	.642	-8.95	5.52
Sex*SMU	.77	1.16	0.67	.506	-1.51	3.05
Avoid*Approach	-10.63	4.22	-2.52	.012	-18.95	-2.32
Avoid*SMU	2.07	1.77	1.17	.243	-1.42	5.56
Approach*SMU	-.39	1.73	-0.22	.823	-3.79	3.01
Three-way interactions						
Age*Sex*Avoid	.97	2.16	0.45	.652	-3.27	5.22
Age*Sex*Approach	.72	2.40	0.30	.766	-4.02	5.45
Age*Sex*SMU	.11	.66	0.17	.864	-1.19	1.42
Age*Avoid*Approach	3.48	3.30	1.06	.292	-3.02	9.98
Age*Avoid*SMU	1.91	.91	2.10	.037	0.11	3.70
Age*Approach*SMU	.35	1.09	0.32	.753	-1.81	2.50
Sex*Avoid*Approach	-2.39	9.07	-0.26	.793	-20.26	15.48
Sex*Avoid*SMU	.51	3.52	0.14	.886	-6.42	7.43
Sex*Approach*SMU	4.62	3.59	1.29	.200	-2.46	11.70
Avoid*Approach*SMU	-3.11	5.51	-0.56	.573	-13.95	7.74
Four-way interactions						
Age*Sex*Avoid*Approach	-7.30	7.13	-1.02	.307	-21.35	6.74
Age*Sex*Avoid*SMU	-.37	1.92	-0.19	.849	-4.15	3.41
Age*Sex*Approach*SMU	3.59	2.30	1.56	.120	-0.94	8.13

(Continues)

TABLE 3 (Continued)

Model summary	<i>R</i>	<i>R</i> ²	MSE	<i>F</i>	<i>df</i>	<i>p</i>
Age*Avoid*Approach*SMU	-3.35	3.22	-1.04	.299	-9.71	3.00
Sex*Avoid*Approach*SMU	-8.52	11.83	-0.72	.472	-31.83	14.79
Five-way interaction						
Age*Sex*Avoid*Approach*SMU	5.17	7.08	0.73	.466	-8.78	19.11

Note: Bold values indicate a significant effect ($p < .05$).

Abbreviations: LLCI, lower limit confidence interval; MEMORE, Mediation and Moderation analysis for Repeated measures designs; SMU, social media use; ULCI, upper limit confidence interval.

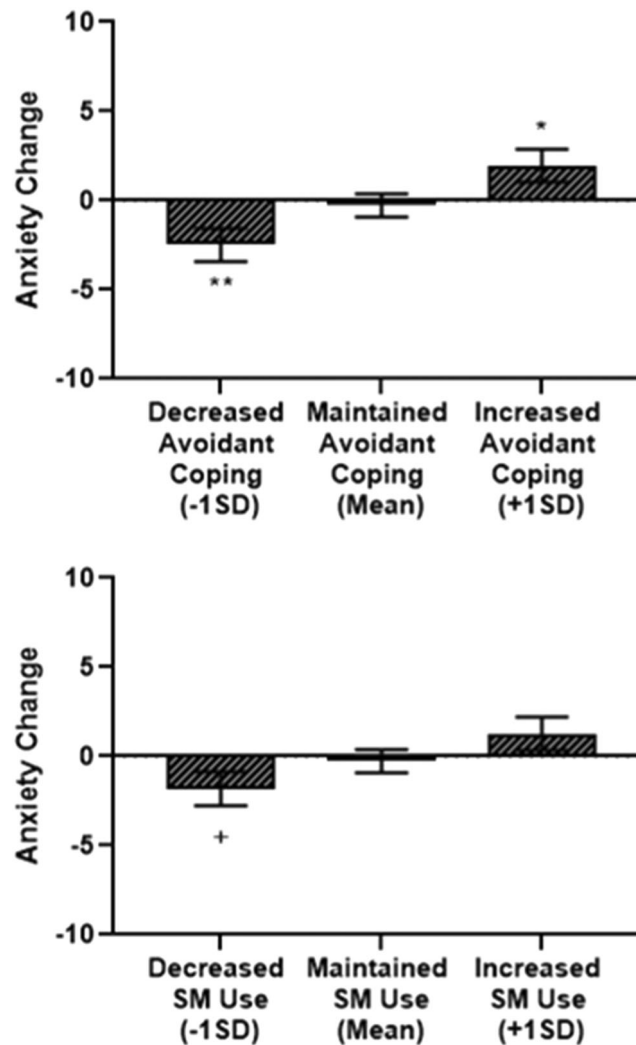


FIGURE 1 Decreases and increases in avoidant coping predicted significant anxiety symptom decreases and increases, respectively. Decreasing social media use (SMU) predicted marginal decline in anxiety symptoms.

and indicated that multicollinearity was low (highest VIF = 1.25). The MEMORE procedure also tests for effects of predictors on each time point outcome independently (i.e., T1 and T6 anxiety symptoms). Neither of these models reached significance [T1 anxiety-independent outcome: $R^2 = .15$, $F(31, 233) = 1.35$, $p = .110$; T6 anxiety-independent outcome: $R^2 = .14$, $F(31, 233) = 1.23$, $p = .202$].

Avoidant coping change independently moderated change in anxiety symptoms ($b = 5.65$, $SE = 1.73$, $p = .001$, 95% confidence interval [95% CI: 2.24, 9.07]). A decrease in avoidant coping coincided with a significant decrease in anxiety from T1 to T6 [-1 SD: $b = -2.49$, $SE = 0.94$, $p = .009$, 95% CI (-4.35, -0.64); Figure 1, top]. Conversely, increasing avoidant coping

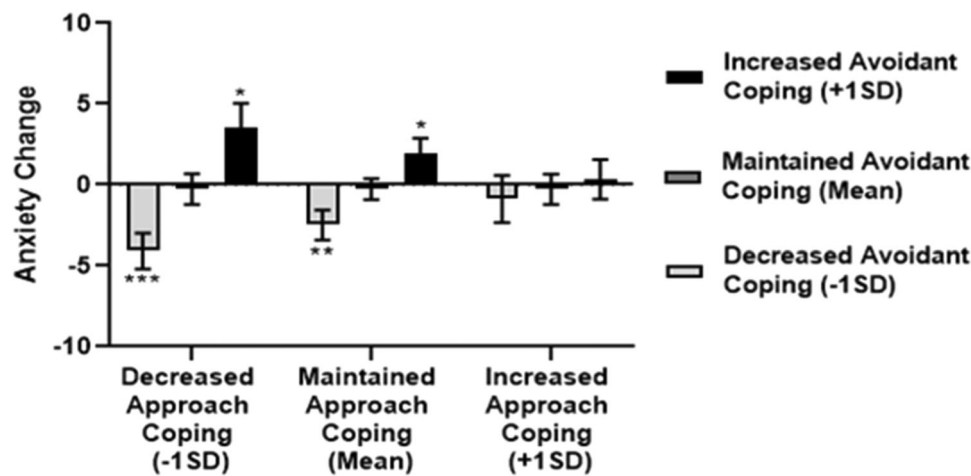


FIGURE 2 Avoidant coping and approach coping change interacted to predict anxiety change. Notably, increased avoidant coping predicted significant anxiety increase, but only when approach coping levels were either decreasing or maintained over time.

predicted a significant increase in anxiety from T1 to T6 (+1 SD: $b = 1.95$, $SE = 0.93$, $p = .038$, 95% CI [0.11, 3.78]). However, when levels of avoidant coping were maintained over time, no significant change in anxiety occurred ($p > .10$).

SMU change also significantly moderated anxiety symptom change ($b = 1.32$, $SE = 0.59$, $p = .026$, 95% CI [0.16, 2.48]), suggesting a positive association between SMU and anxiety over time. However, probing this interaction revealed only a marginally significant conditional effect such that declining SMU coincided with decreasing anxiety (-1 SD for SM difference score, corresponding to a decline in SMU of ~ 1 scale point; $b = 1.32$, $SE = 0.59$, $p = .026$, 95% CI [0.16, 2.48]; Figure 1, bottom). Sex, age, and approach coping did not independently significantly moderate anxiety change (p 's $\geq .380$).

The avoidant coping*approach coping interaction significantly moderated anxiety change ($b = -10.63$, $SE = 4.22$, $p = .012$, 95% CI [-18.95, -2.32]; Figure 2). Significant conditional effects emerged such that when decreases (-1 SD: $b = -4.10$, $SE = 1.10$, $p < .001$, 95% CI [-6.26, -1.93]) or maintenance (mean: $b = -2.49$, $SE = 0.94$, $p = .009$, 95% CI [-4.35, -0.64]) of approach coping, anxiety symptoms significantly declined from T1 to T6 (Figure 2). In contrast, adolescents showing patterns of escalating avoidant coping but declining (-1 SD: $b = 3.56$, $SE = 1.49$, $p = .017$, 95% CI [0.64, 6.49]) or maintained (mean: $b = 1.95$, $SE = 0.93$, $p = .038$, 95% CI [0.11, 3.78]) approach coping showed increases in anxiety symptoms from T1 to T6.

Finally, we explored whether sex and age interacted with other moderators to predict anxiety symptom change. No significant effects of sex on anxiety change were found (p 's $> .120$). The age*avoidant coping*SMU interaction significantly moderated anxiety change ($b = 1.91$, $SE = 0.91$, $p = .037$, 95% CI [0.11, 3.70]; Figure 3). Significant conditional effects emerged as follows. For younger adolescents (-1 SD: < 13.75 years) and middle adolescents (mean: ~ 15.56 years), patterns of avoidant coping and SMU were coupled, such that decreases and increases in avoidant coping and SMU coincided with significant anxiety decreases (younger: $b = -4.20$, $SE = 2.11$, $p = .047$, 95% CI [-8.35, -0.05]; middle: $b = -3.09$, $SE = 1.33$, $p = .022$, 95% CI [-5.72, -0.46]) and increases (younger: $b = 3.57$, $SE = 1.81$, $p = .049$, 95% CI [0.01, 7.12]; middle: $b = 4.45$, $SE = 1.41$, $p = .002$, 95% CI [1.67, 7.23]), respectively. For middle adolescents, decreasing ($b = -2.49$, $SE = 0.94$, $p = .009$, 95% CI [-4.35, -0.64]) and increasing ($b = 1.95$, $SE = 0.93$, $p = .038$, 95% CI [0.11, 3.78]) avoidant coping also predicted corresponding anxiety changes when levels of SMU were maintained over time.

For older adolescents (+1 SD: > 17.37 years), predictive patterns of avoidant coping and SMU were decoupled, such that the directionality of the association between SMU and anxiety varied based on whether avoidant coping increased or decreased. For these older adolescents, increasing avoidant coping and SMU predicted increasing anxiety ($b = 5.33$, $SE = 2.04$, $p = .001$, 95% CI [1.31, 9.36]), consistent with patterns revealed for younger and middle adolescents. However, increasing ($b = -3.61$, $SE = 1.80$, $p = .047$, 95% CI [-7.15, -0.05]) or maintained ($b = -2.79$, $SE = 1.32$, $p = .036$, 95% CI [-5.39, -0.19]) SMU predicted decreasing anxiety when avoidant coping declined over time.

4 | DISCUSSION

The disruptive force of the COVID-19 pandemic has presented unpredictable and uncontrollable stressors for all, and potentially compounded the difficulties faced by many adolescents. The current study employed a longitudinal design to examine how adolescents' coping strategies and SMU related to change in anxiety symptoms across 6 months.

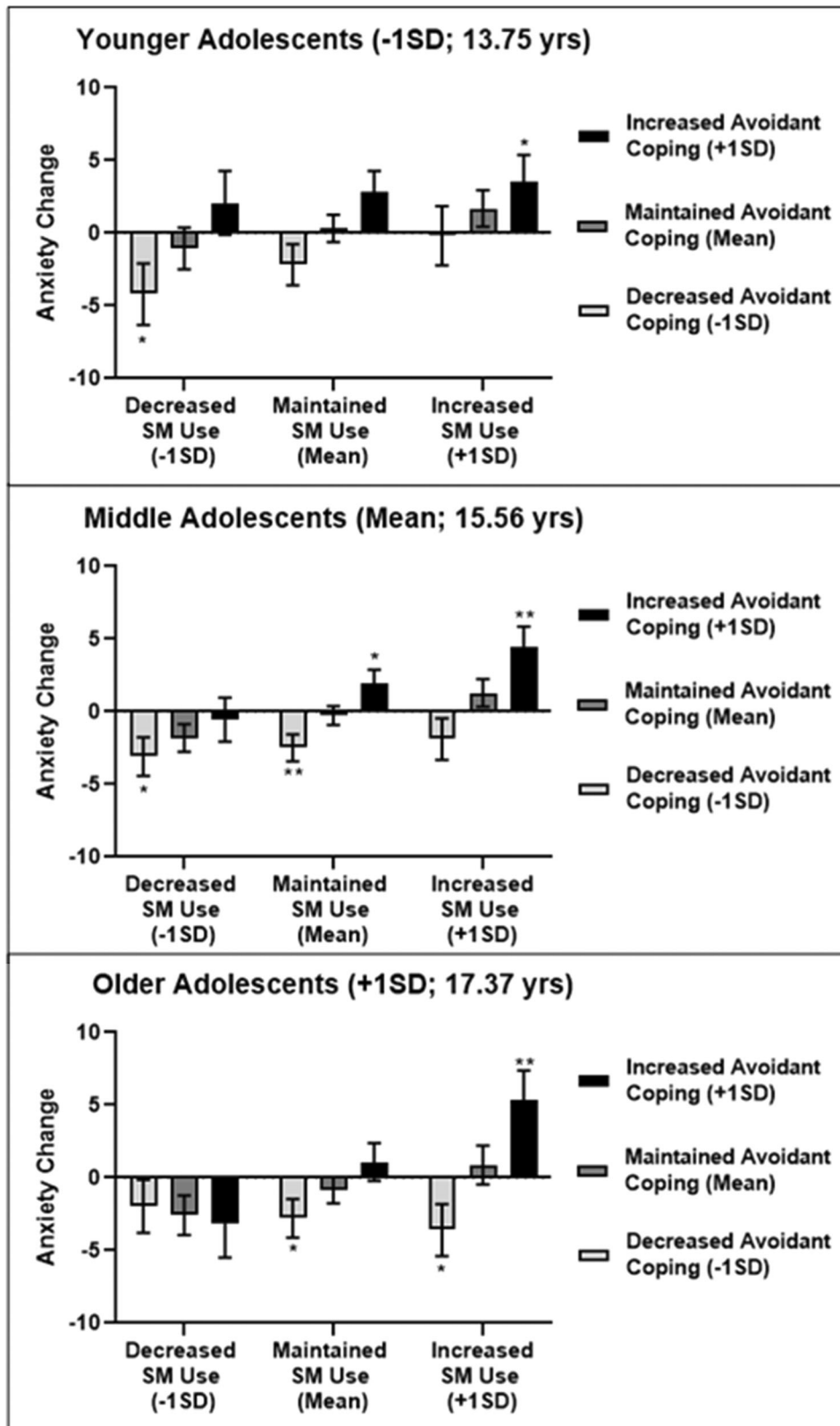


FIGURE 3 Age, avoidant coping change, and social media use (SMU) change significantly interacted. Although changes and directionality of avoidant coping and SMU change coincided with anxiety change for younger and middle adolescents, only older adolescents showed a significant decrease in anxiety symptoms when avoidant coping declined, whereas SMU became more frequent.

Consistent with predictions (H1), changes in avoidant coping from T1 to T6 coincided with anxiety changes, and avoidant and approach coping patterns also interacted to moderate anxiety change. Anxiety significantly increased among adolescents engaging in increased avoidant coping coupled with declining or maintained approach coping. This suggests that adolescents may engage in more avoidance as anxiety symptoms rise over time, escalating avoidance may exacerbate anxiety, and/or avoidance may become less effective as stressors persist, particularly when avoidance strategies are not replaced by or supplemented with approach strategies. These patterns are consistent with the conceptualization of avoidant coping as generally less effective at managing anxiety symptoms in comparison with approach coping (Gomez et al., 1998; Richardson et al., 2021).

In addition, anxiety symptoms significantly decreased among adolescents showing decreases in avoidant coping, both independently and in concert with decreasing or maintained approach coping. This may indicate that avoidance, or perhaps either type of coping strategy, while potentially protective during the earlier stage of the pandemic, became less necessary as pandemic-related stressors declined due to the passage of time or adolescents adapted to the disruptions to their daily lives. These findings are in line with prior work (e.g., Sheppes, 2020) and coping theory (Folkman & Lazarus, 1991; Folkman, 2014; Lazarus & Folkman, 1984, 1991) suggesting that avoidant coping may be most beneficial for managing high intensity emotions in shorter time-spans in highly uncontrollable contexts, which may have been more relevant in the earlier stages of the pandemic.

Contrary to predictions, increases in approach coping did not moderate changes in anxiety symptoms, either independently or via interactions with avoidant coping. This suggests that avoidant strategies may not have been replaced with approach strategies as the intensity or unpredictability of pandemic-related stressors declined over time. It may be that the sources of stressors in these circumstances (e.g., financial strain, lack of in-person social opportunities) were beyond adolescents' direct control and thus less serviced by approach strategies. That is, approach coping tends to be a less frequent strategic choice when stressors are perceived as relatively uncontrollable (e.g., Jensen et al., 2013).

Interestingly, although avoidant and approach coping showed differential moderating effects on anxiety symptom change, these variables were significantly positively correlated at both time points. Specifically, These positive correlations likely reflect that some adolescents use a variety of coping strategies that fall in both avoidant and approach categories. Our findings highlight that although some may use both strategy types, it is the within-person changes (i.e., increasing or decreasing) in reliance on one or the other that seems to predict anxiety symptom fluctuations.

SMU was positively correlated with avoidant coping at both T1 and T6, suggesting that adolescents may use social media as an avenue to avoid unpleasant thoughts or feeling related to stress of the pandemic. This is consistent with prior work showing that adolescents use social media to disengage from unpleasant thoughts and emotions (McNicol & Thorsteinsson, 2017; Stockdale & Coyne, 2020; Tillman, 2020). SMU by itself also moderated anxiety change, although follow-up tests revealed only a marginal effect of reduced SMU predicting decreasing anxiety. This subthreshold conditional effect may be due to the age-related differences in patterns of SMU-anxiety change associations revealed by the three-way interaction. That is, our exploration of age-related differences revealed that the moderating effect of SMU and avoidant coping on anxiety change depended on adolescent age.

For younger (i.e., $-1SD$: <13.75 years) and middle (i.e., mean: 15.56 years) adolescents, increases in SMU coincided with increases anxiety, but only if adolescents were also using more avoidant coping over time. These adolescents may have been using social media to distract themselves from stressors, but this coping strategy could have exacerbated anxiety. For older adolescents, increases in SMU coincided with decreases in anxiety, but only if these adolescents were also using less avoidant coping over time. This suggests that socio-emotional and cognitive maturation makes older adolescents better equipped to use social media to connect with others as in an adaptive manner, as they would in-person (e.g., Yau & Reich, 2018) rather than avoid unpleasant thoughts and emotions. This shift in the form and function of SMU potentially contributes to relief from anxiety symptoms. This is consistent with a recent meta-analysis (Marciano et al., 2022) documenting that positive, one-on-one interactions online were related to greater adolescent well-being. Thus, our prediction (H2) that greater SMU and avoidant coping would be coupled, together moderating significant increases in anxiety, was supported only for younger and middle adolescents, represented by ~ 12 – 16 years old in the current sample.

Interestingly, no significant changes in coping, SMU, or anxiety symptoms were present at the sample level, contrary to prior findings from studies of the COVID-19 pandemic (Ellis et al., 2020). This could be due to the time course of our study, which began approximately 5 months after the pandemic onset in the United States, thus not capturing prepandemic or early pandemic levels. This could reflect the rapid nature by which individuals may implement coping strategies, or reframing, even after the most sweeping stressors. Others found similar lack of significant changes in adolescent anxiety (Barendse et al., 2023) and SMU (O'Kane et al., 2021) pre- versus postpandemic. These null findings could be explained by interactions between variables and individual differences in anxiety symptom changes not captured when examining sample means.

A major strength of the current study was the longitudinal design, enabling us to examine change in adolescent socio-emotional functioning across the first year and a half of the COVID-19 pandemic. This adds to the extant literature on adolescents' mental health during the pandemic which has predominately focused on acute effects in the first months of the global health crisis. We also leverage theoretical perspectives on the timing of avoidant and approach coping during a major

stressor and were able to examine coping patterns in conjunction with SMU and adolescent age, adding to the growing literature emphasizing the important nuances in how adolescents use SM to pursue socio-emotional goals (Haddock et al., 2022; Hamilton et al., 2022; Nesi et al., 2018a, 2018b).

However, limitations of the current study should also be considered. First, the diversity of our sample was limited in terms of socioeconomic status and race/ethnicity, with the large majority of the sample consisting of middle to high income families (78.3%), college educated (or higher) parents (81.5%), and White adolescents (89.6%), preventing us from examining potential difference or interactions based on these factors. Importantly, the COVID-19 pandemic has disproportionately impacted low-income families and racial/ethnic minorities (Millett et al., 2020; Perrigo et al., 2022; Tai et al., 2021). Adolescents of color are at greater risk of developing anxiety symptoms following negative life events (e.g., Lewis et al., 2012) and also display differing affect trajectories following SMU (Nereim et al., 2022). These trends highlight the need for future studies to examine effects of coping and SMU on anxiety in diverse representative samples.

Caveats concerning our measurement of coping and SMU variables should be noted. Adolescents responded regarding their coping in the face of recent stress, not pandemic-related stress specifically. Thus, results should be interpreted with this in mind, that is, effects pertain to how adolescents coped with stress during the pandemic, not necessarily specific to about the pandemic. In addition, our measure of SMU provided information about sheer frequency of use only. Thus, we were unable to examine how nuances in SMU may relate to anxiety change during the pandemic. For instance, Thorisdottir et al. (2019) demonstrated that, above and beyond SMU frequency, passive SMU (e.g., browsing without interacting with others) was associated with greater anxiety, whereas active use (e.g., fostering social connections) related to lower symptoms. Other studies have highlighted the need to draw direct comparisons between SMU and frequency of face-to-face social engagement (e.g., Keles et al., 2020; Myruski et al., 2020). Thus, future studies should aim to capture such nuances in SMU beyond sheer frequency.

In addition, we indexed SMU and coping during the pandemic via retrospective reports, which required adolescents to generalize their behaviors over the preceding months. Prior work has shown that, although adolescents' self-report of digital media use is somewhat consistent with direct frequency measures (e.g., correlation of .49; Wade et al., 2021), retrospective estimation of SMU is limited in that users often underestimate their use frequency (Parry et al., 2021). Although objective SMU measures such as passive mobile sensing offer greater precision, these techniques have their own limitations including potential introduction of changes to habitual behavior due to awareness of monitoring, as well as failure to capture SMU conducted across multiple devices (e.g., computers, tablets, mobile phones). Future studies should leverage techniques that are more precise than general retrospective report while maintaining ability to capture SMU nuances, such as ecological momentary assessment, to characterize how adolescent coping, SMU, and anxiety may change in daily life following a major stressor.

Next, only parent report of adolescent anxiety symptoms was available due to a clerical error which excluded the adolescent SCARED from T1 questionnaires. Interpretation of the current study's results should keep this in mind, since concordance between parent and youth report of symptoms of psychopathology has been shown to be low to moderate (De Los Reyes et al., 2015). However, in our sample, parent and adolescent report at T6 was correlated ($r = .540$). For the SCARED specifically, parent and youth agreement is modest (Rappaport et al., 2017), and the discrepancy direction (i.e., parent or youth reporting higher symptoms) between reporters varies based on comparisons with clinical assessments. That is, parents tend to report higher anxiety severity (compared with youth self-report) when their child has an anxiety diagnosis, and parents report lower anxiety severity (compared with youth self-report) when their child is nonanxious. It appears that parents tend to report at the extremes within diagnostic categories, relative to their children's self-views. In addition to diagnostic category, other factors not measured in the current study, such as parent-child relationship closeness, adolescents' level of disclosure of symptoms, and parents' attunement to their child's emotional state, likely influence the accuracy of anxiety symptom measurement. However, parent-report accuracy may have been bolstered, as parents and children were likely to be spending more time than usual together at home due to COVID-19-related closures and restrictions.

Finally, the current study focused on examining predictors of anxiety symptom change. The importance of focusing on change is supported by our finding that although we detected significant correlations among SMU, coping, and anxiety concurrently at each time point, models with age, sex, coping and SMU and their interactions predicting T1 and T6 anxiety symptoms independently were not significant. However, our focus on symptom change introduces the limitation that the current study does not provide insight into individual differences in meeting clinical thresholds for anxiety disorders.

Our emphasis on symptoms rather than clinical diagnoses is in line with a dimensional rather than categorical view of psychopathologies (Hudziak et al., 2007; Kamphaus & Campbell, 2008). Prior work has indicated that subthreshold anxiety symptoms confer significant risk for impairment in socio-emotional functioning (e.g., Biederman et al., 2007; Flanagan et al., 2008; Wolitzky-Taylor et al., 2012), and thus fluctuations in symptoms regardless of diagnostic criteria are an important focal outcome. In addition, when considering the impact of major stressors such as the COVID-19 pandemic, within-person change in anxiety symptoms is a highly relevant outcome to judge the relatively more adaptive and maladaptive approaches to managing responses to stressors. Our approach is also appropriate given the community sample for the current study. That is, participants were not screened for elevated anxiety, and indeed the mean anxiety symptoms

reported were substantially below the clinical cutoff for the SCARED (<25; Birmaher et al., 1999), with 71.3% of the sample below this benchmark at both T1 and T6. Future research employing gold-standard diagnostic tools (e.g., clinical interviews) would be better equipped to examine how coping and SMU relate to the presence or absence of anxiety disorders, as well as movement from below to above diagnostic thresholds, during the time course of major stressors.

In sum, the current study demonstrated that coping strategies and SMU predicted patterns of anxiety change across 6 months, adding to the growing literature on adolescent mental health during the pandemic era. Our findings inform future investigations of the roles of SMU and coping strategies in adolescent mental health, targets for intervention research, as well as recommendations for coping responses during prolonged wide-scale stressors. Specifically, although potentially beneficial during early phases of a stressor, prolonged reliance on avoidant strategies should be discouraged. Regarding SMU, turning to online spaces to serve avoidant coping strategies should be discouraged, particularly for younger and middle adolescents (i.e., approximately <16 years old). Taken together, results highlight the need to examine adolescents' coping and SMU patterns contextualized within the time course of major stressors, while considering developmental trends in social-emotional functioning.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

- Anderson, M., & Jiang, J. (2018). Teens, social media & technology 2018. *Pew Research Center*, 31(2018), 1673–1689.
- Barendse, M. E., Flannery, J., Cavanagh, C., Aristizabal, M., Becker, S. P., Berger, E., Breaux, R., Campione-Barr, N., Church, J. A., Crone, E. A., Dahl, R. E., Dennis-Tiwary, T. A., Dvorsky, M. R., Dziura, S. L., van de Groep, S., Ho, T. C., Killoren, S. E., Langberg, J. M., Larginho, T. L., & Pfeifer, J. H. (2023). Longitudinal change in adolescent depression and anxiety symptoms from before to during the COVID-19 pandemic. *Journal of Research on Adolescence*, 33(1), 74–91.
- Barry, C. T., Sidoti, C. L., Briggs, S. M., Reiter, S. R., & Lindsey, R. A. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *Journal of Adolescence*, 61, 1–11.
- Biederman, J., Petty, C. R., Hirshfeld-Becker, D. R., Henin, A., Faraone, S. V., Fraire, M., Henry, B., McQuade, J., & Rosenbaum, J. F. (2007). Developmental trajectories of anxiety disorders in offspring at high risk for panic disorder and major depression. *Psychiatry Research*, 153(3), 245–252. <https://doi.org/10.1016/j.psychres.2007.02.016>
- Birkeland, M. S., Breivik, K., & Wold, B. (2014). Peer acceptance protects global self-esteem from negative effects of low closeness to parents during adolescence and early adulthood. *Journal of Youth and Adolescence*, 43, 70–80.
- Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the screen for child anxiety related emotional disorders (SCARED): a replication study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(10), 1230–1236.
- Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., & Neer, S. M. (1997). The screen for child anxiety related emotional disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child & Adolescent Psychiatry*, 36(4), 545–553.
- Bistricky, S. L., Long, L. J., Lai, B. S., Gallagher, M. W., Kanenberg, H., Elkins, S. R., Harper, K. L., & Short, M. B. (2019). Surviving the storm: Avoidant coping, helping behavior, resilience and affective symptoms around a major hurricane-flood. *Journal of Affective Disorders*, 257, 297–306.
- Blalock, J. A., & Joiner, Jr., T. E. (2000). Interaction of cognitive avoidance coping and stress in predicting depression/anxiety. *Cognitive Therapy and Research*, 24(1), 47–65.
- Brown, B. B., & Larson, J. (2009). Peer relationships in adolescence, *Handbook of adolescent psychology* (Vol. 2, Pt I, pp. 74–104). Wiley.
- Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Review of Neurotherapeutics*, 12(8), 937–947.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief cope. *International journal of behavioral medicine*, 4(1), 92–100.
- Cauberghe, V., Van Wesenbeeck, I., De Jans, S., Hudders, L., & Ponnet, K. (2021). How adolescents use social media to cope with feelings of loneliness and anxiety during COVID-19 lockdown. *Cyberpsychology, Behavior and Social Networking*, 24(4), 250–257.
- Cheng, C., Sun, P., & Mak, K.-K. (2015). Internet addiction and psychosocial maladjustment: Avoidant coping and coping inflexibility as psychological mechanisms. *Cyberpsychology, Behavior and Social Networking*, 18(9), 539–546.
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*, 127(1), 87–127.

- Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., Williams, E., & Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin*, *143*(9), 939–991.
- Courtois, C., All, A., & Vanwynsberghe, H. (2012). Social network profiles as information sources for adolescents' offline relations. *Cyberpsychology, Behavior and Social Networking*, *15*(6), 290–295.
- Crone, E. A., Green, K. H., van de Groep, I. H., & van der Cruisen, R. (2022). A neurocognitive model of self-concept development in adolescence. *Annual Review of Developmental Psychology*, *4*, 273–295.
- Dhir, A., Yossatorn, Y., Kaur, P., & Chen, S. (2018). Online social media fatigue and psychological wellbeing—a study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management*, *40*, 141–152.
- Eden, A. L., Johnson, B. K., Reinecke, L., & Grady, S. M. (2020). Media for coping during COVID-19 social distancing: Stress, anxiety, and psychological well-being. *Frontiers in Psychology*, *11*, 577639.
- Van den Eijnden, R. J. J. M., Lemmens, J. S., & Valkenburg, P. M. (2016). The social media disorder scale. *Computers in Human Behavior*, *61*, 478–487.
- Eisenberg, N., Fabes, R. A., & Guthrie, I. K. (1997). Coping with stress. In *Handbook of children's coping* (pp. 41–70). Springer.
- Ellis, W. E., Dumas, T. M., & Forbes, L. M. (2020). Physically isolated but socially connected: Psychological adjustment and stress among adolescents during the initial COVID-19 crisis. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, *52*(3), 177–187.
- Ellis, W. E., & Zarbatany, L. (2017). Understanding processes of peer clique influence in late childhood and early adolescence. *Child Development Perspectives*, *11*(4), 227–232.
- Eschenbeck, H., Kohlmann, C.-W., & Lohaus, A. (2007). Gender differences in coping strategies in children and adolescents. *Journal of Individual Differences*, *28*(1), 18–26.
- Eschenbeck, H., Schmid, S., Schröder, I., Wasserfall, N., & Kohlmann, C.-W. (2018). Development of coping strategies from childhood to adolescence: Cross-sectional and longitudinal trends. *European Journal of Health Psychology*, *25*(1), 18–30.
- Flanagan, K. S., Erath, S. A., & Bierman, K. L. (2008). Unique associations between peer relations and social anxiety in early adolescence. *Journal of Clinical Child & Adolescent Psychology*, *37*(4), 759–769. <https://doi.org/10.1080/15374410802359700>
- Folkman, S. (2014). Coping across the life span: Theoretical issues. In *Life-span developmental psychology* (pp. 3–19). Psychology Press.
- Folkman, S., & Lazarus, R. S. (1991). Coping and emotion. In *Stress and coping: An anthology* (pp. 207–227). Columbia University Press.
- Fullana, M. A., Hidalgo-Mazzei, D., Vieta, E., & Radua, J. (2020). Coping behaviors associated with decreased anxiety and depressive symptoms during the COVID-19 pandemic and lockdown. *Journal of Affective Disorders*, *275*, 80–81.
- Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLoS One*, *15*(4), e0231924.
- Garcia, C. (2010). Conceptualization and measurement of coping during adolescence: A review of the literature. *Journal of Nursing Scholarship*, *42*(2), 166–185.
- Gerhold, L. (2020). COVID-19: Risk perception and coping strategies. <https://doi.org/10.31234/osf.io/xmpk4>
- Ghandour, R. M., Sherman, L. J., Vladutiu, C. J., Ali, M. M., Lynch, S. E., Bitsko, R. H., & Blumberg, S. J. (2019). Prevalence and treatment of depression, anxiety, and conduct problems in US children. *The Journal of Pediatrics*, *206*, 256–267.
- Glass, K., Flory, K., Hankin, B. L., Kloos, B., & Turecki, G. (2009). Are coping strategies, social support, and hope associated with psychological distress among Hurricane Katrina survivors? *Journal of Social and Clinical Psychology*, *28*(6), 779–795.
- Gomez, R. (1998). Locus of control and avoidant coping: Direct, interactional and mediational effects on maladjustment in adolescents. *Personality and Individual Differences*, *24*(3), 325–334.
- Gomez, R., Bounds, J., Holmberg, K., Fullarton, C., & Gomez, A. (1998). Effects of neuroticism and avoidant coping style on maladjustment during early adolescence. *Personality and Individual Differences*, *26*(2), 305–319.
- Guessoum, S. B., Lachal, J., Radjack, R., Carretier, E., Minassian, S., Benoit, L., & Moro, M. R. (2020). Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. *Psychiatry Research*, *291*, 113264.
- Haddock, A., Ward, N., Yu, R., & O'Dea, N. (2022). Positive effects of digital technology use by adolescents: A scoping review of the literature. *International Journal of Environmental Research and Public Health*, *19*(21), 14009.
- Hamilton, J. L., Do, Q. B., Choukas-Bradley, S., Ladouceur, C. D., & Silk, J. S. (2021). Where it hurts the most: Peer interactions on social media and in person are differentially associated with emotional reactivity and sustained affect among adolescent girls. *Research on Child and Adolescent Psychopathology*, *49*(2), 155–167.
- Hamilton, J. L., Nesi, J., & Choukas-Bradley, S. (2022). Reexamining social media and socioemotional well-being among adolescents through the lens of the COVID-19 pandemic: A theoretical review and directions for future research. *Perspectives on Psychological Science*, *17*(3), 662–679.
- Hanna, E., Ward, L. M., Seabrook, R. C., Jerald, M., Reed, L., Giaccardi, S., & Lippman, J. R. (2017). Contributions of social comparison and self-objectification in mediating associations between Facebook use and emergent adults' psychological well-being. *Cyberpsychology, Behavior and Social Networking*, *20*(3), 172–179.
- Hawes, M. T., Szenczy, A. K., Klein, D. N., Hajcak, G., & Nelson, B. D. (2021). Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychological Medicine*, *52*(14), 3222–3230.
- Herman-Stabl, M. A., Stemmler, M., & Petersen, A. C. (1995). Approach and avoidant coping: Implications for adolescent mental health. *Journal of Youth and Adolescence*, *24*(6), 649–665.
- Hudziak, J. J., Achenbach, T. M., Althoff, R. R., & Pine, D. S. (2007). A dimensional approach to developmental psychopathology. *International Journal of Methods in Psychiatric Research*, *16*(S1), S16–S23.
- Jensen, T. K., Ellestad, A., & Dyb, G. (2013). Children and adolescents' self-reported coping strategies during the Southeast Asian Tsunami. *British Journal of Clinical Psychology*, *52*(1), 92–106.
- Judd, C. M., Kenny, D. A., & McClelland, G. H. (2001). Estimating and testing mediation and moderation in within-subject designs. *Psychological Methods*, *6*(2), 115–134.
- Kamphaus, R. W., & Campbell, J. M. (2008). *Psychodiagnostic assessment of children: Dimensional and categorical approaches*. John Wiley & Sons.
- Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: The influence of social media on depression, anxiety and psychological distress in adolescents. *International Journal of Adolescence and Youth*, *25*(1), 79–93.
- Kenny, D. A. (2018). *Moderator variables: Introduction*. <https://davidakenny.net/cm/moderation.htm>
- Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Üstün, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry*, *20*(4), 359–364.

- Kim, M.-S., & Duda, J. L. (2003). The coping process: Cognitive appraisals of stress, coping strategies, and coping effectiveness. *The Sport Psychologist*, 17(4), 406–425.
- Kim-Cohen, J., Caspi, A., Moffitt, T. E., Harrington, H., Milne, B. J., & Poulton, R. (2003). Prior juvenile diagnoses in adults with mental disorder: Developmental follow-back of a prospective-longitudinal cohort. *Archives of General Psychiatry*, 60(7), 709–717.
- Korte, C., Friedberg, R. D., Wilgenbusch, T., Paternostro, J. K., Brown, K., Kakolu, A., Tiller-Ormord, J., Baweja, R., Cassar, M., Barnowski, A., Movahedi, Y., Kohl, K., Martinez, W., Trafalis, S., & Leykin, Y. (2022). Intolerance of uncertainty and health-related anxiety in youth amid the COVID-19 pandemic: Understanding and weathering the continuing storm. *Journal of Clinical Psychology in Medical Settings*, 29(3), 645–653.
- Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R. (2014). Bullying in the digital age: A critical review and meta-analysis of cyberbullying research among youth. *Psychological Bulletin*, 140(4), 1073–1137.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.
- Lazarus, R. S., & Folkman, S. (1991). The concept of coping. In *Stress and coping: An anthology* (pp. 189–206). Columbia University Press.
- Lewis, K. M., Byrd, D. A., & Ollendick, T. H. (2012). Anxiety symptoms in African-American and Caucasian youth: Relations to negative life events, social support, and coping. *Journal of Anxiety Disorders*, 26(1), 32–39.
- Litman, J. A. (2006). The COPE inventory: Dimensionality and relationships with approach-and avoidance-motives and positive and negative traits. *Personality and Individual Differences*, 41(2), 273–284.
- Liu, C., & Liu, Y. (2020). Media exposure and anxiety during COVID-19: The mediation effect of media vicarious traumatization. *International Journal of Environmental Research and Public Health*, 17(13), 4720.
- De Los Reyes, A., Augenstein, T. M., Wang, M., Thomas, S. A., Drabick, D. A. G., Burgers, D. E., & Rabinowitz, J. (2015). The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychological Bulletin*, 141(4), 858–900.
- Lu, X., Katoh, T., Chen, Z., Nagata, T., & Kitamura, T. (2014). Text messaging: Are dependency and excessive use discretely different for Japanese university students? *Psychiatry Research*, 216(2), 255–262.
- Magson, N. R., Freeman, J. Y. A., Rapee, R. M., Richardson, C. E., Oar, E. L., & Fardouly, J. (2021). Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic. *Journal of Youth and Adolescence*, 50(1), 44–57.
- Marciano, L., Ostroumova, M., Schulz, P. J., & Camerini, A.-L. (2022). Digital media use and adolescents' mental health during the COVID-19 pandemic: A systematic review and meta-analysis. *Frontiers in Public Health*, 9, 793868.
- Mariani, R., Renzi, A., Di Trani, M., Trabucchi, G., Danskin, K., & Tambelli, R. (2020). The impact of coping strategies and perceived family support on depressive and anxious symptomatology during the coronavirus pandemic (COVID-19) lockdown. *Frontiers in Psychiatry*, 11, 587724.
- McCrae, N., Gettings, S., & Purssell, E. (2017). Social media and depressive symptoms in childhood and adolescence: A systematic review. *Adolescent Research Review*, 2, 315–330.
- McNicol, M. L., & Thorsteinsson, E. B. (2017). Internet addiction, psychological distress, and coping responses among adolescents and adults. *Cyberpsychology, Behavior and Social Networking*, 20(5), 296–304.
- Merikangas, K. R., He, J., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from The National comorbidity survey replication-adolescent supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(10), 980–989. <https://doi.org/10.1016/j.jaac.2010.05.017>
- Metherell, T. E., Ghai, S., McCormick, E. M., Ford, T. J., & Orben, A. (2021). Digital exclusion predicts worse mental health among adolescents during COVID-19. *medRxiv*, 1, 1–10. <https://doi.org/10.1101/2021.11.25.21266853>
- Millett, G. A., Jones, A. T., Benkeser, D., Baral, S., Mercer, L., Beyrer, C., Honermann, B., Lankiewicz, E., Mena, L., Crowley, J. S., Sherwood, J., & Sullivan, P. S. (2020). Assessing differential impacts of COVID-19 on black communities. *Annals of Epidemiology*, 47, 37–44.
- Montoya, A. K. (2019). Moderation analysis in two-instance repeated measures designs: Probing methods and multiple moderator models. *Behavior research methods*, 51, 61–82.
- Montoya, A. K., & Hayes, A. F. (2017). Two-condition within-participant statistical mediation analysis: A path-analytic framework. *Psychological Methods*, 22(1), 6.
- Myruski, S., Quintero, J. M., Deneffrio, S., & Dennis-Tiwary, T. A. (2020). Through a screen darkly: Use of computer-mediated communication predicts emotional functioning. *Psychological Reports*, 123(6), 2305–2332.
- Navarro, J. L., & Tudge, J. (2022). Technologizing Bronfenbrenner: Neo-ecological theory. *Current Psychology*, 42, 19338–19354.
- Nereim, C., Bickham, D., & Rich, M. (2022). Exploring use patterns and racial and ethnic differences in real time affective states during social media use among a clinical sample of adolescents with depression: Prospective cohort study. *JMIR Formative Research*, 6(5), e30900.
- Nesi, J., Choukas-Bradley, S., & Prinstein, M. J. (2018a). Transformation of adolescent peer relations in the social media context: Part 1—A theoretical framework and application to dyadic peer relationships. *Clinical Child and Family Psychology Review*, 21, 267–294.
- Nesi, J., Choukas-Bradley, S., & Prinstein, M. J. (2018b). Transformation of adolescent peer relations in the social media context: Part 2—Application to peer group processes and future directions for research. *Clinical Child and Family Psychology Review*, 21, 295–319.
- Nick, E. A., Cole, D. A., Cho, S.-J., Smith, D. K., Carter, T. G., & Zerkowicz, R. L. (2018). The online social support scale: Measure development and validation. *Psychological Assessment*, 30(9), 1127–1143.
- Nick, E. A., Kilic, Z., Nesi, J., Telzer, E. H., Lindquist, K. A., & Prinstein, M. J. (2022). Adolescent digital stress: Frequencies, correlates, and longitudinal association with depressive symptoms. *Journal of Adolescent Health*, 70(2), 336–339.
- Nikolaïdis, A., DeRosa, J., Kass, M., Droney, I., Alexander, L., Di Martino, A., Bromet, E., Merikangas, K., Milham, M. P., & Paksarian, D. (2022). Heterogeneity in COVID-19 pandemic-induced lifestyle stressors predicts future mental health in adults and children in the US and UK. *Journal of Psychiatric Research*, 147, 291–300.
- Nikolaïdis, A., Paksarian, D., Alexander, L., Derosa, J., Dunn, J., Nielson, D. M., Droney, I., Kang, M., Douka, I., Bromet, E., Milham, M., Stringaris, A., & Merikangas, K. R. (2021). The Coronavirus Health and Impact Survey (CRISIS) reveals reproducible correlates of pandemic-related mood states across the Atlantic. *Scientific Reports*, 11(1), 8139.
- Nilsson, A., Rosendahl, I., & Jayaram-Lindström, N. (2022). Gaming and social media use among adolescents in the midst of the COVID-19 pandemic. *Nordic Studies on Alcohol and Drugs*, 39(4), 347–361.
- O'Keefe, G. S., & Clarke-Pearson, K. (2011). The impact of social media on children, adolescents, and families. *Pediatrics (Evanston, IL)*, 127(4), 800–804.
- O'Day, E. B., & Heimberg, R. G. (2021). Social media use, social anxiety, and loneliness: A systematic review. *Computers in Human Behavior Reports*, 3, 100070.
- Ogders, C. L., & Jensen, M. R. (2020). Annual research review: adolescent mental health in the digital age: Facts, fears, and future directions. *Journal of Child Psychology and Psychiatry*, 61(3), 336–348.

- O'Kane, S. M., Lahart, I. M., Gallagher, A. M., Carlin, A., Faulkner, M., Jago, R., & Murphy, M. H. (2021). Changes in physical activity, sleep, mental health, and social media use during COVID-19 lockdown among adolescent girls: A mixed-methods study. *Journal of Physical Activity and Health*, 18(6), 677–685.
- Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, 3(2), 173–182.
- Panchal, U., Salazar de Pablo, G., Franco, M., Moreno, C., Parellada, M., Arango, C., & Fusar-Poli, P. (2021). The impact of COVID-19 lockdown on child and adolescent mental health: systematic review. *European Child & Adolescent Psychiatry*, 32(7), 1151–1177.
- Parry, D. A., Davidson, B. I., Sewall, C. J. R., Fisher, J. T., Mieczkowski, H., & Quintana, D. S. (2021). A systematic review and meta-analysis of discrepancies between logged and self-reported digital media use. *Nature Human Behaviour*, 5(11), 1535–1547.
- Perrigo, J. L., Samek, A., & Hurlburt, M. (2022). Minority and low-SES families' experiences during the early phases of the COVID-19 pandemic crisis: A qualitative study. *Children and Youth Services Review*, 140, 106594.
- Pigaiani, Y., Zoccante, L., Zocca, A., Arzenton, A., Menegolli, M., Fadel, S., & Colizzi, M. (2020). Adolescent lifestyle behaviors, coping strategies and subjective wellbeing during the COVID-19 pandemic: an online student survey. *Healthcare*, 8(4), 472.
- Politte-Corn, M., Nick, E. A., Dickey, L., Pegg, S., Cole, D. A., & Kujawa, A. (2022). #socialdistancing: Social media use and online social support moderate the effect of pandemic-related stress on internalizing symptoms in emerging adults. *Journal of Social and Clinical Psychology*, 41(1), 30–53.
- Racine, N., Cooke, J. E., Eirich, R., Korczak, D. J., McArthur, B., & Madigan, S. (2020). Child and adolescent mental illness during COVID-19: A rapid review. *Psychiatry Research*, 292, 113307.
- Rapee, R. M., Oar, E. L., Johnco, C. J., Forbes, M. K., Fardouly, J., Magson, N. R., & Richardson, C. E. (2019). Adolescent development and risk for the onset of social-emotional disorders: A review and conceptual model. *Behaviour Research and Therapy*, 123, 103501.
- Rappaport, B. I., Pagliaccio, D., Pine, D. S., Klein, D. N., & Jarcho, J. M. (2017). Discriminant validity, diagnostic utility, and parent-child agreement on the screen for child anxiety related emotional disorders (SCARED) in treatment- and non-treatment-seeking youth. *Journal of Anxiety Disorders*, 51, 22–31.
- Richardson, C. E., Magson, N. R., Fardouly, J., Oar, E. L., Forbes, M. K., Johnco, C. J., & Rapee, R. M. (2021). Longitudinal associations between coping strategies and psychopathology in pre-adolescence. *Journal of Youth and Adolescence*, 50(6), 1189–1204.
- Rideout, V., & Fox, S., Well Being Trust. (2018). Digital health practices, social media use, and mental well-being among teens and young adults in the US. *Articles Abstracts and Reports*, 1093.
- Rideout, V., Peebles, A., Mann, S., & Robb, M. B. (2021). *Media use by tweens and teens: Infographic*. Retrieved May 16, 2021, from <https://www.common SenseMedia.org/the-common-sense-census-media-use-by-tweens-and-teens-infographic>
- Sarmiento, I. G., Olson, C., Yeo, G., Chen, Y. A., Toma, C. L., Brown, B. B., Bellmore, A., & Mares, M. L. (2020). How does social media use relate to adolescents' internalizing symptoms? Conclusions from a systematic narrative review. *Adolescent Research Review*, 5, 381–404.
- Seabrook, E. M., Kern, M. L., & Rickard, N. S. (2016). Social networking sites, depression, and anxiety: A systematic review. *JMIR Mental Health*, 3(4), e50.
- Sheppes, G. (2020). Transcending the “good & bad” and “here & now” in emotion regulation: Costs and benefits of strategies across regulatory stages, In *Advances in experimental social psychology* (61, pp. 185–236). Elsevier.
- Smirni, P., Lavanco, G., & Smirni, D. (2020). Anxiety in older adolescents at the time of COVID-19. *Journal of Clinical Medicine*, 9(10), 3064.
- Stockdale, L. A., & Coyne, S. M. (2020). Bored and online: Reasons for using social media, problematic social networking site use, and behavioral outcomes across the transition from adolescence to emerging adulthood. *Journal of Adolescence*, 79, 173–183.
- Tai, D. B. G., Shah, A., Doubeni, C. A., Sia, I. G., & Wieland, M. L. (2021). The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clinical Infectious Diseases*, 72(4), 703–706.
- Thorisdottir, I. E., Sigurvinsdottir, R., Asgeirsdottir, B. B., Allegrante, J. P., & Sigfusdottir, I. D. (2019). Active and passive social media use and symptoms of anxiety and depressed mood among Icelandic adolescents. *Cyberpsychology, Behavior and Social Networking*, 22(8), 535–542.
- Tiirikainen, K., Haravuori, H., Ranta, K., Kältiala-Heino, R., & Marttunen, M. (2019). Psychometric properties of the 7-item Generalized Anxiety Disorder Scale (GAD-7) in a large representative sample of Finnish adolescents. *Psychiatry Research*, 272, 30–35.
- Tillman, G. (2020). *The indirect effects of disordered social media use on stress and depression via fear of COVID-19*. <https://doi.org/10.31234/osf.io/dbg62>
- Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Ólafsson, K., Wójcik, S., Macarie, G. F., Tzavara, C., & Richardson, C. (2014). Internet addictive behavior in adolescence: a cross-sectional study in seven European countries. *Cyberpsychology, Behavior and Social Networking*, 17(8), 528–535.
- Valkenburg, P. M. (2022). Theoretical foundations of social media uses and effects, *Handbook of adolescent digital media use and mental health* (pp. 39–60). Cambridge University Press.
- Vall-Roqué, H., Andrés, A., & Saldaña, C. (2021). The impact of COVID-19 lockdown on social network sites use, body image disturbances and self-esteem among adolescent and young women. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 110, 110293.
- Vannucci, A., & Ohannessian, C. M. (2019). Social media use subgroups differentially predict psychosocial well-being during early adolescence. *Journal of Youth and Adolescence*, 48, 1469–1493.
- Wade, N. E., Ortigara, J. M., Sullivan, R. M., Tomko, R. L., Breslin, F. J., Baker, F. C., Fuemmeler, B. F., Delrahim Howlett, K., Lisdahl, K. M., Marshall, A. T., Mason, M. J., Neale, M. C., Squeglia, L. M., Wolff-Hughes, D. L., Tapert, S. F., & Bagot, K. S. (2021). Passive sensing of preteens' smartphone use: An Adolescent Brain Cognitive Development (ABCD) cohort substudy. *JMIR Mental Health*, 8(10), e29426.
- Wang, M.-T., Toro, J. D., Scanlon, C. L., Schall, J. D., Zhang, A. L., Belmont, A. M., Voltin, S. E., & Plevniak, K. A. (2021). The roles of stress, coping, and parental support in adolescent psychological well-being in the context of COVID-19: A daily-diary study. *Journal of Affective Disorders*, 294, 245–253.
- Waselewski, E. A., Waselewski, M. E., & Chang, T. (2020). Needs and coping behaviors of youth in the US during COVID-19. *Journal of Adolescent Health*, 67(5), 649–652.
- Wilson, G. S., Pritchard, M. E., & Revalee, B. (2005). Individual differences in adolescent health symptoms: The effects of gender and coping. *Journal of Adolescence*, 28(3), 369–379.
- Wolitzky-Taylor, K., Bobova, L., Zinbarg, R. E., Mineka, S., & Craske, M. G. (2012). Longitudinal investigation of the impact of anxiety and mood disorders in adolescence on subsequent substance use disorder onset and vice versa. *Addictive Behaviors*, 37(8), 982–985. <https://doi.org/10.1016/j.addbeh.2012.03.026>
- Yan, H., Zhang, R., Oniffrey, T., Chen, G., Wang, Y., Wu, Y., Zhang, X., Wang, Q., Ma, L., Li, R., & Moore, J. (2017). Associations among screen time and unhealthy behaviors, academic performance, and well-being in Chinese adolescents. *International Journal of Environmental Research and Public Health*, 14(6), 596.
- Yau, J. C., & Reich, S. M. (2018). Are the qualities of adolescents' offline friendships present in digital interactions? *Adolescent Research Review*, 3(3), 339–355.

- Yen, J.-Y., Yen, C.-F., Chen, C.-S., Wang, P.-W., Chang, Y.-H., & Ko, C.-H. (2012). Social anxiety in online and real-life interaction and their associated factors. *Cyberpsychology, Behavior and Social Networking*, 15(1), 7–12.
- Zakowski, S. G., Hall, M. H., Klein, L. C., & Baum, A. (2001). Appraised control, coping, and stress in a community sample: A test of the goodness-of-fit hypothesis. *Annals of Behavioral Medicine*, 23(3), 158–165.
- Zhang, B., Zaman, A., Silenzio, V., Kautz, H., & Hoque, E. (2020). The relationships of deteriorating depression and anxiety with longitudinal behavioral changes in Google and YouTube use during COVID-19: observational study. *JMIR Mental Health*, 7(11), e24012.
- Zhang, S., Liu, M., Li, Y., & Chung, J. E. (2021). Teens' social media engagement during the COVID-19 pandemic: A time series examination of posting and emotion on Reddit. *International Journal of Environmental Research and Public Health*, 18(19), 10079.
- Zimmer-Gembeck, M. J., & Skinner, E. A. (2011). Review: The development of coping across childhood and adolescence: An integrative review and critique of research. *International Journal of Behavioral Development*, 35(1), 1–17.

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