"DO TIME PERSPECTIVES MODERATE THE LINK BETWEEN COVID-19-RELATED ANXIETY AND EXCESSIVE SMARTPHONE USE?"

A THESIS

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FOR THE DEGREE OF
MASTER OF SCIENCE IN PSYCHOLOGICAL SCIENCE

By

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Do Time Perspectives Moderate the Link Between Covid-19-Related Anxiety and Excessive Smartphone Use?

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ABSTRACT

The COVID-19 pandemic forced a major shift in how we use technology. During the early context of lockdown, many of students' social and academic activities predominantly took place online, with laptops and smartphones becoming indispensable tools in navigating daily life. The COVID-19 pandemic and subsequent lockdowns had given rise to a significant increase in social media use, particularly during the early stages of the crisis. Weekly screen time has shown a notable rise from pre-pandemic levels, with platforms like Twitter, YouTube, TikTok, and Instagram accounting for a big chunk of daily use. The emerging behavioral patterns associated with excessive social media use have raised concerns among researchers investigating the psychological impact of Covid-19 in young adults.

Although the threat of COVID-19 has been diminished due to vaccines and rapid testing, this research aimed to explore the prevalence of Covid anxiety and assess whether this residual anxiety can lead to an increased dependence on social media platforms as a means of alleviating such distress. By investigating the relationship between COVID anxiety and overreliance on social media, this research aimed to shed light on the coping strategies individuals employ and their reliance on digital platforms in response to COVID-related anxiety.
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INTRODUCTION

The global pandemic caused by the SARS-CoV-2 virus shocked nations across the world, pressing many long-standing academic institutions to reconceptualize the traditional academic environment. In the early stages of lockdown, students' social and academic activities were largely limited to the digital realm, with laptops and smartphones becoming essential tools for navigating daily life (Ellis, Forbes, & Dumas, 2021). Young adults' leisure media use has significantly increased since the pandemic's start. Weekly screen time rose from 25.9±11.9 hours in 2018 to 28.5±11.6 hours during lockdown, with social media platforms like Twitter, YouTube, TikTok, and Instagram showing notable and sustained increases (Wagner et al., 2021). The rise in social media use amidst the early periods of lockdown has been speculated to have stemmed from unconscious patterns of coping strategies for offsetting Covid-related stress and uncertainty (Brailovskaia & Margraf, 2021). However, these emerging patterns of behaviors associated with increased social media use have become of concern to researchers investigating the rise of mental health problems in young adults (Brailovskaia & Margraf, 2021; Chu, Yeo & Su, 2022; Garfin, Silver, & Holman, 2020; Paredes, Apaolaza, Fernandez-Robin, Hartmann & Yanez-Martinez, 2021).

As of current writing there has yet to be any published research which assesses the prevalence of Covid-related anxiety within the present-day contexts of this pandemic. Despite the fact that many of the public health concerns associated with Covid have significantly diminished as a result of logistical advances in testing and vaccine roll outs, it is critical to continue to monitor any symptoms related to Covid anxiety as it can help researchers better understand individual motivations for increased smartphone and social media use. In identifying
individual concerns as it relates to Covid, this research can help better understand smartphone and social media coping strategies and the psychological factors synonymous with compulsive and excessive use (Aqeel, Rehna, Shuja, & Abbas, 2022).

**Literature Review**

In the wake of this ongoing pandemic, some people are reporting significant mental health challenges as a result of Covid-related fear, leading to what some researchers describe as Covid-related anxiety (Aqeel et al., 2022). Symptoms of Covid-related anxiety include loss of well-being, obsessive cleaning, repeated hand washing, avoidance of social gatherings, and increased affirmation seeking via smartphone and social media use (Nikčević & Spada, 2020). Evidence suggests two-thirds of the general population displayed some symptoms of anxiety and depression during early lockdown periods (Fullana, Hidalgo-Mazzei, Vieta, & Radua, 2020), with participants indicating a loss of motivation and agency in their day-to-day life due to mandated lockdowns (Li, Zhan, Zhou, & Gao, 2021). During the initial period of lockdown, researchers speculate many young adults had relied on various social media platforms as a means for maintaining well-being and fulfilling basic psychological needs (i.e., autonomy, relationships, competency; Brailovskaia et al., 2021).

By and large, social media use is suggested to have a significant influence in the development of autonomy and personal identity and offers many opportunities for young adults to express themselves remotely (Jan, Soomro, & Ahmad, 2017). In addition, social media platforms can also help shape the aspirations of goals and discovery of new hobbies (Hayes, 2020) and can provide many educational resources for individuals who experience difficulty with learning (Reid & Weigle 2014). During lockdown, social media served as a crucial means of communication (Brailovskaia et al., 2021; Wagner et al., 2020). However, the increasing use of
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social media during the period of lockdown has raised concern regarding maladaptive coping behaviors, such as using social media excessively as a means of coping with the challenges and uncertainty of the pandemic, subsequently leading to problematic smartphone use (Zhao et al., 2022).

Problematic smartphone use is defined as a set of compulsive patterns and difficulties in regulating individual smartphone and internet use (Sapci, Elhai, Amialchuk, & Montag, 2021). When compared to older-age groups, teenagers and young adults are more prone to experience self-regulatory difficulties associated with media and smartphone use, and are at a much greater risk for developing behaviors associated with compulsive smartphone use. On average young adults spend approximately 3 hours daily on their smartphone device (Wagner et al., 2021). Furthermore, excessive measures of screen time use that is associated with social media use has been linked to negative academic outcomes (Alghmadi, Karpinski, Lepp, & Barkley 2020), reduction in academic self-efficacy (Sapci, Elhai, Amialchuk, & Montag 2021), and has been suggested to have contributed to the rise of anxiety and depression-like symptoms in adolescents and young adults (Aqeel et al., 2022). Given the emergence of behavioral patterns associated with smartphone and social media which had arose amidst the pandemic, the way in which young adults perceive and categorize their experiences when interacting with Covid-related information may play a key role in emotional, cognitive, and motivational processes (Zimbardo & Boyd, 1999), and may influence Covid-related stress response in young adults (Chu et al., 2022). To understand the prevalence of Covid-related anxiety in young adults, it is crucial to examine their time perspectives in the present context of post-lockdown. By understanding how young adults reflect upon present and future global outcomes within the current context of
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Covid, we can gain a deeper understanding of their emotional, cognitive, and motivational processes, which may influence Covid-related stress response.

The theoretical framework of Time Perspectives defines time perspectives as an unconscious sociocognitive variable in which the pervasive flow of personal and social experiences are organized into temporal categories that influence decision making processes (Zimbardo & Boyd, 1999). Zimbardo and Boyd’s (1999) model of Time Perspectives assesses cognitive orientations and biases towards temporal states of mind, which include: Past-Negative (tendency to regret past events and ruminate on previous failures), Past-Positive (tendency to positively reminisce on previous life events), Present-Hedonistic (the desire for immediate pleasure-seeking, and subsequent task avoidance), Present Fatalistic (tendency to feel hopeless of the present and the future), and, finally, Future Perspectives (characterized by the strength of one's beliefs for positive future outcomes and achievements; Zimbardo & Boyd, 1999). The theoretical framework of Time Perspectives has been used to predict various socio-cognitive behavioral outcomes associated with work and health outcomes (Dreves & Blackhart, 2019) and has been suggested to play an important role in mental health and well-being (Zimbardo & Boyd, 1999).

Furthermore, the theoretical framework of Time Perspectives has also played a significant role in research exploring addiction and behaviors associated with alcohol and drug use (Andre et al., 2018), and more importantly for this study, addictive behaviors associated with frequent internet and social media use (Przepiorka & Blachnio, 2016; Przepiorka, Blachnio, & Cudo, 2019). For example, individuals who experienced Present Hedonistic and Fatalistic time perspectives were more likely to value short-term proximal motives and were more likely to exhibit behaviors associated with problematic smartphone and social media use when compared
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to individuals with future-oriented time perspectives (Przeporka & Blachnio, 2016). Meanwhile, individuals with a future-oriented time perspective were less likely to take on risky behavior associated with alcohol and drug use (Andre et al., 2018), and were more likely to delay immediate gratification (Dreves, 2018). Individuals who are more oriented towards future events and are optimistic about their future goals and achievements were less likely to experience anxiety and depression-like symptoms, and furthermore had better academic outcomes, and reduced instances of motivational interference while studying (King & Gaerlan, 2013).

Time perspectives have been characterized as relatively stable constructs (Zimbardo & Boyd 1999), and may play an important role for mental health and well-being amid this ongoing pandemic (Paredes et al., 2021). The way in which individuals reflect on present and future situational outcomes within the contexts of Covid may be associated with Covid-related anxiety, and furthermore, may influence the strength of the relationship between Covid anxiety and measures of screen time (Paredes et al., 2021). However, as of current writing, researchers have yet to systematically examine the moderating role of time perspectives when addressing individual differences of Covid-related anxiety and measures of screen time associated with social media use. In addressing students' time perspectives within the contexts of this pandemic, researchers can develop a deeper understanding of the motivational antecedents associated with problematic smartphone and social media use. Therefore, the main goal of this research seeks to address the positive association between Covid-related anxiety and excessive social media use through the theoretical lens of Time Perspectives.
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Research Questions

1. Do Time Perspectives moderate the relationship between Covid-related anxiety and measures of social media use?

2. Are future time perspectives associated with a reduction of measures associated with measures of social media use?

Hypotheses

1. Measures of Covid-related anxiety will be positively associated with increased screen time and social media use, and positively associated with problematic smartphone use.

2. Present Fatalistic and Hedonistic time perspectives will be positively associated with increased measures of weekly screen time use and positively associated with problematic smartphone use.

3. Future time perspectives will be negatively associated with measures of social media use and negatively associated with problematic smartphone use.

4. Present Fatalistic and Hedonistic time perspectives will moderate the direction and strengthen the relationship between Covid-related anxiety and measures associated with problematic smartphone use.
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METHODOLOGY

Participants and Procedures

The present study was conducted between November 28th and December 19th of 2022, with participants mainly being recruited from SUNY New Paltz through a campus-wide invitation email that included a link to an online Qualtrics survey. Additionally, New Paltz psychology students received one SONA research credit for completing the survey via the SONA systems platform. Prior to accessing the survey, participants provided informed consent as this study received ethical approval from the HREB at New Paltz. The survey was hosted on Qualtrics, an online survey platform. Through Qualtrics we were able to collect 269 questionnaire responses (71.4% female, 19.7% male, 6.7% non-binary, and 2.2% prefer not to disclose their gender) with an average age of 19.8 years (SD= 1.87). The age of participants ranged from 18-28 years old with the majority of the participants identifying as undergraduate students (96.7%), while the remaining 3.3% identified as graduate students.

After completing basic demographic questions, participants were then prompted to average their weekly smartphone screen time use, and were also asked to report their weekly screen time use on social media platforms such as TikTok, Reddit, Twitter, YouTube, Snapchat, and Instagram. Participants were provided instructions for accessing weekly measures of screen time use, and were instructed to report the average amount of time they had spent on their smartphone within the last three weeks. The purpose for collecting weekly screen time measures of smartphone and social media use was to provide a better and detailed description of individuals digital behaviors. Identifying the duration to which individuals engage with social media separately from their phones can provide a nuanced understanding of individuals media
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habits on a weekly basis, and furthermore can help researchers understand how these habits may influence well being. Excessive social media use has been shown to influence self-esteem, and has been shown to have a positive association with depression and anxiety in emerging adults (Primack et al., 2017). Participants then were asked to respond to survey questions regarding Covid-Anxiety, Time Perspectives, and perceptions of individual smartphone use.

Measures

To assess the independent variable, participants were presented with the The Covid Stress Measure (Taylor et al., 2020). The Covid Stress Measure consists of 28 items that explore the prevalence of Covid-related worries relating to socio-economic consequences of Covid, as well as incurred traumatic stress, fear of Covid-related contamination, compulsive information seeking, and xenophobia. Participants were asked to reflect on the kinds of worries experienced over the past seven days and report from 1 (not at all) to 4 (extremely) with questions such as “I am worried our healthcare system is unable to keep me safe from the virus” and “I am worried that social distancing is not enough to keep me safe from the virus.” This study did not assess the sub-construct of xenophobia as this construct was not pertinent to the research questions. Therefore this subscale was not included in the final analysis of this research. All five sub constructs showed item reliability (Covid related danger $\alpha=.917$, Socioeconomic consequences $\alpha=.944$, Fear of contamination $\alpha=.904$, Traumatic stress $\alpha=.908$, and Compulsive online checking $\alpha=.865$).

Three subscales from the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) were used to measure Present-Hedonistic, Present-Fatalistic, and Future-Time perspectives. Present-Hedonistic time perspectives measure the degree to which one cognitively orients their behavior towards self-gratification. Present-Fatalistic time perspectives measure
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how much a person feels that both the present and future are hopeless and catastrophic. Finally, Future-time perspectives measure how positively a person views the future and how much they plan for future goals. These subscales were used for the purposes of assessing how young adults reflect upon present and future outcomes within the context of Covid, and to measure the direction and strength of the interaction between the I.V (Covid Anxiety) and the D.V (Problematic Smartphone use). In order to assess these time perspectives, survey participants were presented with statements which asked respondents to reflect on “how characteristic or true is this of you?” (Example item: “If things don’t get done on time, I don’t worry about it”). Responses were recorded using a 5-point Likert scale (1=very uncharacteristic, 5=very characteristic). All three subscales showed item reliability (Present Hedonistic $\alpha=.846$, Present Fatalistic $\alpha=.737$, and Future Time Perspective $\alpha=.780$).

To assess the dependent variable participants were presented with the Problematic smartphone use scale. The Problematic smartphone use scale consists of 15 questions which aims to assess the degree to which their smartphone usage is problematic (Troll et al., 2021). Participants had to answer statements that asked them to reflect on their smartphone use in daily life with prompts such as “I am increasingly dependent on my smartphone to gather information on the internet.” Participants' responses were recorded using a 5-point scale (1=very rarely to 5 very often). The internal consistency of the scale items was found to be $\alpha=.884$ and the purpose of using this scale was to assess the degree of motivational interference individuals incur from their smartphone use.
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Results

The table below presents the descriptive statistics of the variables of interest.

<table>
<thead>
<tr>
<th>Descriptives</th>
<th>age</th>
<th>weekly screentime</th>
<th>COVID ANXIETY OVERALL</th>
<th>PSU AVG</th>
<th>TP-FAT</th>
<th>TP-HED</th>
<th>TP-FUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
<td>269</td>
</tr>
<tr>
<td>Missing</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>2.81</td>
<td>3.44</td>
<td>25.4</td>
<td>3.30</td>
<td>2.63</td>
<td>3.24</td>
<td>3.41</td>
</tr>
<tr>
<td>Median</td>
<td>3</td>
<td>3</td>
<td>21.0</td>
<td>3.27</td>
<td>2.56</td>
<td>3.20</td>
<td>3.46</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.87</td>
<td>1.95</td>
<td>20.6</td>
<td>0.747</td>
<td>0.620</td>
<td>0.610</td>
<td>0.592</td>
</tr>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1</td>
<td>0.00</td>
<td>1.07</td>
<td>1.22</td>
<td>1.87</td>
<td>1.69</td>
</tr>
<tr>
<td>Maximum</td>
<td>11</td>
<td>6</td>
<td>94.0</td>
<td>4.93</td>
<td>4.67</td>
<td>4.93</td>
<td>5.00</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.32</td>
<td>0.0291</td>
<td>0.882</td>
<td>-0.162</td>
<td>0.372</td>
<td>0.173</td>
<td>-0.0689</td>
</tr>
<tr>
<td>Std. error skewness</td>
<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
<td>0.149</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.59</td>
<td>-1.53</td>
<td>0.0902</td>
<td>-0.175</td>
<td>0.0978</td>
<td>-0.217</td>
<td>0.206</td>
</tr>
<tr>
<td>Std. error kurtosis</td>
<td>0.296</td>
<td>0.296</td>
<td>0.296</td>
<td>0.296</td>
<td>0.296</td>
<td>0.296</td>
<td>0.296</td>
</tr>
</tbody>
</table>

PSU AVG = Problematic smartphone use. TP-FAT = Fatalistic Time perspectives. TP-HED = Hedonistic Time perspectives. TP-FUT = Future Time perspectives.

When assessing the prevalence of Covid related anxiety within the SUNY New Paltz student sample, half of the sample size had minimal COVID anxiety. A score of 22 or below on the COVID Stress Scale indicates low levels of anxiety and stress related to the pandemic.
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Furthermore, when measuring the weekly average of smartphone use, we found an inverted distribution curve pattern to which the majority of the scores fell alongside the lower and higher end of weekly screen time use.

In testing Hypothesis 1 ("Measures of Covid-related anxiety will be positively associated with increased measures of social media use, and positively associated with problematic smartphone use") we used a correlation analysis to explore the strength and direction of the association between Covid Anxiety, Problematic smartphone use and Time perspectives. Based on this correlation analysis, evidence indicates no significant relationships to be found between Covid anxiety, weekly smartphone use, and Problematic smartphone use. Therefore, the evidence provided does not support Hypothesis 1. However, when testing for Hypothesis 2 ("Present Fatalistic and Hedonistic time perspectives will be positively associated with increased measures of weekly screen time use and positively associated with problematic smartphone use") and
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Hypothesis 3 (“Future-time perspectives will be negatively associated with measures of weekly screen time use and negatively associated with problematic smartphone use”) analysis show problematic smartphone use to have a negative correlation with Future-time perspectives ($r = -0.265$, $p < .001$) and a positive correlation with Fatalistic-time perspectives ($r = 0.290$, $p < .001$) and Hedonistic-time perspectives ($r = 0.285$, $p < .001$), providing partial support for both hypotheses. Furthermore, evidence suggests a positive association exists between Covid anxiety and time perspectives, specifically Fatalistic ($r = 0.124$, $p= 0.042$) and Future time perspectives ($r= 0.133$, $p= 0.029$). It may be that individuals who are more cognitively oriented toward fatalistic and future time perspectives were also more likely to experience Covid anxiety; meanwhile, individuals who were more oriented towards hedonistic time perspectives were less likely to experience Covid anxiety.

![Correlation Matrix](image)

**Note.** * p < .05, ** p < .01, *** p < .001

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To investigate the interaction between Covid anxiety and time perspectives, a multiple regression analysis was conducted. The objective of this research was to determine if Time perspectives moderated the relationship between Covid anxiety (I.V) and Problematic smartphone use (D.V) when controlling for age and gender. The model was statistically significant, $F(11,257)=9.53, p<.001, R^2=.290$ and initial evidence suggests female participants had significantly higher problematic use scores than males ($\beta=0.271, p=.006$), while non-binary participants did not differ significantly from males ($\beta=-0.220, p=.214$). Evidence also suggests age to have a negative association with problematic smartphone use ($\beta=-0.042, p=.052$), in which younger individuals were more likely to incur problematic smartphone use.

<table>
<thead>
<tr>
<th>Model Fit Measures</th>
<th>Overall Model Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>R</td>
</tr>
<tr>
<td>1</td>
<td>0.538</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Coefficients - PSU AVG_C</th>
<th>Predictor</th>
<th>Estimate</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>Stand. Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.04731</td>
<td>0.10693</td>
<td>-0.442</td>
<td>0.659</td>
<td>0.1648</td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>0.27196</td>
<td>0.09804</td>
<td>2.774</td>
<td>0.006</td>
<td>0.1111</td>
<td></td>
</tr>
<tr>
<td>non-binary</td>
<td>-0.22078</td>
<td>0.17711</td>
<td>-1.247</td>
<td>0.214</td>
<td>-0.0740</td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>-0.04268</td>
<td>0.02183</td>
<td>-1.955</td>
<td>0.052</td>
<td>-0.1067</td>
<td></td>
</tr>
<tr>
<td>covid anxiety overall_c</td>
<td>0.00402</td>
<td>0.00212</td>
<td>1.899</td>
<td>0.059</td>
<td>0.1111</td>
<td></td>
</tr>
<tr>
<td>TP-FUT Center</td>
<td>-0.21608</td>
<td>0.07281</td>
<td>-2.968</td>
<td>0.003</td>
<td>-0.1713</td>
<td></td>
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<tr>
<td>TP-HED_C</td>
<td>0.16489</td>
<td>0.07717</td>
<td>2.137</td>
<td>0.034</td>
<td>0.1345</td>
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<tr>
<td>TP-FAT_C</td>
<td>0.19973</td>
<td>0.07696</td>
<td>2.595</td>
<td>0.010</td>
<td>0.1659</td>
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<tr>
<td>WEEKLY SCREENTIME_C</td>
<td>0.11766</td>
<td>0.02093</td>
<td>5.621</td>
<td>&lt;.001</td>
<td>0.3070</td>
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<tr>
<td>covid anxiety overall_c * TP-FUT Center</td>
<td>-0.00212</td>
<td>0.00353</td>
<td>-0.601</td>
<td>0.548</td>
<td>-0.0347</td>
<td></td>
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<tr>
<td>covid anxiety overall_c * TP-HED_C</td>
<td>0.00394</td>
<td>0.00356</td>
<td>1.108</td>
<td>0.269</td>
<td>0.0664</td>
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<tr>
<td>covid anxiety overall_c * TP-FAT_C</td>
<td>-0.00396</td>
<td>0.00355</td>
<td>-1.115</td>
<td>0.266</td>
<td>-0.0679</td>
<td></td>
</tr>
</tbody>
</table>

PSU AVG_C = Problematic smartphone use, TP-FAT_C = Fatalistic Time perspectives, TP-HED_C = Hedonistic Time perspectives, TP-FUT_Center = Future Time perspectives
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It is important to note that Covid anxiety did not significantly predict problematic smartphone use ($\beta=0.004$, $p=.059$). However, results show increased measures of weekly smartphone use to have predicted higher measures of problematic smartphone use ($\beta=0.117$, $p<.001$). Furthermore, individual time perspectives also predicted differences in measures associated with problematic smartphone use. Individuals who were more oriented towards Future time perspectives were less likely to express problematic smartphone use ($\beta=-0.216$, $p=.003$), however, individuals that were more oriented towards Hedonistic and Fatalistic time perspectives were more likely to report difficulties with regulating individual smartphone use, indicating increased measures of problematic smartphone use (Hedonistic $\beta=0.164$, $p=.034$, Fatalistic $\beta=0.199$, $p=.014$). Regarding the moderating effects of time perspective, time perspectives had no interaction between Covid anxiety and problematic smartphone use, therefore based on the findings of this study there is no evidence which provides support for Hypothesis 4 (“Present Fatalistic and Hedonistic time perspectives will moderate the strength of the relationship between Covid-related anxiety and measures associated with problematic smartphone use”).

Discussion

The aim of this study was to explore the prevalence of Covid anxiety in the SUNY New Paltz student population, and furthermore to explore the relationship between Covid anxiety and smartphone use through the theoretical framework of time perspectives. Based on the descriptive data, approximately 50% of the student population had reported minimal or no Covid anxiety, which is a positive indicator showing that fear of Covid is becoming less prevalent due to widely available test-kits and vaccines. We had also found an inverse distribution curve when examining weekly measures of screen time use, in which the spread of sample participants was distributed bi-modally (5-10 hours weekly and 30+ hours weekly). This may be a result of individual
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differences in age and time perspectives, for which younger individuals with Hedonistic and Fatalistic time-perspectives may be more likely to report increased measures of screen time and social media use. Additionally, based on the results, the data seems to show that young adults are more likely to experience problematic smartphone use. This may be attributed to their increased access to social media platforms during periods of lockdown. Young adults may have relied on these platforms for socializing and seeking validation, which could have led to a higher adoption of smartphone use as a coping mechanism to alleviate stress.

The results of this study did not indicate any relationship between Covid anxiety and increased measures in weekly smartphone use as originally found by Brailovskaia (2021), however, time perspectives may be an important variable in understanding individual differences in the frequency of smartphone and social media use (Przepiorka et al., 2016). The results of this study show that Covid anxiety had a positive association with Fatalistic and Future time perspectives, and individual differences in time perspectives may correspond with the degree to which individuals tolerate stress and fear as it relates to Covid (Przepiorka et al., 2019). For instance, in the case of individuals with Fatalistic time perspectives, or individuals that often believe that their fate is predetermined, these individuals may feel helpless believing in the inevitability of the pandemic. Conversely, individuals that are more cognitively oriented towards a Future time perspective may have incurred Covid anxiety due to experiencing fear and stress about the potential consequences of foreseeable Covid mutations and or other pandemics that could have deleterious effects on the world. Additionally, individuals oriented towards a Future time perspective may be more likely to engage in thinking and planning, which may lead to increased worry and anxiety with regards to the duration of the pandemic, subsequently leading to increased measures of Covid anxiety (Dreves & Blackhart, 2019).
Time perspectives may also be an important variable to consider when investigating rising smartphone and social media use. The results of the regression analysis show that individuals who were oriented towards a Future-Time perspective were less likely to report difficulties in regulating smartphone use. While Covid anxiety was not a significant predictor of problematic smartphone use, this finding regarding time perspectives is consistent with previous research indicating that individuals with a stronger focus for planning towards future situated events were less likely to have difficulties in regulating smartphone use (Przepiorka et al., 2016). Conversely, individuals with a Hedonistic and Fatalistic time perspective were more likely to report having difficulties in regulating smartphone use (Przepiorka et al., 2019). It may be that individuals with Fatalistic and Hedonistic time perspectives may use social media and internet content as a means to cope with stress and anxiety related to the pandemic, which may ultimately lead to problematic and compulsive smartphone use (Brailovskaia et al., 2021). Additionally, the regression analysis had also indicated that age and gender were significant predictors of problematic smartphone use. Specifically, younger individuals were more likely to incur problematic smartphone use, while female participants had significantly higher problematic use scores than male participants.

Limitations and Future Directions

Overall, time perspectives did not moderate the relationship between Covid anxiety and measures associated with problematic smartphone use. While some research suggests time perspectives as relatively stable constructs (Zimbardo & Boyd, 1999; Andre et al., 2018), it is quite difficult to measure time perspectives accurately, as they are inherently subjective and are dynamically influenced by a variety of external environmental factors as well as influenced by individual differences, including personality traits. However, based on previous research on time
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perspectives and health and career outcomes, the theoretical framework of time perspectives may help capture individual differences relating to self-control, as in the case with this study in which time perspectives were found to predict differences in measures associated with smartphone use (Andre et al., 2018). One potential direction for future research is to explore the influence of online culture in understanding differences in individual time perspectives during environmental catastrophes. Cultural differences may influence the extent to which individuals perceive the future as uncertain, predetermined, or fatalistic, which may have an impact on young adults coping mechanisms.

Several limitations of this study stem from the difficulty in capturing the dynamic and fast-moving nature of this pandemic. The study used the Covid stress scale (Taylor et al., 2020) in assessing participants Covid related stress. However the scale relies on self report measures which may introduce self-reporting that is similar to generalized anxiety. Furthermore, parts of the inventory include questions which were contextually specific to the early periods of lock down, questions such as “I am worried about grocery stores running out of food, and water”, which may have influenced reported measures relating to Covid stress. The prevalence of Covid anxiety was presumably significantly higher during the early stages of the pandemic back in 2020 and this research design was limited to a single point in time, and did not capture the behavioral variations and adjustment to Covid anxiety as the pandemic progressed.

Additionally, data collection for this study occurred after vaccine rollouts, which likely reduced overall Covid anxiety for many people, perhaps weakening the effects that were detectable in late 2022. While the results of this study did not indicate any relationship between Covid anxiety and increased measures in weekly smartphone use as originally found by Brailovskaia (2021), it is important to note that identifying the causal direction between these
variables may be challenging. Furthermore, it is necessary to acknowledge that there are other ways to interpret the correlation, as the relationship between Covid anxiety and problematic smartphone use can be bidirectional. For example, measures of increased smartphone use which had occurred during the early period of lockdown could have possibly led to more exposure to Covid-related news and stories, leading to increased Covid anxiety. However, it is possible that the uncertainty which had emerged within the early context of lockdowns could have possibly led to an increase in dependency for smartphone and social media use. The exact direction of influence between these variables remains unclear and future research could use longitudinal designs to investigate the temporal relationships between Covid anxiety and mal-adaptive coping mechanisms as they relate to smartphone and social media use. Future research could investigate the underlying mechanisms linking time perspectives and problematic smartphone use in times of catastrophic events in order to further understanding of stress-related reactions such as emotion regulation and impulsivity. Furthermore, researchers should focus on developing a deeper understanding of smartphone and social media use as a means of coping with environmental catastrophes, and subsequently the long-term behavioral implications of these smartphone associated coping strategies.

**Conclusion**

The goal of this study was to seek out the prevalence of Covid anxiety in young adults, and to explore how it may influence problematic smartphone use. In conclusion, our findings show no significant correlations between Covid anxiety and problematic smartphone use. However, the results of this study indicate a positive association between Covid anxiety and Fatalistic and Future time perspectives. Additionally, the goal of this study was to also explore the role of time perspectives as a moderating variable. However, the results of this study do not
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confirm a significant interaction between these variables. Overall, the study provides insights into the prevalence of Covid anxiety in young adults at a particular point in the pandemic, and explores the relationship between time perspectives, Covid anxiety, and problematic smartphone use. Individuals with a Fatalistic and Hedonistic time perspective were more likely to report problematic smartphone use. However, individuals with a Future time perspective were less likely to report having difficulties in regulating individual smartphone use. Finally, our findings provide support for previous research, confirming the positive association between problematic smartphone use and time perspectives.
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References


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Appendix A

The COVID Stress Scale


Scoring

Danger Subscale: Add score for items 1-6
Socio-economic consequences subscale: Add scores for items 7-12
Contamination: Add scores for items 13-17
Traumatic Stress: Add scores for items 18-23
Compulsive Checking: Add scores for items 24-28

The following asks about various kinds of worries that you might have experienced over the past seven days.

In the following statements, we refer to COVID-19 as "the virus".
Response Options: 1(Not at all) to 4(Extremely)

1. I am worried about catching the virus
2. I am worried that I can’t keep my family safe from the virus
3. I am worried that our healthcare system won’t be able to protect my loved ones
4. I am worried our healthcare system is unable to keep my safe from the virus
5. I am worried that basic hygiene (e.g., handwashing) is not enough to keep my safe from the virus
6. I am worried that social distancing is not enough to keep me safe from the virus
7. I am worried about grocery stores running out of food
8. I am worried that grocery stores will close down
9. I am worried about grocery stores running out of cleaning or disinfectant supplies
10. I am worried about grocery stores running out of cold or flu remedies
11. I am worried about grocery stores running out of water
12. I am worried about pharmacies running out of prescription medicines
13. I am worried that if I touched something in a public space (e.g., handrail, door handle), I would catch the virus
14. I am worried that if someone coughed or sneezed near me, I would catch the virus
15. I am worried about taking change in cash transaction
16. I am worried that I might catch the virus from handling money or using a debit machine
17. I am worried that my mail has been contaminated by mail handlers

Please read each statement and indicate how frequently you have experienced each problem during the past seven days.
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18. I had trouble concentrating because I kept thinking about the virus
19. Disturbing mental images about the virus popped into my mind against my will
20. I had trouble sleeping because I worried about the virus
21. I thought about the virus when I didn’t mean to.
22. Reminders of the virus caused me to have physical reactions, such as sweating or a pounding heart
23. I had bad dreams about the virus

The following items ask about checking behaviors. **During the past seven days**, how much have you done the following because of concerns about COVID-19?

24. Searched the Internet for treatments for COVID-19
25. Checked Youtube videos about COVID-19
26. Checked your own body for signs of infection (e.g., taking your temperature)
27. Sought reassurance from friends or family about COVID-19
28. Checked social media posts concern COVID-19
Appendix B

The Time Perspective scale

This scale assesses how individuals perceive past, present and future time, and assesses cognitive biases for temporal states of mind (Zimbardo et al., 1999)

Respondents are asked to read each item and, as honestly as they can, answer the following 1 (very uncharacteristic) to 5 (very characteristic)

Scoring instructions
Before scoring the ZTPI, 5 items must be reverse coded.
For the items that are reverse coded (5, 15 & 37): “1” becomes a “5” “2” becomes a “4” “3” becomes a “3” “4” becomes a “2” “5” becomes a “1”

After reverse coding the 5 items, add your scores for the items that comprise each factor. After adding your scores for each factor, divide the total score by the number of questions that comprise each factor.
This results in an average score for each of the five factors.
These are the formulas:

Present Hedonistic: Add your scores on items 1, 8, 12, 17, 19, 23, 26, 28, 31, 32, 42, 44, 46, 48, & 55. Then divide this number by 15.

Future: Add your scores on items 6, 9 (reverse coded), 10, 13, 18, 21, 24 (reverse coded), 30, 40, 43, 45, 51, 56 (reverse coded). Then divide this number by 13.

Present Fatalistic Add your scores on items 3, 14, 35, 37, 38, 39, 47, 52, & 53. Then divide this number by 9.

1. I believe that getting together with one’s friends to party is one of life’s important pleasures
2. Fate determines much in my life
3. I believe that a person’s day should be planned ahead each morning
4. I do things impulsively
5. If things don’t get done on time, I don’t worry about it
6. When I want to achieve something, I set goals and consider specific means for reaching those goals
7. When listening to my favorite music, I often lose all track of time
8. Meeting tomorrow’s deadlines and doing other necessary work comes before tonight’s play
9. Since whatever will be will be, it doesn’t really matter what I do.
10. I try to live my life as fully as possible, one day at a time.
11. It upsets me to be late for appointments.
12. Ideally I would live each day as if it were my last.
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13. I meet obligations to friends, and authorities on time
15. I take each day as it is rather than try to plan it out
16. It is important to put excitement in my life
17. I feel that it’s more important to enjoy what you’re doing than to get work done on time
18. Before making a decisions, I weigh the costs against the benefits
19. Taking risks keeps my life from becoming boring
20. It is more important for me to enjoy life’s journey than to focus only on the destination
21. It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products
22. You can’t really plan for the future because things change so much
23. My life path is controlled by forces I cannot influence
24. It doesn’t make any sense to worry about the future, since there is nothing I can do about it anyway.
25. I complete projects on time by making steady progress.
26. I take risks to put excitement in my life
27. I make lists of things to do
28. I often follow my heart more than my head
29. I am able to resist temptations when I know that there is work to be done.
30. I find myself getting swept up in the excitement of the moment.
31. Life today is too complicated; I would prefer the simpler life of the past.
32. I prefer friends who are spontaneous rather than predictable
33. I keep working at difficult, uninteresting tasks if they will help me get ahead
34. Spending what I earn on pleasure today is better than saving for tomorrow’s security
35. Often luck pays off better than hard work.
36. I like my close relationships to be passionate
37. There will always be time to catch up on my work
Appendix C

Problemsitic Smartphone use Scale

This scale measures motivational interference one incurs from smartphone use and subjective perceptions of individual smartphone use (Troll et al., 2021)

Here are six statements to consider. For each, answer: (1) very rarely, (2) rarely, (3) sometimes, (4) often, or (5) very often.

Scoring: Average of all items

1. I am increasingly dependent on my smartphone to gather information on the internet
2. I waste an unnecessary amount of time on my smartphone
3. I am uncomfortable with doing nothing and often reach for my smartphone when resting
4. I use my smartphone to actively keep myself from more pressing things
5. In the evening, I often spend time on my smartphone and end up falling asleep late
6. I feel the need to constantly check for news, to be up to speed.
7. When I’m on my smartphone, sometimes moments pass by without me actually noticing
8. I am often interrupted in my current activity and have to start over again (e.g., because my smartphone vibrates when a message arrives)
9. I feel under pressure because I think people expect me to answer messages immediately
10. I am jittery and can’t concentrate on one thing for long
11. I compare myself to idealized presentations on the internet (e.g., beauty, nutrition)
12. When I’m picking up my smartphone, (e.g., to make an appointment), I get distracted by notifications and forget my initial objective.
13. My performance (in school, college, or at work) has declined as a result of the time I spend on the smartphone.
14. Because of my smartphone use I am bothered by fatigue, headaches, and poor posture
15. I catch myself checking for news or messages on my smartphone while I’m in traffic