COLLEGE STUDENTS' LEISURE ACTIVITIES DURING THE COVID-19 PANDEMIC: AN EXAMINATION OF PANDEMIC-RELATED CONSTRAINTS TO PARTICIPATION

A Thesis

by

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ABSTRACT

Leisure is an important aspect of life because many people find meaning and purpose through leisure. College students, who are experiencing dramatic changes across the transition from late adolescence and into young adulthood, have a substantial amount of free time in which they make choices about leisure activities. The onset of the COVID-19 pandemic affected the daily life and leisure practices of many. For college students, unique challenges were presented as many changed living situations and shifted from in-person to remote education. This purpose of this study was to apply the hierarchical model of leisure constraints to examine whether and how factors related to the COVID-19 pandemic were associated with college students' participation in a variety of different leisure activities. The present study used secondary data from a larger study about college students' leisure collected at the onset of the pandemic (n = 2,245). A descriptive analysis of college students' reports of participation in 14 leisure activities suggested that students reported changes in their participation rates because of the pandemic for all activities, except for media use (which remained high before and during the pandemic). Using exploratory factor analysis, four factors were revealed, three of which aligned with previous research (exercise, active, and creative leisure) and one, home-based leisure, which comprised passive and indoor activities. Hierarchical linear regressions tested whether pandemic-related constraints explained variance in leisure activity participation. Although there was varied support for the hierarchical constraints model, several pandemic-related indicators were significant constraints to leisure, such as adaptation challenges in regard to friend, family, work, and school responsibilities as well as caregiving responsibilities. The COVID-19 pandemic certainly had an effect on leisure participation for college students and created unique barriers to participation (i.e., constraints) for many.

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INTRODUCTION

Leisure is an important aspect of life because it is a primary way in which individuals find meaning or purpose (Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). Although there are many ways in which scholars define leisure, common to all definitions is the notion that leisure activities are non-obligatory, non-work related, and freely chosen, often based on personal interests (Hills & Argyle, 1998; Holder et al., 2009; Kim et al., 2014; Ragheb & Tate, 1993). Leisure is particularly important for college students because it provides opportunities for enhanced well-being (Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). College students typically have more opportunities for self-determination (i.e., the process of controlling one's life) than they were accustomed to when living with parents. College students have a substantial amount of time to spend on leisure, such that the average college student classifies about 25% of their time as 'free time or leisure time' (Chen, et al., 2016). This can be compared to the 2018 American Time Use Study which found that the average person, age 15 or older, spent about 19% of their time participating in leisure. How students spend their leisure time explains, in part, their physical, mental, and social health (Caldwell et al., 1992), as well as their self-esteem and self-worth (Kim et al., 2015).

According to ecological systems theory (Bronfenbrenner, 1979), leisure is a microsystem, or proximal setting, and what occurs in the microsystem is affected by other distal settings, such as the macrosystem, which includes the norms, policies, and cultures that "trickle down" to affect proximal settings. The ecological system is nested within time, such that major historical events (i.e., what Bronfenbrenner termed "macro-time") disturb the system. Indeed, the COVID-19 pandemic was a major historical event that affected the leisure activities of many college students. For example, abrupt changes in daily life caused by the pandemic affected college

students' living situations, employment, educational experiences, and social support systems (Branje & Morris, 2021; Champione-Barr et al., 2021). This study applies ecological systems theory to understand the leisure microsystem among college students at the onset of the COVID-19 pandemic and associations between leisure and factors at other levels of the system.

Preliminary studies have shown that the COVID-19 pandemic likely constrained developmental opportunities, including leisure. For example, adolescents and young adults reported higher levels of depression and anxiety, lower quality relationships, greater isolation, and higher levels of domestic violence than before the pandemic (Champione-Barr et al., 2021; Nivette et al., 2021). Thus, pandemic-related ecological factors may be conceptualized as potential constraints to leisure. The hierarchical model of constraints suggests that there are types of constraints to leisure participation that are overcome first at the intrapersonal level, then interpersonal, and finally structural levels (Crawford et al., 1991). In the present study, cross-sectional data collected from college students at the onset of the COVID-19 pandemic are used to examine three questions:

1. What are the relative *rates of participation* in various leisure activities before and during the pandemic?
2. What are the *patterns of covariation* among leisure activities during the pandemic?
3. Is there an association between pandemic-related *constraints* and leisure activity participation?

Theoretical Foundation: Leisure and the Ecological System Theory

Ecological systems theory explains that development involves individuals as well as the multiple, nested settings which comprise individuals' lives (Bronfenbrenner & Morris, 2006). That is, development is the process of adaptation between individuals and settings that occurs

within a system. As a systems-based theory, the ecological system is conceptualized as a "system" of parts (i.e., individuals and settings) whose interconnections make up the whole. Thus, questions concerning human development should account for the individual and the setting.

According to ecological systems theory (Bronfenbrenner & Morris, 2006), the settings that comprise the system are nested, such that they involve proximal settings in which individuals directly interact, as well as distal settings that "trickle" down to affect proximal settings and the individuals within them. More specifically, the settings are: micro, meso, exo, and macro. The microsystem is the proximal setting where individuals directly interact such as, leisure activities, family settings, or peer settings. The mesosystem involves the interactions among proximal settings (i.e., multiple microsystems), such as interactions between leisure activities and family settings. The exosystem includes the settings in which individuals indirectly interact, such as parents' work, and that affect their development through their micro- or meso-systems. Finally, the macrosystem encompasses broad societal values and practices, such as cultural values and government policies, that affect individuals' interactions with all other levels of the system. In this study, leisure is conceptualized as a salient microsystem for college students because it represents a setting where they spend a significant portion of time.

Development occurs within and through time. Bronfenbrenner and Morris (2006) conceptualize time in the ecological system as the chronosystem and identify various levels through which time affects the system. The most proximal level of time is referred to as micro-time and accounts for individuals' experiences of proximal settings, such as the amount of time spent in a specific leisure activity at a specific time. Meso-time is the period of time in which micro-time experiences are accumulated, such as the experience of participating in a leisure

activity across a specific period of time (e.g., college). The most "distal" level of time is macro-time, which accounts for the time in history in which micro- and meso-time occurs. Macro time matters in various ways, including how major historical events or how personal life events affect individuals. In the context of the COVID-19 pandemic, the macrosystem may have had a substantial impact on youth ecological systems, for example, by affecting to which microsystems individuals had access, the extent to which youth spent time in particular microsystems, and the extent to which the COVID-19 pandemic affected their time use. This study positions the COVID-19 pandemic as a macro-time factor that likely disrupted the leisure microsystem.

In theory, the COVID-19 pandemic likely affected each level of the system and in a variety of ways. Pandemic restrictions, such as government-induced stay-at-home mandates and closures of schools, gyms, and restaurants likely impacted leisure opportunities. That is, the types of leisure activities that were available and opportunities for leisure that did not contribute to the spread of the virus may have changed. In the mesosystem, there may have been shifts in individual's work, school, and home. For example, many workplaces opted for their employees to work remotely which resulted in individuals spending more time at home and potentially navigating a new work/life balance. College students likely experienced abrupt changes as universities shifted to virtual education and many closed on-campus living residences. Exosystem factors changed and became more or less salient for many individuals, especially college students, as they or the individuals they lived with changed residences (e.g., many students moved back home, where parents' work became a salient exosystem factor). Various macrosystem factors were salient during the pandemic, such as stereotypes about particular groups (e.g., Asians as virus carriers), compliance with government policies (e.g., stay-at-home orders) or government-recommended best practices (e.g., social distancing) (Chen et al., 2020;

Nofal et al., 2020; Roberto et al., 2020; Wright et al., 2020). Although there are preliminary studies suggesting that various pandemic-related factors disrupted college students' everyday life (e.g., Lederer et al., 2020; Saurabh & Ranjan, 2020; Tasso et al., 2021) and individual health and well-being (e.g., Perz et al., 2020; Son et al, 2020), there are few studies that have empirically examined the extent to which the pandemic affected college students' leisure.

The Leisure Microsystem

Leisure has positive benefits for physical and psychological health, both of which can be traced to greater overall well-being of participants across the life span (Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). Some of the psychological benefits of leisure include increased sense of happiness, self-esteem, and life satisfaction, elevated levels of endorphins, and increased ability to cope with stress (Caltabiano, 1995; Coleman & Iso-Ahola, 1993). Elevated levels of happiness are because "leisure produces feelings of pleasure, satisfaction, and enjoyment, enabling the individual to feel happy" (Sylvester, 2005; p. 3). Leisure is also associated with long-term benefits (Arnett, 2006; Larson et al., 2006). For example, physical leisure activity protects against depression, distress, and anxiety (Physical Activity Guidelines Advisory Committee, 2008; Caldwell, et al., 1992; Doerkson et al., 2014). Understanding college students' leisure is important, given the many positive benefits of leisure and the recent findings indicating that college students' ratings of personal mental health are declining (Pryor, et al., 2010; Stone et al., 2010).

Leisure is a complex construct, and its definition has evolved over time. In modern study, leisure is defined as time spent participating in interest-based activities that are non-obligatory, non-work related, and freely chosen (Hills & Argyle, 1998; Holder et al., 2009; Kim et al., 2015; Ragheb & Tate, 1993). The concept of choice or self-determination (i.e., the process of

controlling one's life) in leisure is noted by many scholars as integral to the concept of leisure time use (Kaplan, 1975; Kelly, 1990; Stebbins, 2005). Additionally, the concept of freedom of choice regarding leisure is often considered a Western ideal as Western societies often prioritize individual freedom more than Eastern collectivist societies (Godbey, 2003). In the contemporary study of leisure in the social sciences, definitions of leisure should be specific and appropriate to the context or population under investigation. In other words, how leisure is defined depends necessarily on the research question.

Godbey (2003) identifies leisure in four concepts: time (i.e., available time with freedom of choice of activity), activities (i.e., certain activities, like passive or active recreation), state of existence (i.e., being unhurried, tranquil, or without regard to time), and state of mind (i.e., sense of freedom and/or a feeling of control). Godbey's four conceptualizations of leisure have each been empirically linked with indicators of well-being (e.g., Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). However, in studies of older adolescents and young adults, particular leisure activities have been identified that explain more variance in developmental indicators than other conceptualizations. For example, some ways in which college students spend their free time (e.g., socializing informally with friends) have immediate benefits (e.g., hedonic happiness), but few long-term developmental benefits (e.g., Caldwell & Witt, 2011). Long-term developmental growth has also been associated with students experiencing autonomous challenge (Larson, 2000), which is in opposition, to some extent, to the unhurried, relaxed states of mind that Godbey associated with leisure. There is also some evidence that particular states of existence (e.g., flow) and mind (e.g., mindfulness) are difficult to achieve in early developmental periods because of immature cognitive functioning (e.g.,

Burke, 2010). Thus, particular activities that have been identified as common leisure activities tend to be a focus for studies of leisure among college students (e.g., Caldwell et al., 1992).

Classifying Leisure Activities

College presents a unique context for development and time use in college is different in this period of life than others (Arnett, 2000). The transition to college often instigates a transition to independent living, which results in increased autonomy in decision making about time use and leisure activities (Tanner, 2006). On average, college students classified about 25% of their time as leisure time (Chen, et al., 2016). In fact, the 2016 American Time Use Survey indicated that college students reported spending 4 hours a day participating in leisure, on average (U.S. Department of Labor, 2016). Time use involves a zero-sum computation (i.e., there are only 24 hours in a day) and, thus, increases in leisure must also be associated with decreases in other opportunities. Among college students, time use has decreased in academic endeavors and increased in employment and leisure, over the last forty years (Babcock & Marks, 2010). Leisure is consuming a large facet of college students' time, so it is important to understand how college students spend their leisure time.

There are many types of activities in which college students engage during their leisure time. For example, a study of 302 U.S. college students found that over half participated in recreational activities for at least 3 to 4 hours a week, with the most common activities being basketball, weight training and volleyball (Cheng et al., 2004). Another study found that college students' most frequent leisure activities involved hanging out with friends and the least frequent leisure activities were religious activities and volunteering (Cheng et al., 2004; Doerksen et al., 2012). Hickerson and Beggs (2007) examined college students' most frequent leisure activities and found the following categories: passive activities (36% of respondents),

active competition team sports (27% of respondents), individual sports (22% of respondents), and active outdoor recreation activities (15% of respondents). Unsurprisingly, there is variation in leisure by gender, such that males were more likely to participate in active leisure activities and competitive team sports, whereas females were more likely to participate in passive leisure activities (Sylvia-Bobiak & Caldwell, 2007; Doerksen et al., 2014). In sum, there are many different activities in which college students spend their leisure and a common way of distinguishing leisure is whether the activities are passive or active.

One way in which leisure activities have been studied in the social sciences is by identifying distinct groups of activities that have similar characteristics (e.g., active or passive categories of activities). The scholarship categorizing activities based on leisure is aimed at identifying antecedents of leisure (e.g., selecting certain leisure activities) or outcomes of leisure (e.g., well-being). For example, Meeks and Mauldin (1990) used the 1981 Time Use Longitudinal Panel Study to examine leisure activities and a priori categorized several different activities into two overarching groups (structured and unstructured) with multiple subcategories within each, such as lessons/competitive sports, organizations, active sports, games, outdoor activities, hobbies, passive leisure, music and art, socializing, events, and shopping. The shortcoming of this type of grouping is that it categorizes activities based on the authors' perspectives, rather than using empirical tools.

Rather than a priori categorizing leisure activities, some scholars use variable-centered analyses to find patterns among various leisure activities. For example, Tinsley and Eldridge (1995) used personal anecdotes from 3,771 respondents (72% or 2,720 were college students) and identified 82 leisure activities. The authors used a person-centered analysis (i.e., cluster analysis) to identify subgroups of people who had common leisure activities and found several

clusters of leisure activities that varied by individual's reports of leisure needs satisfaction. As examples, one cluster included sport-based leisure activities, which satisfied the need for exertion and challenge; another cluster included art-based activities, which satisfied the need for self-expression. The use of person- and variable-centered analyses has become a common method for creating a taxonomy of leisure activities, which is useful for empirical studies examining participation across various leisure activities. A benefit of using taxonomies in studies about leisure is that they create a more holistic portrait of leisure. In the present study, we use a variable-centered analysis (i.e., factor analysis) to assess patterns of covariation within a set of leisure activities.

There are several empirical papers using empirical tools to classify leisure activities. One approach to classifying leisure activities is to use person-centered analyses to identify sub-populations of individuals who share common patterns of participation across leisure activities. For example, Tinsley and Eldridge (1995) used cluster analysis and identified several clusters of leisure, such as sport-based or arts-based leisure. Another approach is to use variable-centered approaches to classify leisure activities based on the patterns of covariation among the activities. Based on existing variable-centered research, we expect that groups (factors) of activities may emerge that vary based on the following dimensions: active leisure (e.g. walks, physical activity) vs passive leisure (e.g. arts, video games), outdoor (e.g. hiking, yardwork) vs indoor leisure (e.g. reading, baking), creative leisure (e.g. arts), and gender-stereotyped male vs female leisure (Crawford & Godbey, 1987; Crawford et al., 1991; Hickerson & Beggs, 2007; Meeks & Mauldin, 1990; Tinsley & Eldridge 1995). In the context of the COVID-19 pandemic, leisure activities might be categorized as COVID-safe/compliant (e.g., solitary, outdoor and/or social distanced activities) versus non-COVID-safe/non-compliant (e.g., indoor and/or group-based

activities). In sum, there are many distinct categories of leisure activities represented in the literature. We expect to identify factors of existing known categories of leisure, as well as a potentially new category in which leisure activities share common variance related to pandemic conditions.

Categorizing leisure based on conceptual distinctness is helpful in both theory and in practice. In theory, sets of leisure activities can be reduced to conceptually distinct factors, which maximizes between factor differences and within factor similarity. Conceptually distinct leisure activity factors are necessary to understand the nuanced antecedents to and outcomes of participating in those activities. In practice, identifying distinct factors that can be represented through sets of activities can reduce participant burden from reporting on leisure inventories involving reading lists of several activities. In this study, we use exploratory factor analysis to reduce a set of leisure activities to conceptually distinct leisure activity factors. Then, we examine potential constraints associated with participation in leisure within each factor.

Leisure Participation: A Constraints Approach

Theoretically, as a major historical event, the COVID-19 pandemic may have had a major impact on college students' leisure activities. However, whether the pandemic fostered or hindered leisure is an empirical question. Crawford's and Godbey's (1987) work established three categories of leisure constraints: intrapersonal, interpersonal, and structural. Intrapersonal constraints are psychological states and individual attributes, such as attributes of personality, ability, or attitudes, that may influence individual's interest in leisure activities. Interpersonal constraints include characteristics of social interactions or relationships, such as attitudes about in-groups and out-groups (e.g., stereotypes). Finally, structural constraints are external factors, such as opportunities, financial resources, or family care obligations (Crawford & Godbey,

1987). Later Crawford et al. built upon these established categories and explored leisure constraint negotiation. They established the hierarchical model of constraints that argues that constraints are addressed by individuals in a specific order: 1. Intrapersonal, 2. Interpersonal, 3. Structural (Crawford et al., 1991). The hierarchical model provides one conceptual framing for examining whether and how the pandemic affected leisure.

The hierarchical model of constraints (Crawford et al., 1991) suggests that leisure constraints do not function independently but, instead, individuals must overcome them in a particular order to achieve participation in a leisure activity. The first step toward leisure activity participation is that intrapersonal constraints must be resolved, which establishes an individual's leisure preferences. Next, individuals may or may not encounter interpersonal constraints (often more present in activities that require group participation than in individual leisure activities). Once intrapersonal and interpersonal constraints are resolved, individuals must confront and resolve structural constraints. Finally, after all categories of constraints are resolved, participation in the leisure activity occurs. If an individual does not overcome one of the three constraint categories, nonparticipation in the leisure activity is likely.

There are few studies of college student's negotiation of leisure constraints. A limitation of existing research is that it does not explicitly address the theorized hierarchy involved in the hierarchical constraints model. Instead, studies focus generally on one of the constraint categories or examine the three constraint categories in a non-hierarchical manner. Many existing studies of leisure constraints focus on one or two constraint categories without accounting for the full process of constraint negotiation (i.e., Crawford's & Godbey's [1987] three categories), with one notable exception worth review. Cho and Price (2018) applied the hierarchical model of leisure constraints to examine common intrapersonal, interpersonal, and

structural constraints to using recreational facilities and found that college students often struggle more to overcome structural constraints than intrapersonal or interpersonal constraints. Cho's and Price's finding make sense, given that structural constraints are likely less controllable than intrapersonal or interpersonal constraints. Thus, structural constraints may explain a substantial amount of variance in college students' leisure activities.

Despite not applying the hierarchical constraints model (Young et al., 2003; Elkins et al., 2007; Liechty et al., 2006), empirical studies consistently highlight structural constraints as the most notable constraint to recreation. Lack of time was cited as college students' top reason for not using the university recreational facility (Young et al., 2003; Cho & Price, 2018; Elkins et al., 2007), which is interesting given the finding that college students have a large amount of leisure time. However, this may be because students do not view this type of recreation as leisure and are instead spending that time in other leisure pursuits. Other structural constraints to college students' use of recreational facilities were lack of parking and lack of programs that fit into their schedules (Elkins et al., 2007; Young et al., 2003). Many studies also highlighted the interpersonal constraint of not having a friend to go to recreational facilities with or to participate in activities with at recreational facilities (Elkins et al., 2007; Liechty et al., 2006). One study found that "appearance-related constraints" (described conceptually as an intrapersonal constraint) were a common constraint to leisure for college-aged females (Liechty et al., 2006). Keeping this in mind, we know that college students often experience constraints to leisure in some way. Existing research on how leisure constraints pertain to college students often focus on the use of university-provided recreation facilities or programs rather than leisure activities more broadly. This study examines college students' constraints to a variety of leisure activities during the COVID-19 pandemic.

Leisure During the COVID-19 Pandemic

One way the COVID-19 pandemic may have affected college students' leisure is through restrictions imposed to curb the spread of the virus. Public health guidance included recommendations and/or mandates from governments to shelter-in-place (i.e., stay at home), engage in small social circles (i.e., social distance), physically distance from others, wear masks when in public, and work from home whenever possible. A few preliminary studies have examined adherence to public health recommendations and identified several factors that explained variance in adherence (Bavel et al., 2020; Caparo & Barcelo, 2020; Gette et al., 2021; Mahalik et al., 2021). The variability in adherence to public health recommendations may explain differences in college students' leisure activity participation during the pandemic.

Although there is little research on the pandemic and potential constraints to leisure, one empirical study exploring changes in leisure patterns during the pandemic provides preliminary insight. Morse and colleagues (2021) studied individuals from 70 different countries and found that creative activities such as home crafts, language activities, and fine arts were more likely to increase during the COVID-19 pandemic as opposed to sport and outdoor pursuits; other non-creative leisure pursuits that increased were mind games, social media use, eating food, and relaxation. Although Morse et al. did not empirically test whether and how different pandemic-related factors were associated with the changes in leisure, one question is whether changes in leisure patterns can be linked to individuals' adherence to public health recommendations during the pandemic.

Some general assumptions can be made about potential intrapersonal, interpersonal and structural constraints to leisure during the COVID-19 pandemic. Intrapersonal constraints may have involved the states of being that were caused by the pandemic. For example, many

experienced changes in family, friend, work or school responsibilities. New levels of personal adherence to public health efforts such as shelter-in-place orders or social distancing recommendations, may have also affected leisure attitudes and in turn which kinds of leisure activities college students chose to participate in. The pandemic may have caused interpersonal constraints because of changes in living arrangements and space sufficiency in their home during the pandemic There may have also been structural constraints to leisure related to time availability because of changes in school instruction modality and workload, new caregiving responsibilities (for elderly relatives or younger siblings), or frequency of work done for pay. Although it is unclear whether leisure activity declined as a result of COVID-19 pandemic-related constraints, it is likely that activity patterns were altered in some way for many college students.

The different kinds of constraints may have different associations with leisure, depending on the conceptual nature of the leisure activity factor. Intrapersonal constraints related to complying with public health mandates (e.g., masking, social distancing) may have strong associations with categories of home-based leisure activities (i.e., because compliant individuals sought leisure in the home). Interpersonal constraints may have unexpected associations with categories of activities defined by gender stereotypes. The pandemic restricted many individuals to stay inside and remain in homes, which may have offered some individuals a safe space to cross gender-stereotyped boundaries (e.g., males may have cooked more during the pandemic and females may have done yardwork). Based on existing research, structural constraints (e.g., lack of time, money, access, opportunity) are commonly cited for college students (Young et al., 2003; Cho & Price, 2018; Elkins et al., 2007) and is likely a common constraint for all the various activity types (e.g., passive and active leisure). Structural constraints related to leisure

enacted indoors may be particularly important in active categories that typically provide leisure services through indoor facilities (e.g., organized sport or exercise in gyms).

Summary and Study Goals

Despite the varied definitions of leisure and recreation, common across the leisure scholarship is the finding that leisure provides numerous health and psychological benefits (Paffenbarger et al., 1991; Ragheb & Tate, 1993; Tinsley & Eldridge, 1995). Leisure is important to study among college students because they report more available time for leisure activities compared to other age groups (Chen et al., 2016; Kleibler et al., 1986; Tanner, 2006) and leisure provides developmental opportunities during this period of life transition (Arnett, 2000). College students experience a variety of different constraints to leisure, which may have included factors involving the COVID-19 pandemic. The hierarchical model of constraints suggests that there are three types of constraints to leisure, namely intrapersonal, interpersonal, or structural, and such constraints are overcome in a sequential manner to achieve leisure activity participation (Crawford & Godbey, 1987; Crawford et al., 1991). The pandemic affected individuals' ecologies in various ways, and pandemic-related factors (e.g., public health orders, transitions to virtual learning, moving out of apartments or dorms) may have been intrapersonal, interpersonal, or structural constraints to college students' leisure. The present study explores college students' participation in a variety of different leisure activities and associations with potential pandemic-related constraints. More specifically, this study examines: 1. The relative *rates of participation* in various leisure activities before and during the COVID-19 pandemic; 2. *patterns of covariation* among leisure activities during the pandemic; and 3. associations between pandemic-related *constraints* and leisure activity participation.

METHOD AND RESULTS

Procedures

This study uses secondary data from a larger study about young adult's leisure during the COVID-19 pandemic. Cross-sectional data were collected for the larger study between April 2020 and May 2020, thus capturing data from early in the COVID-19 pandemic. Self-report surveys were administered electronically using Qualtrics. Young adults ages 18 – 25 were eligible to participate in the larger study and were recruited through the university where the study took place (e.g., through listservs and emails sent to departments and student organizations), as well as through community methods (e.g., social media, word of mouth, and snowball sampling). Participation was incentivized with a drawing for a Nintendo Switch ($200 value). The study was approved by the Institutional Review Board at the university where the study was conducted.

Data Collection Context

The time period in which these data were collected should be especially noted because it occurred during the COVID-19 pandemic. As described by the World Health Organization (WHO; 2022),

> COVID-19 is the disease caused by a new coronavirus called SARS-CoV-2. WHO first learned of this new virus on 31 December 2019, following a report of a cluster of cases of 'viral pneumonia' in Wuhan, People's Republic of China. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention.

The first COVID-19 case was reported in the US on January 20th, 2020 and the US and World Health Organization subsequently declared a public health emergency on January 31st. The

university where a majority of respondents attended cancelled all in-person classes for the Spring 2020 semester in mid-March. Shortly after the cancellation of in-person classes at the university, the Governor of the state in which the study was conducted, issued an executive order closing schools, bars, restaurants, gyms, and retail services. Data collection for this study began in early April, 2020, when such university transitions (e.g., virtual classes) and state restrictions (e.g., establishments closed) were in place.

Sample

The sample for the larger study was comprised of 3,337 respondents, ages 18 to 25. Individuals who were not currently enrolled in college/university (*N* = 1,092 or 32.72% of the full sample) were dropped from the sample, given the focus in the present study on college students. The sample for the present study includes students who were enrolled in college at least half-time (*N* = 2,245). The average age of respondents was about 22 years old (*M* = 22.04; *SD* = 3.26). The sample was majority female (57.82%; *Male* = 38.08%, *Nonbinary* = 2.41%) and represented diverse racial/ethnic backgrounds (*White/Caucasian* = 44.59%, *Black/African American* = 2.73%, *Asian/Asian American* = 19.38%, *Hispanic/Latino* = 18.93%, Other= 2.64%, *Biracial*= 2.33%, *Multiracial*= 3.41%).

Measures

All measures used in this study are self-reported by participants through an online survey. The main constructs assessed in this study are leisure activities and constraints. First, we explain the assessment tool to measure leisure activity participation and then we explain how constraints were operationalized in the context of the pandemic.

Leisure Activity Inventory

Leisure activity participation was measured using an inventory of 14 different leisure activities. Students were asked to report their frequency of current participation in each activity (1 = *neve*r; 5 = *>4 hours/week*), as well as whether the activity was something they participated in before the pandemic (1 = *yes*, 0 = *no*) and whether their time spent in each activity changed during the pandemic (1 = *spend LESS time now*, 2 = *SAME amount of time*, 3 = *spend MORE time now*). These 14 activities were chosen by the research team by reviewing other inventories (Tinsley & Eldridge, 1995) and selecting which activities were most relevant to college students and during the pandemic. The 14 selected activities included: playing video games, watching media (e.g., TV, streaming shows or movies), cooking/baking, household chores (e.g., cleaning, laundry), yard work (e.g., gardening, mowing), arts/crafts, reading for pleasure, games (e.g., board games, cards), spending time with pets, taking leisurely walks, physical activity (e.g., working out or exercising), organized sports (e.g., on a team or individually), home projects (e.g., do-it-yourself projects), and drinking alcohol/substance use. Reported descriptive statistics for each item can be found in Table A.1.

Leisure Constraints

The present study conceptualizes the COVID-19 pandemic as causing a variety of potential constraints to college students' leisure. Respondents were asked to reflect on various aspects of the pandemic using a variety of indicators developed by the research team (unless otherwise noted). The indicators represented various constraints to leisure that the pandemic may have imposed. Using Crawford's and Godbey's (1987) definitions of the three categories of constraints (i.e., intrapersonal, interpersonal, and structural), each indicator was categorized by the research team as a specific type of constraint. The three types of constraints each have

multiple indicators. When existing measures are used, the citation is included. Measures without citations were developed by the researchers.

Intrapersonal constraints, commonly measured as fears, anxiety, religiosity, perceived skill, and reference group norms that prevent leisure participation, included 7 indicators. There were 4 indicators of *adaptation challenges* which was measured using four questions asking participants "how challenging it was to adapt" in each of four categories: family, work, school, friend responsibilities. The categories of adaptation challenges were not expected to be highly correlated (e.g., because family challenges do not necessarily imply school challenges), so each of the 4 indicators were entered separately. There was 1 indicator of *personal adherence* (average of 2 items; "To what extent did you social distance/shelter-in-place when restrictions were imposed?"; 1 = *not at all*, 4 = *totally and completely*; M = 3.29, SD = 0.68; α = 0.77). Finally, 2 indicators of leisure attitudes were measured using existing scales: *cognitive leisure attitudes* (average of 6 items; e.g., "leisure is a wise use of time"; Freire & Teixeira, 2018; 1 = *strongly disagree*, 5 = *strongly agree*; M = 4.32, SD = 0.75; α = 0.92), and *affective leisure attitudes* (average of 6 items; e.g., "leisure is refreshing"; Freire & Teixeira, 2018; 1 = *strongly disagree*, 5 = *strongly agree; M* = 4.19, SD = 0.76; α = 0.90).

Interpersonal constraints, commonly measured as deference to other people's preference or poor interpersonal experiences within a certain activity or location that prevent leisure participation, included 3 indicators that were each developed by the research team: *number of people* (1 item; "How many people are in your home?"; R = 0-8, M = 2.17, SD = 1.55), *space sufficiency* (1 item; "How much space do you have in your home during the pandemic?"; 1 = *definitely not enough*, 5 = *definitely more than enough*; M = 3.23, SD = 1.13), and *change in*

living arrangement (1 item; "Did your living arrangement change during the pandemic?"; *yes* = 60.52%*)*.

Structural constraints, commonly measured as lack of time, financial resources, information or accessibility that prevent leisure participation, included 5 indicators that were each developed by the research team: *caregiving* (dichotomized yes/no; "Did you have to care for children/parents or older adults/spouses or partners/friends or roommates because of the pandemic?", yes = *cared for at least 1*, no = *cared for none*; yes = 22.85%), *virtual schooling* (1 item: "To what extent did your workload in college change as a result of the transition to virtual schooling during the pandemic?"; 1 = *significantly decreased*, 5 = *significantly increased*; *M* = 3.22, *SD* = 1.18), *employment* (1 item; "Are you currently employed?"; 1 = *yes*, 0 = *no*; *yes* = 60.46%), *essential worker* (1 item; "Were you an essential worker during the pandemic?"; 1 = *yes*, 0 = *no*; *yes* = 40.50%), and *frequency of employment* (1 item; "How many hours/week do you work for pay?"; 1 = *<10 hours*, 4 = *30 or more hours*; *M* = 2.26, *SD* = 0.94)).

Analysis Plan

The analysis plan aligns with the three study questions, which were to examine: 1. Relative rates of participation in various leisure activities before and during the pandemic; 2. Patterns of covariation among leisure activities during the pandemic; and 3. Associations between pandemic-related constraints and leisure activity participation. The analyses that correspond with Research Question 1 and 2 each provide important information to be used in the analysis for Research Question 3.

Rates of Participation

To assess frequency of participation in various leisure activities, a variety of descriptive analyses are used. First, descriptive statistics (means and standard deviations) were computed for

each of the 14 leisure activities. Next, correlations among the 14 leisure activities were examined for patterns of covariance. Frequencies (%) were calculated for each activity to examine how participation changed during the pandemic (i.e., yes/no responses to whether the individual participated in the activity before the pandemic), as well as whether or not people participated differently during the pandemic than before (i.e., % of responses indicating more/same/less participation).

The descriptive analyses to examine rates of leisure activity participation during the pandemic were also helpful to flag problematic variables for the subsequent analysis and, as well, to reveal which activities were particularly salient during the pandemic. That is, the descriptive analyses will help to identify leisure activities that have little or no variability in the sample (i.e., whether there are activities in which few college students participated or whether there are activities in which all college students participated), which activities may potentially factor together in the subsequent analysis (e.g., those with high correlations), which activities signal new activities that became prevalent during the pandemic (e.g., activities with high frequency of participation and high percentages of reports that it ***was not*** an activity in which they participated before the pandemic), which activities were dropped during the pandemic (e.g., activities with low frequency of participation and high percentages of reports that it ***was*** an activity in which they participated before the pandemic). The information provided by the descriptive analyses informed decisions made in the subsequent analysis regarding factors of leisure activities.

Patterns of Covariance Among Leisure Activities

To examine patterns of participation across 14 different leisure activities, exploratory factor analysis (EFA) was used. EFA is based on the common factor model, which assumes that

latent constructs underlie and explain variation among the set of leisure activity variables (in other words, that there are common factors among the 14 activities). Exploratory factor analysis was used (as opposed to confirmatory) because there are no hypotheses about the underlying factor structure of the leisure activities, given the unprecedented nature of leisure during the pandemic. The EFA followed standard analysis recommendations, including three basic decision points: number of factors, extraction method, and rotation method.

First, an EFA was estimated in SPSS v.28 to determine the number of factors. Six empirical tools were used to help decide how many factors (groups of leisure activities) best represent the data: *the Kaiser-Guttman rule* (i.e., the number of factors is equal to the number of factors with eigenvalues, which represents the variance accounted for by each underlying factor, greater than one; Kaiser, 1960; Guttman, 1954); a *scree plot* of the number of factors by eigenvalues (i.e., the number of factors is determined by sharpest decent in eigenvalues as factors increases, known informally as the "elbow" of the plot; Zwick & Velicer, 1986); accounting for a *minimum amount of variance* (i.e., about 70%, an admittedly arbitrary criterion), a *parallel analysis* (i.e., the number of factors is equal to the number of eigenvalues that exceed the eigenvalues produced based on random data with the same *N* and number of measures; Horn, 1965), a *minimum average partial* (MAP) test (i.e., the number of factors is equal to the number of components required to extract to achieve more common factor variance than unique variance; Valicer, 1976), and *statistical significance* test using maximum likelihood estimation (i.e., the number of factors is equal to the number of factors necessary to specify a model that statistically significantly accounts for the correlation among the items). The number of factors recommended by each of these tools was considered in determining the final number of factors to retain, however, above all else, theory and conceptual meaning guided the retained solution.

Second, after determining the number of factors, a second EFA was estimated to produce the factor loadings. Principal Axis Factoring (PAF) was used as the extraction method, given recommendations of the approach over alternative extraction methods (e.g., principal components analysis, which assumes no measurement error, or maximum likelihood, which can require many iterations; Gorsuch, 1989). The extraction method was used to produce factor loadings for each item on each extracted factor. The goal was to obtain a simple structure, in which most items have a large loading on one (and only one) factor, but small loadings on other factors.

Third, rotation was used to simplify the interpretation of factors, such that high loadings were maximized and low loadings were minimized. An orthogonal (varimax) rotation was used (which does not allow the factors to be correlated) because participation in one factor did not necessarily imply a particular extent of participation in another factor. The meaningfulness of each factor and representative labels for each factor were determined in the context of the theoretical and conceptual framing of the study. Three decisions were made to drop: any items that did not load highly on any factor (e.g., at least .30), any items that loaded highly on multiple factors (unless there was a clear conceptual reason for an item to be retained on a specific factor), or items which were the sole representation on a factor (i.e., there was only one item that loaded on that factor).

Associations between Pandemic-Related Constraints and Leisure Activity Participation

Associations between pandemic-related constraints and patterns of leisure was analyzed using hierarchical linear regression in SPSS v.28. The dependent variables were the factors identified in the EFA in the preceding question. For example, if four factors were determined to underlie the 14 leisure activities, then four dependent variables (i.e., representing qualitatively

different leisure factors) were used. Each dependent variable was modeled in a separate regression to address multi-collinearity (i.e., potential correlations among the factors). The dependent variable(s) was computed based on the mean of the leisure activities that loaded onto the factor(s). For example, if 4 of 14 leisure activities loaded onto Factor 1, then the dependent variable for Factor 1 was the mean of the 4 leisure activities.

Each regression was estimated as a hierarchical linear regression. Based on the hierarchical constraints model, the three types of constraints to leisure are overcome in a sequential manner, namely intrapersonal, interpersonal, and structural constraints (Crawford et al., 1991). A hierarchical regression allowed for the sets of constraints to be entered in steps, which could then be interpreted separately in terms of the amount of variance explained in the dependent variable (i.e., the leisure factor). In each regression, there was four steps: controls (age, gender, race/ethnicity), intrapersonal constraints (4 indicators: adaptation challenges, personal adherence, cognitive leisure attitudes, affective leisure attitudes), interpersonal constraints (3 indicators: number of people, space sufficiency, change in living arrangement), and structural constraints (5 indicators: caregiving, virtual schooling, employment, essential worker, frequency of employment). The r^2 for each step, which represents the amount of variance in the dependent variable that was accounted for by the set of predictors in the particular step, was interpreted. The standardized beta coefficients for each predictor was interpreted in terms of statistical significance ($p < .05$) and effect size (.1 for small, .3 for medium, and .5 or higher for large effects).

The results of each model were interpreted within the hierarchical model of constraints, which suggests that constraints are overcome sequentially from intrapersonal, to interpersonal, to structural constraints. This study was not a test of the hierarchical model of constraints, but

instead, the questions were guided by the model and results were interpreted in the context of the model. Guided by the hierarchical model of constraints, results could be interpreted in multiple ways in terms of the r^2 for each step. For example, models in which intrapersonal, interpersonal and structural constraints are each statistically significant (i.e., explain a statistically significant proportion of variance in the outcome) might suggest that there remain substantial barriers at all levels for that particular activity. If structural constraints were statistically significant, but intrapersonal and interpersonal constraints were nonsignificant, then result might suggest that the first two levels of constraints were overcome and the primary barrier to that particular activity was structural constraints. Results will be interpreted in the context of the hierarchical model of constraints in an effort to advance scholarship on leisure participation as well as to advance conceptual understanding of the nature of constraints.

Results

Rates of Participation

First, we examined the distributions of the 14 leisure activity variables (as seen in Table A.1). All activities were normally distributed (i.e., skewness and kurtosis were in the acceptable ranges). Participation in activities varied, such that the highest levels of participation were in media, chores, and cooking, and the lowest levels of participation were in yardwork and sport.

Next, we examined frequencies of each leisure activity variable based on two questions (see Table A.2): "Was this an activity you participated in before the pandemic?" (*yes/no*) and "compared to before the pandemic, how much do you participate in this activity now?" (*less/same/more*). There were some activities in which the majority of respondents participated before the pandemic, such as media, chores, cooking and physical activity (*at least 75%*). There

were also some activities in which the majority of respondents did not participate before the pandemic, such as yardwork, home projects, and sports (*less than 50%*).

A chi-square test was used to examine the correspondence between participation before the pandemic (*yes/no*) and changes in participation compared to before the pandemic (*less/same/more*). As shown in Table A.2, there was a significant relation between participation before the pandemic and changes in participation for all leisure activities, except for media. Most of the effect sizes were small across the leisure activities, with the exception of sports, which had a relatively large effect size (*phi* = 0.51) and walks, physical activity, video games, and pets, and alcohol use, which all had moderately sized effects (*phi*s > 0.21).

There were two categories of participation before the pandemic (*yes/no*) and three categories of changes in participation (*less/same/more*), yielding 6 possible combinations (cells). The adjusted standardized residuals (ASRs) were used to identify which cells were statistically significantly different from chance (with *ASRs* >2.96 interpreted as significant at $p < 0.05$). There were several cells that were significantly different from chance and some patterns across the different leisure activities. We interpret the results for the cells representing the correspondence of "yes" participation before the pandemic with each of the categories of changes in participation (i.e., yes X less/same/more); we do not interpret the correspondence of the "no" participation before the pandemic category with changes in participation, noting that they are the reverse interpretation of the "yes" participation by changes in participation cells.

There were several patterns across the leisure activities worth noting. First, some respondents who said "yes" to participating *before* the pandemic were more likely than chance to be participating *less* during the pandemic, a group we describe as decreasing during the pandemic. The leisure activities exhibiting patterns of "decreasing" during the pandemic

included cooking, games, and walks. Next, some respondents who said "yes" to participating *before* the pandemic were more likely than chance to be participating at the *same* rate in comparison to before the pandemic; we describe this group as "persisting steadily" through the pandemic and the activities included media, chores, and reading. Third, some respondents who said "yes" to participating *before* the pandemic were more likely than chance to be participating *more* during the pandemic; we describe this group as "increasing" through the pandemic and activities included arts, yardwork, video games, and pets. Finally, one group of respondents exhibited a mixed pattern of correspondence with changes in participation. That is, respondents who said "yes" to participating *before* the pandemic were more likely than chance to be participating both *less* and *more* during the pandemic. We describe the final group as representing "unstable" activities that were either "picked up" or "dropped" during the pandemic. The "unstable" activities included physical activity, sports and alcohol use. An example of the "unstable" activities is helpful for interpretation. For example, alcohol use was an "unstable" activity, such that students either drank more during the pandemic or stopped drinking during the pandemic, two patterns with likely different explanations. Increases in alcohol use might represent a coping strategy and decreases in alcohol use might be because students went home to live with their parents. These results reveal different ways in which COVID may have affected different kinds of leisure activities, especially when examined in the context of the rates of participation in the activities.

Taken together, the means and chi-square tests (as presented in Table A.2) provide information that can be interpreted qualitatively to draw conclusions about the impact of the COVID-19 pandemic on the leisure activities. The qualitative interpretations about the effects of the pandemic across the descriptive statistics for the leisure activities variables is presented in

Table A.3. Several patterns were revealed in the qualitative interpretations. First, the only activity with high participation, media use, had no pandemic effect. Next, among the activities with moderate rates of participation ($M > 2.5 < 4.0$; *2 = 1-2 hours per week, 4 = > 4 hours per week*), there was variation in the pandemic effect: Some activities had increased participation (i.e., video games and pets), some did not change during the pandemic (i.e., reading and chores), and some were "unstable activities" that either were either "picked up" (increased) or "dropped" (decreased) during the pandemic (i.e., cooking, walks, physical activity). Finally, the activities with low rates of participation ($M <2.5$; *2 = 1-2 hours per week*) were all affected in some way by the COVID-19 pandemic, such that some activities were "dropped" during the pandemic (i.e., games, home projects), others were "picked up" (i.e., yardwork, arts), and others were "unstable activities" (i.e., sports, alcohol).

Patterns of Covariance Among Leisure Activities

In preparation for estimating the Exploratory Factor Analysis (EFA) and to better understand the covariance patterns among the 14 leisure activities, correlations were examined (as seen in Table A.1). The correlations ranged from small to moderate, with several worth noting. For example, several pairs of activities were moderately correlated and in the expected positive direction ($rs > 0.32$, $ps < 0.01$), such as: arts and home projects; home projects and yardwork; walks and physical activity; and chores and cooking. Unexpectedly, there was a moderate and positive correlation between home projects and sports ($r = 0.30$, $ps < 0.01$). Other unexpected positive correlations, though smaller, included games with home projects and media with chores ($rs > 0.22$, $ps < 0.01$).

An exploratory factor analysis (EFA) was estimated with the 14 leisure activity items, using Principal Axis Factoring as the extraction method, and using an orthogonal (varimax)

rotation to improve interpretation. Six empirical criteria were used to determine the number of factors that should be retained: eigenvalues, prescribed amount of total variance, scree plot, parallel analysis, minimum average partial test, and statistical significance test.

The initial analysis of the 14 items yielded inconsistent determinations of the number of factors across the 6 empirical criteria. That is, the number of factors suggested by each criterion was either 1 (MAP test), 3 or 4 (first sharp descent in scree plot), 5 (eigenvalues >1), 6 (ML test), or 7 (second sharp descent in scree plot, >70% variance explained, parallel analysis). Given that there was most consistency across the indicators suggesting that a 7-factor solution best fit the data, we retained 7 factors and re-ran the EFA with the orthogonal rotation to interpret the solution. Next, we examined the factor loadings for the 7-factor solution, using a minimum 0.3 cutoff to justify retaining an item on a factor. Three items, namely alcohol use, pets, and video games, each loaded onto its own factor (as the only item on that factor) and were dropped because one item was deemed insufficient to identify an underlying factor (see table B.1 for the 7-factor solution including all items). The 3 activities that were dropped are each not traditionally used in leisure inventories and were added by the research team, and each had relatively low participation. The choice to drop alcohol use also made practical sense because many respondents in the sample were not of legal drinking age.

Next, we estimated the EFA again with the 11 leisure activities to determine the number of factors that should be retained. The number of factors suggested by each criterion was either 1 (MAP test), 3 (eigenvalues>1, first sharp descent in the scree plot), 4 (parallel analysis), or 5 (>70% variance explained, ML test). There was inconsistency with the number of factors recommended to retain and, thus, three EFAs with orthogonal rotation were estimated retaining 3, 4, and 5 factors, to examine factor loadings and determine the appropriate solution. We

examined the rotated factor matrix for each solution to determine which solution made conceptual sense. There were 2 factors representing conceptually distinct activities that were consistent across all factor solutions, namely home-based activities (i.e., media, cooking, and chores) and physical activities (i.e., walks, physical activity, sports). The 3-factor solution had the factors representing home-based and physical activities. However, the third factor in the 3-factor solution included two different types of conceptually distinct activities, namely activities typically representing the arts (i.e., arts, reading, games) and activities that are "physical" in nature (i.e., yardwork, home projects and sports). The 4-factor solution retained home-based and physical activities, and, as well, split the third factor from the 3-factor solution into two conceptually distinct sets of activities. That is, the third factor in the 4-factor solution creative (i.e., arts, reading, games) and the fourth factor was active (i.e., yardwork, home projects and sports). The 5-factor solution replicated the four factors found in the 4-factor solution, but the fifth factor included only a single activity, namely sports. The 5-factor solution was rejected in factor of the 4-factor solution, in which sports had an adequate loading on a conceptually distinct set of activities. The 4-factor solution yielded factors that made the most sense conceptually, was most consistent with previous literature, and was therefore retained. We explain the 4-factor solution in full detail next.

The rotated factor loading matrix for the 4-factor solution is presented in Table A.4 (See Table A.5 for the rotated factor loading matrix for the 3- and 5-factor solutions). Three activities represented *home-based leisure*: media, cooking and chores. Three activities represented *creative leisure*: arts, reading, and games. Two activities represented *exercise leisure*: walks and physical activity. Three activities represented *active leisure*: yardwork, sport, and home projects. Note that the projects item double-loaded onto the *creative leisure* factor, but it was retained on the

active leisure factor because of the higher loading (i.e., 0.546 vs. 0338) and because it had better alignment with the other items that loaded on the *active leisure* factor. Similarly, the sports item double-loaded onto the exercise leisure factor but was retained on the *active leisure* factor because of the higher loading (i.e., 0.425 vs 0.327) and it was better aligned with the other items that loaded on that the *active leisure* factor.

Leisure activity participation was measured as the mean participation across the activities which loaded on each of the four factors identified in the EFA: home-based leisure (media, cooking and chores), creative leisure (crafts, reading, and games), exercise leisure (walks and physical activity), and active leisure (yardwork, sport, and projects). Descriptive information for the factors is presented in Table A.6. To examine within-person differences in means on the four factors, dependent sample *t*-tests were estimated for each pair of factors. On average, students participated in more home-based leisure ($M = 3.59$) than creative leisure ($M = 2.38$; $t(2212) = 53.23$, $p < .001$), exercise leisure ($M = 2.92$; $t(2197) = 26.61$, $p < 0.001$) or active leisure ($M = 1.83$; $t(2216) = 76.66$, $p < 0.001$). On average, students participated in more creative leisure ($M = 2.38$) than exercise leisure ($M = 2.92$; $t(2196) = -20.66$, $p < 0.001$) or active leisure ($M = 1.83$; $t(2214) = 27.15$, $p < 0.001$). Finally, on average, students participated in exercise leisure ($M = 2.92$) more than active leisure ($M = 1.83$; $t(2199) = 43.28$, $p < 0.001$). All tests were statistically significant at a p value less than 0.001.

Associations between Pandemic-Related Constraints and Leisure Activity Participation

Research Question 3 used hierarchical linear regression models (as seen in Tables A.7-A.10) to predict the extent to which intrapersonal, interpersonal, and structural constraints explained variance in leisure activity participation. A model was estimated for each of the four leisure activity factors. In each model, predictors were entered in four steps: controls (age,

race/ethnicity, gender), intrapersonal constraints (adaptation challenges, personal adherence, cognitive leisure attitudes, and affective leisure attitudes), interpersonal constraints (number of people in the home, space sufficiency, and change in living arrangement), and structural constraints (caregiving, virtual schooling, employment, frequency of employment, and essential worker status).

Before estimating the regression models, the predictor variables were examined for multi-collinearity. The correlations among the predictors ranged from -0.114 to 0.342. To determine whether there was substantial multi-collinearity that may potentially cause instability in the regression coefficients, we examined the tolerance and VIF statistics for the predictors. Tolerance and VIF were in the recommended ranges (i.e., 0-1 and <3, respectively) for all variables and, thus, all predictors were retained in the regressions.

Home-based Leisure Factor. The hierarchical linear regression model for the home-based leisure factor had good model fit (F (714) = 4.36, p<0.001) and explained 9.8% of the variance in home-based leisure (as seen in Table A.7).

The set of control variables explained 5.2% of the variance in home-based leisure. Among the control variables, four were statistically significant and all were small in size: females were more likely than males to participate in home-based leisure, and Asian, biracial and respondents who identified as an "other" race/ethnicity were each more likely than White respondents to participate in home-based leisure.

Intrapersonal constraints explained an additional 4.3% of the variance in active leisure, above and beyond the set of control variables, which was a statistically significant change in R^2 (p<0.001). Among the seven intrapersonal constraints, two were statistically significant, and both were positive and small in size. That is, increases in family adaptation challenges and in

adherence to public health guidelines were each associated with increases in participation in home-based leisure.

Interpersonal constraints explained an additional 1.5% of variance in home-based leisure, which was a statistically significant change in R^2 ($p = 0.007$). Among the three interpersonal constraints the only statistically significant constraint was space sufficiency, such that low reported space sufficiency was associated with less home-based leisure, but the effect size was small.

Structural constraints explained an additional 0.6% of the variance in home-based leisure, which was a statistically nonsignificant change in R^2 ($p = 0.400$). None of the five structural constraints were statistically significant.

Creative Leisure Factor. The hierarchical linear regression model for the creative factor had good model fit ($F(716) = 2.97$, $p < 0.001$) and explained 6.0% of the variance in creative leisure (as seen in Table A.8).

The set of control variables explained 2.8% of the variance in creative leisure. Among the control variables, two were statistically significant and small in size, such that females were more likely than males and Hispanic respondents were less likely than White respondents to participate in creative leisure.

Intrapersonal constraints explained an additional 3.7% of the variance in creative leisure, above and beyond the set of control variables, which was a statistically significant change in R^2 ($p < 0.001$). Among the seven intrapersonal constraints, two were statistically significant and small in size. Increases in challenging friend adaptations and affective leisure attitudes were associated with increases in participation in creative leisure.

Interpersonal constraints explained an additional 0.2% of variance in creative leisure, though the change in R^2 was statistically nonsignificant ($p = 0.632$). None of the three interpersonal constraints were statistically significant.

Structural constraints explained an additional 0.8% of the variance, which was also a statistically nonsignificant change in R^2 ($p = 0.252$). Among the five structural constraints, the only statistically significant constraint was caregiving responsibility, which was small in size and suggested that caregiving responsibility is associated with increased participation in creative leisure.

Exercise Leisure Factor. The hierarchical linear regression model for the exercise factor had good model fit ($F(710) = 2.034$, $p = 0.003$) and explained 3.3% of the variance in exercise leisure (as seen in Table A.9).

The set of control variables explained 1.8% of the variance in exercise leisure. Among the control variables, two were statistically significant and small in size, such that Black and Asian respondents were less likely than White respondents to participate in exercise leisure.

Intrapersonal constraints explained an additional 2.4% of the variance in exercise leisure, above and beyond the control variables, which was a statistically significant change in R^2 ($p = 0.012$). Among the seven intrapersonal constraints, one was statistically significant and small in size. Challenging work adaptations were associated with increased participation in exercise leisure.

Interpersonal constraints explained an additional 0.3% of variance in exercise leisure, though the change in R^2 was statistically nonsignificant ($p = 0.453$). None of the three interpersonal constraints were statistically significant.

Structural constraints explained an additional 0.7% of the variance in exercise leisure, which was a statistically nonsignificant change in R^2 ($p = 0.406$). None of the five structural constraints were statistically significant.

Active Leisure Factor. The hierarchical linear regression model for the active factor had good model fit ($F(713) = 5.726$, $p < 0.001$) and explained 13.3% of the variance in active leisure (as seen in Table A.10).

The set of control variables explained 4.7% of the variance in active leisure. Among the control variables, three were statistically significant and small in size such that, females were less likely than males and Asian and biracial respondents were less likely than White respondents to participate in active leisure.

Intrapersonal constraints explained an additional 5.4% of the variance in active leisure, above and beyond the control variables, which was a statistically significant change in R^2 ($p < 0.001$). Among the seven intrapersonal constraints, two were statistically significant and small in size. Challenging friend adaptations were associated with increased participation in active leisure. Cognitive leisure attitudes were associated with decreased participation in active leisure.

Interpersonal constraints explained an additional 0.3% of variance in active leisure, though the change in R^2 was statistically nonsignificant ($p = 0.540$). Among the three interpersonal constraints, none were statistically significant.

Structural constraints explained an additional 4.7% of the variance in active leisure, which was a statistically significant change in R^2 ($p < 0.001$). Among the five structural constraints, three were statistically significant and all were small in size. Caregiving and hours of work per week were associated with increased participation in active leisure while employment status was associated with decreased participation in active leisure.

Summary of regression models. Examining overarching patterns of associations between constraints and four different types of leisure activities is helpful to understand the general role of the pandemic as a constraint to leisure. Table A.11 shows a summary of which categories of constraints explained a statistically significant proportion of variance in which leisure activities. As shown in the table, home-based leisure had statistically significant intrapersonal and interpersonal constraints, while exercise leisure only had statistically significant intrapersonal constraints. Both creative leisure and active leisure had statistically significant constraints at both the intrapersonal and structural level. It is important to note that there were statistically significant intrapersonal constraints across every leisure factor.

DISCUSSION

College students participate in a wide variety of leisure activities, including passive leisure activities (e.g., hanging out with friends) (Cheng et al., 2004; Doerksen et al., 2012; Hickerson & Beggs, 2007), and active leisure activities (e.g., sports, weight training, and outdoor recreation) (Cheng et al., 2004; Hickerson & Beggs, 2007), to name a few. Leisure provides health and psychological benefits (Paffenbarger et al., 1991; Ragheb & Tate, 1993; Tinsley & Eldridge, 1995) which, coupled with the considerable discretionary time available to college students (Chen et al., 2016; Kleibler et al., 1986; Tanner, 2006), could be an opportunity to improve quality of life (Arnett, 2006). College students' leisure was likely affected by the COVID-19 pandemic, due to the mandates imposed during the pandemic (e.g., stay-at-home orders, masking, social distancing). Our findings do not suggest that students were picking up new activities because of the pandemic. Leisure time, in general, may have increased, but primarily for activities that were already common to the student. There was a new pattern of covariance among leisure activities revealed, such that a factor of home-based leisure combined activities commonly categorized as passive leisure (e.g., media use) with activities commonly completed in the home (e.g., chores, cooking). A cautious conclusion might be drawn that the pandemic also changed students' conceptions of leisure, as evidenced by the merging of previously held distinctions about types of leisure activities.

We applied the hierarchical constraints model to understand the role of the pandemic for college students' participation in a variety of different leisure activities. According to the hierarchical constraints model, individuals must resolve intrapersonal constraints (e.g., attitudes about or preferences for leisure), then interpersonal constraints (e.g., interactions with others that may alter or affect participation), and, finally, structural constraints (e.g., factors that prevent

participation such as lack of time, money, access, or opportunity) before participation in a leisure activity is actualized. There were many indicators conceptualized as pandemic-related constraints that had the expected relations with college students' leisure activities. However, there was varied support for the hierarchical constraints model. Below, we discuss the nature of leisure activities during the pandemic and then reflect on the hierarchical constraints model and its utility to understand participation in leisure activities.

Leisure Activities During the COVID-19 Pandemic

Preliminary research suggests that the COVID-19 pandemic affected daily life and well-being of college students (Lederer et al., 2020; Saurabh & Ranjan, 2020; Tasso et al., 2021; Perz et al., 2020; Son et al, 2020). There is little research examining the extent to which the pandemic mattered for college students' leisure. Overall, findings from the present study suggest that the pandemic affected the extent to which students engaged in leisure activities, such that participation in most activities increased or decreased during the pandemic. Media use was the only activity in which students did not report changes during the pandemic. Media use remained high before and during the pandemic, which is consistent with reports of media usage before the pandemic (Gidion et al., 2016; Twenge et al., 2019). Importantly, leisure is theorized to matter for college students because it has positive benefits for physical and psychological health and overall well-being (Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). However, some leisure activities are associated with negative developmental outcomes. For example, there is evidence that passive leisure, in general, and media use, in particular, are associated with negative outcomes (Kitsantas et al., 2015, Zhao & Zhou, 2020). If media remains an immutable part of college students' lives, then the field may benefit from exploratory studies that identify whether and how media might be leveraged to enhance development.

There were changes reported on nearly all leisure activities and most commonly in the direction of increased participation during the pandemic. A preliminary study found some increases in leisure activity during the pandemic, particularly related to creative/arts-based activities (Morse et al., 2021). Most of the increases in leisure were activities in which students already engaged, but increased involvement during the pandemic, such as yardwork and video games. A few activities increased that were new to students and that were initiated as a result of the pandemic, including cooking and taking walks. Nevertheless, the commonality across the leisure activities that increased during the pandemic was that they were naturally or easily modified to be "covid-safe." That is, many of the activities that increased could be done alone, in the home, and/or outside; factors which contributed to recommended "covid-safe" compliance. Activities that decreased in participation, such as playing board games, may have been difficult to adapt to be "covid-safe" because they are often enacted in a social setting. These findings help us to understand how students spent their time (e.g., using media, or increasing "covid-safe" activities), but does not distinguish the meaning of that time. An interesting next step might be to examine students' subjective assessments of leisure, such as what participation in particular activities, like "covid-safe" activities, means to them (e.g., whether they consider it leisure, their affect during the activity, motives for doing the activity; Unger & Kernan, 1983).

Although there were some patterns for leisure activities that had clear changes during the pandemic, conclusions could not be drawn about several of the leisure activities. That is, some activities, such as alcohol use and participating in sports, seemed to follow a bimodal distribution, where students either "picked up" or "dropped" the activity during the pandemic. The bimodal distribution of "picking up" or "dropping" leisure activities may reflect the bimodal response to pandemic-related restrictions (e.g., masking, social distancing), namely adherence or

non-adherence. One explanation may be that non-adherence led to "picking up" activities, whereas increased adherence led to "dropping" activities during the pandemic. Possible lines of future research might include studies testing other reasons (i.e., beyond adherence) the pandemic potentially affected leisure, such as through psychological reactance (e.g., desiring activities because they are restricted) or lack of opportunity (e.g., cancelled sporting events). Information about the ways in which the pandemic matters for leisure may support a positive transition into the post-COVID era.

Patterns of Covariation Across Leisure Activities: Did the Pandemic Matter?

A goal of this study was to examine the patterns of covariation across a set of leisure activities. Our findings suggest that there were four distinct categories, namely home-based leisure, creative leisure, exercise leisure, and active leisure. The factors were largely representative of or aligned with existing factors that have been identified in previous research (e.g., Meeks & Mauldin, 1990; Tinsley & Eldridge, 1995). There was one factor, home-based leisure, which may be explained by the pandemic. Home-based leisure comprised activities that are often categorized as passive leisure or indoor leisure, perhaps because both kinds of activities had few pandemic-related barriers. These findings are helpful to understand what activities college students were doing, but as noted earlier, does not indicate any particular subjective leisure experience. Future research should consider students' subjective experiences in home-based (or "covid-safe") activities, such as whether they are participating for extrinsic or intrinsic reasons. If participation occurs for extrinsic reasons (e.g., it was the only available opportunity or could be easily modifiable during the pandemic), then the experience and outcomes of it will be less beneficial than if participation occurs for intrinsic reasons (e.g., because of personal meaning or interest).

Four leisure activity factors were identified with clear patterns of loadings, identifying which activities loaded on which factors, except for sport. Sport might traditionally be positioned as an exercise leisure activity or share variance with physical activity (Hickerson & Beggs, 2007; Meeks & Mauldin, 1990; Tinsley & Eldridge 1995). In this study, sport did not load on the factor comprised of exercise activities (e.g., physical activity, walks), but instead covaried with activities in the active leisure factor. Although it makes intuitive sense that sport would represent active leisure, that it did not covary to a greater extent with physical activity was surprising. The lack of covariance between sport and physical activity may be because of pandemic restrictions allowing some activities to proceed more easily than others (i.e., sport was terminated temporarily, whereas physical activity could be pursued individually). An interesting next line of research might be to examine the convergence (or divergence) of sport and physical activity as we progress into the post-covid era. It may be that individual's perceptions of sport as leisure changed or the desire to participate in sport or be a sport spectator declined.

Associations between Pandemic-Related Constraints and Leisure Activity Participation

The Hierarchical Model of Constraints (Crawford et al., 1991) explains that individuals address leisure constraints in a specific order as they attempt participation, namely, intrapersonal followed by interpersonal and then structural constraints. Intrapersonal constraints include individuals' attitudes about and preferences for leisure. Interpersonal constraints arise from interactions with others, which can function to exclude individuals based on interpersonal conflict or maltreatment. Structural constraints are beyond immediate control and commonly include lack of time, financial resources, information and accessibility (Crawford & Godbey, 1987). Findings from the present study provide mixed support for the hierarchical constraints model.

There were several patterns of associations between the different types of constraints and the various leisure factors. First, there was no instance in which the three types of leisure constraints (i.e., intrapersonal, interpersonal, and structural) each explained a statistically significant proportion of variance in the leisure factor. Next, in two instances (i.e., for creative and exercise leisure) only intrapersonal constraints explained a statistically significant proportion of variance in leisure. Only having significant intrapersonal constraints for these two leisure factors may mean that college students were not able to overcome the constraints at this level of the hierarchy and as a result do not move onto overcoming either interpersonal or structural constraints. Next, home-based leisure exhibited a unique pattern of associations with the constraints, such that there were statistically significant intrapersonal and interpersonal constraints, but not structural. Similarly, it may have been that students were not able to overcome intrapersonal and interpersonal constraints and therefore unable to move onto overcoming structural constraints. Finally, creative and active leisure each had significant intrapersonal and structural constraints, but not interpersonal. Such pattern does not make conceptual sense in regard to the hierarchical model. It may be that the model is supported by some but not all types of leisure activities. In the context of this study, it may be that it supports exercise and home-based leisure but not creative and active leisure. I

This mixed support for the hierarchical model of constraints (Crawford et al., 1991) may also be because the process of addressing leisure constraints is more complex than the model specifies. There are at least two ways in which the constraints could be re-considered to address the complex process involving constraints to leisure. First, there may be an interactional process among the constraints. For example, whether intrapersonal factors indeed function to constrain leisure may depend on the extent of interpersonal factors. Interactions among each of the factors

may be theoretically plausible and may explain a more complex process of constraint negotiation, namely a process involving mediated and moderated effects. Second, constraints to leisure may be better conceptualized as involving cumulative constraints. Cumulative risk is a common conceptual approach in developmental psychopathology that involves accounting for the co-occurrence, co-morbidity, or compounding nature of risks (Evans et al., 2013). A cumulative risk approach to constraints might suggest that the accumulation of constraints explains the extent of participation in a leisure activity. Nevertheless, the hierarchical model of constraints likely oversimplifies the way in which leisure activities and constraints to them are approached by college students.

Another explanation for the mixed support may be related to the conceptualization of the constraint categories as defined in the hierarchical model of constraints (Crawford et al., 1991) and our operationalization of the various constraints in the present study. On the one hand, the constraint categories may require more nuanced conceptualizations to address potential overlap of some factors which may function as constraints in multiple categories. For example, moving home to a house with younger siblings may have constrained the leisure of college students in multiple ways. They may have had less time for leisure (i.e., structural constraint) due to the added responsibility of caring for young siblings while parents were at work, while also deferring to the leisure preferences of the sibling (i.e., interpersonal constraint). These structural and interpersonal constraints may have also made continuing college friendships even more difficult (i.e., adaptation challenges; intrapersonal constraints). On the other hand, the indicators selected for this study to operationalize the constraint categories may lack content validity. The present study utilized a data set comprising indicators derived by the research team as constraints an expert panel identified as relevant in the context of the COVID-19 pandemic. As with all

conceptual models, more specificity in defining the focal constructs (e.g., constraints) and in explaining the associations among them (e.g., the process of addressing constraints) will be necessary to advance the model and its applicability to understanding leisure.

Whereas there was mixed support for the hierarchical nature of the model, there was certainly support that pandemic-related constraints served as barriers to participation. There were several indicators that were significant predictors across leisure factors and within each constraint category: 25% of the intrapersonal indicators (7 of 28) were significant, 8% of the interpersonal indicators (1 of 12) were significant, and 20% of the structural indicators (4 of 20) were significant. Thus, intrapersonal and structural constraints mattered most for college students' leisure, which aligns partially with expectations. Previous research shows that structural constraints (specifically, lack of time) are often the most significant for college students (Young et al., 2003; Cho & Price, 2018; Elkins et al., 2007). Whereas the data suggest there were certainly structural constraints to leisure, intrapersonal constraints were as salient in the context of the COVID-19 pandemic. Preliminary research from the pandemic supports that psychological adjustment was a major challenge for college students during the pandemic (Fruehwirth et al., 2021; Hazma et al., 2021; Okado et al., 2021), which may help explain why intrapersonal constraints were significant barriers to leisure.

Within the intrapersonal constraints category, adaptation challenges were the most frequent indicators that were significant predictors of leisure and for each type of leisure. College students struggled to navigate changing responsibilities during the COVID-19 pandemic, which constrained leisure participation. Adjusting to friend responsibilities was the most common challenge that affected leisure. Friendships are particularly important for college students and can function to inhibit or promote positive development (Antonio, 2004; Demir et al., 2013;

Pitman & Richmond, 2008). Moreover, navigating and maintaining relatively new and potentially unstable friendships formed during college could be a challenge, especially for students who were accustomed to participating in leisure in a group and/or social setting. The social isolation that happened during the COVID-19 pandemic likely perpetuated the adaptation challenges in regard to friendship responsibilities (Fruehwirth et al., 2021; Hazma et al., 2021; Okado et al., 2021). A next step in leisure research might be to explain the reasons that friends constrained leisure during the pandemic, such as by eliminating friends to participate in leisure activities with or by causing psychological challenges related to maintaining friendships during the pandemic.

In general, interpersonal indicators were not significant constraints to college students' leisure. There was only one instance in which an indicator of interpersonal constraints was a significant predictor, such that having insufficient space at home constrained students' home-based leisure. Space may function to constrain leisure during the COVID-19 pandemic context in three ways. First, many individuals, especially those who adhered to pandemic-related restrictions, strived to find leisure at home. However, the physical space available at home may not accommodate all home-based leisure activities (e.g., kitchen too small to cook). Next, some individuals may have perceived insufficient space because there were many other individuals in the home, which might limit personal leisure activities in which individuals prefer to engage alone (e.g., media use). Third, the lack of space may have constrained individual's perceptions of freedom, which meant that some activities that were typically enjoyable became obligatory tasks (e.g., household chores). Future research studies on interpersonal aspects of home-based leisure may be warranted.

Within the structural constraints, there was not a consistent pattern of statistically significant constraints across leisure factors. There was, however, a pattern that structural constraints were particularly important for active leisure. Structural constraints may be important for active leisure activities (sports, yardwork, home projects) because they are more demanding than other activities. For example, active leisure typically requires larger time commitments as opposed to other activities (e.g., reading, walks, or media use). Committing to play a sport game, do yard work, or complete a do-it-yourself project might require having blocks of free time or may be activities that individuals engage in on irregularly bases (e.g., on weekends). Active leisure activities are also more demanding financially. Active leisure activities may also be more costly to participate in, such that sports often include fees and equipment and do-it-yourself projects often involve supplies. In sum, although structural constraints do not appear to be major constraints to college students' leisure overall, they may be particular constraints for certain kinds of demanding leisure activities.

Implications for Practice

The findings of this study apply to practitioners who work with college students. These findings may be helpful to inform continued responses to the COVID-19 pandemic, as well as future short- and long-term crises that interrupt the typical college environment. Leisure is particularly important for college students who are in a period of identity exploration, because it provides both immediate and long-term benefits, such as increased happiness, sense of belonging, physical health, and phycological wellbeing (Arnett, 2006; Caldwell & Witt, 2011; Larson et al., 2006). An overarching lesson for practice from this study is that college students face various constraints to leisure and the nature of those constraints varies dependent on leisure

type. Identifying constraints to leisure can help practitioners working with college students to proactively address such constraints and, thus, foster leisure participation.

Especially in times of uncertainty or health crisis, practitioners should adapt existing leisure activities or create new activities that can be enacted through the particular crisis. There was increased participation in activities that could be adapted to be "covid-safe" (i.e., alone, in a family unit, outside, and/or following CDC public health guidelines), and there are many examples of ways in which activities were adapted to be "covid-safe." For example, fitness classes were offered virtually or outdoor activities, such as pickleball (a relatively distanced sport), were appealing. As practitioners consider how to create "safer" activities, time and cost commitment should be considered. Findings from this study suggest that activities that required a smaller time and monetary commitment had higher participation. Practitioners may want to create opportunities that are shorter in duration and higher in frequency rather than long duration, and low frequency activities.

It is also important for practitioners to consider the value of friendships for college students and the role of friendships in promoting positive development (Antonio, 2004; Demir et al., 2013; Pitman & Richmond, 2008). Studies have found that many college students report "time with friends" as their top leisure activity and a decline in leisure activity participation when friends are not available to join them (Cheng et al., 2004; Doerksen et al., 2012; Elkins et al., 2007; Liechty et al., 2006). Practitioners should make a concerted effort to create leisure opportunities that foster the development and continuation of friendships. Promoting friendships can be exceptionally difficult during times that students are residing at primary residence (i.e., parents' home) rather than at universities (i.e., dorms, off-campus apartments, in close proximity to college friends). However, when students are away from universities may be when they feel most

disconnected, thus, creating a great opportunity for practitioners to provide opportunities that promote leisure participation and foster friendships among college students. When not in a centralized geographic location university-sponsored efforts may need to happen virtually, but, when students are at universities it is important that leisure offerings allow safe participation (e.g., "covid-safe" activities), as well as social opportunity.

Limitations and Future Directions

The COVID-19 pandemic presented a new context for leisure research. Although this study offered important findings related to constraints to college students' leisure, the study is not without limitations. There are some limitations to keep in mind in interpreting the findings from this study. Two limitations pertain to the conceptualization and operationalization of the focal study concept, namely leisure. Two limitations are methodological and concern the design and measures. Below, we discuss these limitations and guidance for future research.

One important limitation to consider in interpreting these findings is the definition of the focal construct: leisure. The project from which the data for the present study were derived conceptualized leisure objectively, as a particular set of activities in which college students participate, and from the researcher's perspective using activities identified a priori by the research team as representing leisure. The data did not include subjective interpretations of leisure, such as whether the respondent considered the activity leisure or whether the activity occurred during the respondents' free time. The findings related to cooking may underscore the distinction between subjective and objective leisure. Cooking decreased among students who cooked before the pandemic, but increased among students who did not cook before the pandemic. Picking up cooking during the pandemic may be a sign that it was a leisure activity and dropping cooking may have been a sign that it was approached as an obligatory activity. The

present study provided insight about how college students spent their time in various leisure activities during the pandemic. Future research may consider adding indicators that assess whether the respondent viewed the activity as leisure and/or subjective states during the activity.

The activities included in the study also lacked information to drawn precise conclusions about the pandemic. For example, it was difficult to interpret the specific nature of activities and whether they may be considered "covid-safe." A "covid-safe" activity may mean it could be done alone, in a family unit, or following CDC public health guidelines. As an example, physical activity would be considered "covid-safe" if a student was going for a jog outdoors and either solitary or socially distanced from others; physical activity in a gym would not be considered "covid-safe" because it was indoors. Similarly, board games are often played in a social setting with others and might be considered "covid-safe" if the group was a family unit, but not "covid-safe" if the group involved individuals from multiple households. Future research may include multiple indicators to better capture the context of leisure activities including, for example, the context of the activity (e.g., indoor/outdoor) and who was present (e.g., individual/group). Contextual descriptors are especially important in research concerning situational crises, like the COVID-9 pandemic.

Constraints were conceptualized as intrapersonal, interpersonal, and structural constraints using the hierarchical model constraints (Crawford et al., 1991). The constraints were operationalized in the present study to address the COVID-19 pandemic as a constraint to leisure. There were 15 indicators that were categorized by the research team as either intrapersonal, interpersonal, or structural constraints. Thus, it is possible that other indicators of constraints were left out because they were not included in the larger study. For example, the lack of broad patterns among structural constraints may be somewhat explained by the indicators

used to measure structural constraints. Structural constraints might be more accurately indicated by general items such as: availability of leisure time, availability of equipment desired for leisure participation, ability to travel to place where leisure activity occurs or financial ability to participate in leisure. The present research could be expanded using structural equation modeling to test whether a three-factor model fits the data well. Future research should include conceptual and empirical scrutinization of the conceptualization and operationalization of constraints, especially in specific contexts.

This study had a cross sectional approach and used correlational data that limits ability to predict causality. If future research wanted to predict causality in shift of leisure and constraints to leisure, it would need to incorporate a longitudinal design and experiments. Data was collected right at the onset of the pandemic (April – June 2020). As the pandemic persisted there may have been greater changes in the types or quantity of leisure that people participated in. It may be premature to generalize these trends to the entirety of the COVID-19 pandemic, especially as guidance and mandates about masking, social distancing, indoor recreation spaces, in-person vs virtual schooling and general best practices differed based on location and time period (i.e., different guidelines in April 2020 vs April 2021 and the introduction of vaccines).

CONCLUSION

Leisure is important because through participation individuals find meaning or purpose as well as report higher physical and phycological wellbeing (Paffenbarger et al., 1991; Tinsley & Eldridge, 1995; Tinsley & Tinsley, 1986). College students are uniquely situated to benefit from leisure because they simultaneously experience increased discretionary time, greater control over their time use choices, and have greater opportunities available to them than individuals in high school or beyond college. This study examined leisure activity participation among college students in a specific context, namely during the COVID-19 pandemic. Factors related to the pandemic were used as indicators of constraints and tested for alignment with the hierarchical constraints model (Crawford et al., 1991). Overall, findings suggest that college students were not adopting new leisure activities at the beginning of the pandemic, but were instead shifting time use among activities in which they had historically participated. A new factor of activities that shared common variance emerged, namely home-based leisure representing passive and indoor leisure activities. Although there was varied support for the hierarchical constraints model, there was evidence of several pandemic-related factors acting as constraints to college students' leisure. The most common constraints were intrapersonal, especially those in relation to adapting to new or changing work, school, family, and friend responsibilities. Structural factors primarily functioned to constrain active leisure activities. Findings suggest the need to expand the hierarchical constraints model to account for more complex processes of leisure constraint negotiation and how this may differ across types of leisure activities. This study may help guide future researchers as they study the long term affects the COVID-19 pandemic had for college students, their time use, and overall wellbeing.

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APPENDIX A

Table A.1

Descriptive Statistics and Correlations for Study Variables

Variable	*n*	*M*	*SD*	*Skewness*	*Kurtosis*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Media	2220	4.26	1.09	-1.59	0.10	-													
Cooking	2217	3.21	1.23	0.86	0.10	.19**	-												
Chores	2214	3.29	1.01	-0.94	0.10	.23**	.37**	-											
Games	2213	2.29	1.17	-0.52	0.10	.00	.12**	.08**	-										
Reading	2192	2.55	1.34	0.40	0.10	.02	.13**	.13**	.17**	-									
Arts	2208	2.32	1.28	-0.76	0.10	.02	.14**	.14**	.22**	.24**	-								
Walks	2215	2.75	1.31	-1.01	0.11	.06**	.18**	.18**	.20**	.16**	.16**	-							
Physical activity	2213	3.09	1.33	-0.48	0.10	.06**	.14**	.17**	.15**	.11**	.03	.33**	-						
Yardwork	2220	1.85	1.11	-1.54	0.10	-.11**	.02	.13**	.16**	.13**	.13**	.11**	.14**	-					
Home projects	2208	2.08	1.17	-1.05	0.10	-.07**	.10**	.15**	.23**	.13**	.32**	.13**	.11**	.34**	-				
Sports	2214	1.56	1.02	-1.17	0.10	.06**	-.02	-.06**	.26**	.10**	.12**	.15**	.18**	.25**	.30**	-			
Video games	2238	3.00	1.61	2.66	0.10	.06**	-.02	.00	.07**	.01	-.04	-.10**	-.07**	.06**	.03	.02	-		
Pets	2218	2.78	1.60	-0.19	0.10	-.11**	.03	.16**	.08**	.08**	.16**	.18**	.10**	.21**	.15**	.02	.05*	-	
Alcohol use	2218	2.04	1.23	-0.23	0.10	-.05*	.11**	.05*	.15**	-.01	.06**	.13**	.07**	.11**	.17**	.19**	.02	.10**	-

Notes $^{*}p < .05$. $^{**}p < .01$.

Table A.2

Cross Tabulations and Chi-square Tests of Participation in 14 Leisure Activities

Activity	Mean	SD	Yes	No	Less	Same	More	X^2 (df = 2)	Phi	ASRs
Media	4.26	(1.09)	90.4	9.6	3.78	24.6	68.6	1.04, p=.594	0.02	n/a
Cooking	3.21	(1.23)	76.5[ab]	23.5	11.6a	36.1	52.3[b]	30.14, p<.001	0.12	a = 4.9, b = -4.2
Chores	3.29	(1.01)	92.7[a]	7.3	12.2	53.8[a]	34.0	9.65, p< 01	0.07	a = 3.0
Games	2.29	(1.17)	61.9[ab]	31.8	15.8[a]	47.4[b]	36.8	35.80, p<.001	0.13	a = 5.2, b = -4.9
Reading	2.55	(1.34)	60.0[a]	40.0	13.4	46.5[a]	40.1	15.59, p<.001	0.09	a = -3.9
Arts	2.32	(1.28)	52.9[ab]	47.1	13.4	47.3[a]	39.2[b]	57.57, p<.001	0.17	a = -7.5, b = 6.4
Walks	2.75	(1.31)	56.0[ab]	44.0	16.7a	31.9	51.4[b]	132.33, p<.001	0.26	a = 11.4, b = -6.5
Physical activity	3.09	(1.33)	76.2[abc]	23.8	27.8a	33.7[b]	37.6[c]	85.68, p<.001	0.21	a = 9.2, b = -5.2 c = 3.5
Yardwork	1.85	(1.11)	32.6[ab]	63.7	11.8	64.3[a]	23.9[b]	45.24, p<.001	0.15	a = -6.7, b = 5.3
Home projects	2.08	(1.17)	45.2[ab]	54.8	13.0a	56.0[b]	31.0	27.44, p<.001	0.12	a = 3.4, b = -5.1
Sports	1.56	(1.02)	40.8[abc]	59.2	32.1a	59.6[b]	8.3[c]	506.10, p<.001	0.51	a=19.3, b=-22.5, c=7.2
Video games	3.00	(1.61)	59.0[ab]	41.0	9.2	41.4[a]	49.4[b]	109.24, p<.001	0.23	a = -10.4, b = 8.9
Pets	2.78	(1.60)	57.6[ab]	42.4	11.1	46.0[a]	13.0[b]	161.96, p<.001	0.29	a = -11.8, b = 12.3
Alcohol use	2.04	(1.23)	56.6[abc]	43.4	22.4a	54.7[b]	22.9[c]	254.17, p<.001	0.36	a = 5.7, b = -15.3, c = 12.4

Table A.3

Qualitative Interpretations of the Effects of the Pandemic on Leisure Activity Participation

Activity	Qualitative Descriptions
Media	high participation; no pandemic effect
Cooking	moderate participation; if before, do less; if not before, do more
Chores	moderate participation; no pandemic effect
Games	low participation; if before, do less
Reading	moderate participation; no pandemic effect
Arts	low participation; if before, do more
Walks	moderate participation; if before, do less; if not before, do more
Physical activity	moderate participation; if before, do less
Yardwork	low participation; if before, do more
Home projects	low participation; if before, do less
Sports	low participation; If before, either do more or less
Video games	moderate participation; If before, do more
Pets	moderate participation; if before, do more
Alcohol use	low participation; If before, either do more or less

Note. low participation <2.5. moderate participation < 4.0. high participation >4.0. 1 = never, 5 = more than four hours a week.

Table A.4

Rotated Factor Matrix – Four Factor Solution

	Factor			
Variable	1	2	3	4
Media	0.40	-0.22	0.02	0.04
Cooking	0.46	0.02	0.15	0.16
Chores	0.69	0.18	0.07	0.11
Arts	0.10	0.14	0.67	0.00
Reading	0.11	0.10	0.30	0.17
Games	0.00	0.19	0.31	0.28
Walks	0.15	0.04	0.19	0.50
Physical activity	0.14	0.12	-0.01	0.55
Yardwork	0.03	0.54	0.09	0.11
Sports	-0.28	0.43	0.15	0.33
Home projects	0.05	0.55	0.34	0.07

Note. Rotation converged in 6 iterations.

Table A.5

Rotated Factor Matrix – Three and Five Factor Solution

	3-Factor Solution				5-Factor Solution				
Variable	1	2	3		1	2	3	4	5
Media	-0.13	**0.45**	0.03		**0.36**	0.02	0.08	-0.14	-0.20
Cooking	0.15	**0.49**	0.15		**0.55**	0.13	0.11	-0.02	0.07
Chores	0.20	**0.56**	0.14		**0.63**	0.09	0.14	0.20	-0.07
Arts	**0.48**	0.16	0.00		0.08	**0.72**	0.01	0.11	0.03
Reading	**0.29**	0.14	0.13		0.11	**0.29**	0.16	0.09	0.07
Games	**0.37**	0.03	0.24		0.08	**0.29**	0.20	0.10	0.28
Walks	0.19	0.18	**0.45**		0.15	0.20	**0.50**	0.03	0.09
Physical activity	0.08	0.11	**0.60**		0.13	0.00	**0.58**	0.11	0.09
Yardwork	**0.43**	-0.07	0.15		-0.01	0.10	0.12	**0.60**	0.12
Sports	**0.42**	-0.34	0.33		-0.17	0.11	0.20	0.23	**0.64**
Home projects	**0.65**	0.00	0.07		0.07	0.34	0.04	**0.46**	0.23

Note. Rotation converged in 5 iterations. Bolding represents highest factor loading for the activity.

Table A.6

Descriptive Statistics and Correlations for Factor Variables

Factor	*M*	*SD*	*Skewness*	*Kurtosis*	1	2	3	4
Home-based leisure	3.59	(.79)	-.39	-.18	-			
Creative leisure	2.38	(.87)	.40	-.43	.18**	-		
Exercise leisure	2.92	(1.08)	.13	-.73	.23**	.24**	-	
Active leisure	1.83	(.81)	.81	.55	-.19	.34**	.23**	-

*Notes *p < .05. **p < .01.*

Table A.7

Regression Coefficients From the Hierarchical Linear Regression Model Predicting Home-based Leisure From Three Sets of Constraints

Items	R^2 Δ	*b*	*(SE)*	*B*	*p*
Control	.052				
Age		-0.01	(0.39)	-0.04	0.361
Female[x]		0.18	(0.01)	0.12	0.002
Nonbinary[x]		-0.58	(0.06)	-0.05	0.159
Black only[y]		0.18	(0.41)	0.04	0.279
Asian only[y]		0.24	(0.17)	0.12	0.001
Hispanic only[y]		0.13	(0.08)	0.07	0.059
Other only[y]		-0.69	(0.07)	-0.10	0.003
Biracial only[y]		0.22	(0.24)	0.09	0.018
Multiracial Only[y]		0.08	(0.09)	0.01	0.808
Intrapersonal constraints	.043				
Family adaptations		0.07	(0.02)	0.12	0.003
Work adaptations		0.01	(0.02)	0.03	0.509
School adaptations		-0.03	(0.03)	-0.04	0.315
Friend adaptations		0.04	(0.02)	0.07	0.053
Adherence		0.11	(0.05)	0.09	0.016
Cognitive leisure attitudes		0.09	(0.06)	0.08	0.141
Affective leisure attitudes		0.06	(0.06)	0.06	0.306
Interpersonal constraints	.015				
# of people in home		-0.01	(0.02)	-0.02	0.543
Change in residence		-0.03	(0.03)	-0.04	0.324
Space sufficiency		-0.18	(0.06)	-0.12	0.002
Structural constraints	.006				
Caregiver		-0.10	(0.06)	-0.06	0.112
Virtual school transition		-0.01	(0.03)	-0.02	0.644
Hours of employment		0.05	(0.03)	0.06	0.144
Employment status		-0.04	(0.06)	-0.03	0.482
Essential worker		-0.02	(0.06)	-0.01	0.730

*Notes. *p < .05. **p < .01. [x] reference group male. [y] reference group White only.*

Table A.8

Regression Coefficients Table from the Hierarchical Linear Regression Mode Predicting Creative Leisure from Three Sets of Constraints

Items	$R^2 \Delta$	*b*	*(SE)*	*B*	*p*
Control	.028				
Age		-0.02	(0.01)	-0.05	0.198
Female[x]		0.24	(0.07)	0.13	0.001
Nonbinary[x]		0.22	(0.45)	0.02	0.615
Black only[y]		-0.38	(0.21)	-0.07	0.070
Asian only[y]		-0.05	(0.10)	-0.02	0.579
Hispanic only[y]		-0.24	(0.09)	-0.11	0.007
Other only[y]		-0.25	(0.29)	-0.03	0.398
Biracial only[y]		-0.18	(0.11)	-0.06	0.121
Multiracial Only[y]		0.66	(0.40)	0.06	0.101
Intrapersonal constraints	.037				
Family adaptations		0.05	(0.03)	0.07	0.099
Work adaptations		-0.01	(0.03)	-0.01	0.770
School adaptations		-0.03	(0.04)	-0.04	0.435
Friend adaptations		0.09	(0.03)	0.13	0.001
Adherence		0.03	(0.06)	0.02	0.555
Cognitive leisure attitudes		-0.10	(0.08)	-0.07	0.205
Affective leisure attitudes		0.20	(0.08)	0.15	0.009
Interpersonal constraints	.002				
# of people in home		0.01	(0.02)	0.02	0.686
Change in residence		0.01	(0.03)	0.01	0.793
Space sufficiency		0.06	(0.07)	0.03	0.427
Structural constraints	.003				
Caregiver		0.17	(0.08)	0.08	0.035
Virtual school transition		-0.01	(0.03)	-0.01	0.765
Hours of employment		-0.03	(0.04)	-0.03	0.464
Employment status		-0.03	(0.07)	-0.02	0.661
Essential worker		-0.06	(0.07)	-0.03	0.400

*Notes *p < .05. **p < .01.[x] reference group male. [y] reference group White only.*

Table A.9

Regression Coefficients Table From the Hierarchical Linear Regression Model Predicting Exercise Leisure From Three Sets of Constraints

Items	$R^2 \Delta$	*b*	*(SE)*	*B*	*p*
Control	.018				
Age		0.01	(0.02)	0.02	0.694
Female[x]		0.14	(0.09)	0.06	0.116
Nonbinary[x]		-0.64	(0.56)	-0.04	0.249
Black only[y]		-0.67	(0.27)	-0.09	0.014
Asian only[y]		-0.29	(0.12)	-0.10	0.016
Hispanic only[y]		-0.12	(0.11)	-0.04	0.279
Other only[y]		-0.31	(0.37)	-0.03	0.408
Biracial only[y]		-0.28	(0.15)	-0.07	0.055
Multiracial Only[y]		0.83	(0.56)	0.06	0.140
Intrapersonal constraints	.024				
Family adaptations		0.05	(0.04)	0.06	0.166
Work adaptations		0.08	(0.04)	0.10	0.016
School adaptations		-0.05	(0.04)	-0.05	0.241
Friend adaptations		0.05	(0.03)	0.06	0.129
Adherence		0.03	(0.07)	0.02	0.636
Cognitive leisure attitudes		0.08	(0.10)	0.04	0.447
Affective leisure attitudes		0.09	(0.09)	0.05	0.363
Interpersonal constraints	.03				
# of people in home		0.02	(0.03)	0.03	0.434
Change in residence		-0.05	(0.04)	-0.05	0.209
Space sufficiency		0.02	(0.09)	0.01	0.846
Structural constraints	.07				
Caregiver		-0.10	(0.10)	-0.04	0.322
Virtual school transition		-0.07	(0.04)	-0.07	0.085
Hours of employment		-0.04	(0.05)	-0.04	0.361
Employment status		0.03	(0.09)	0.01	0.726
Essential worker		-0.01	(0.09)	0.00	0.922

*Notes *p < .05. **p < .01.[x] reference group male. [y] reference group White only.*

Table A.10

Regression Coefficients Table From the Hierarchical Linear Regression Model Predicting Active Leisure From Three Sets of Constraints

Items	$R^2 \Delta$	*b*	*(SE)*	*B*	*p*
Control	.047				
Age		-0.01	(0.01)	-0.03	0.400
Female[x]		-0.26	(0.06)	-0.16	0.000
Nonbinary[x]		-0.61	(0.36)	-0.06	0.093
Black only[y]		-0.21	(0.17)	-0.04	0.223
Asian only[y]		-0.19	(0.08)	-0.09	0.015
Hispanic only[y]		-0.08	(0.07)	-0.04	0.261
Other only[y]		-0.02	(0.24)	0.00	0.939
Biracial only[y]		-0.18	(0.09)	-0.07	0.050
Multiracial Only[y]		-0.13	(0.33)	-0.01	0.699
Intrapersonal constraints	.054				
Family adaptations		0.03	(0.02)	0.06	0.173
Work adaptations		0.01	(0.02)	0.01	0.722
School adaptations		0.01	(0.03)	0.01	0.833
Friend adaptations		0.06	(0.02)	0.10	0.007
Adherence		-0.04	(0.05)	-0.03	0.369
Cognitive leisure attitudes		-0.17	(0.07)	-0.15	0.008
Affective leisure attitudes		0.12	(0.06)	0.10	0.059
Interpersonal constraints	.003				
# of people in home		0.02	(0.02)	0.04	0.244
Change in residence		-0.01	(0.03)	-0.01	0.806
Space sufficiency		0.00	(0.06)	0.00	0.988
Structural constraints	.047				
Caregiver		0.30	(0.07)	0.18	0.000
Virtual school transition		-0.04	(0.03)	-0.05	0.174
Hours of employment		0.09	(0.03)	0.11	0.004
Employment status		-0.15	(0.06)	-0.09	0.014
Essential worker		-0.03	(0.06)	-0.02	0.671

*Notes *p < .05. **p < .01.[x] reference group male. [y] reference group White only.*

Table A.11
Summary of Statistically Significant Leisure Constraints

Significant Constraints			
	Intrapersonal Constraints	**Interpersonal Constraints**	**Structural Constraints**
Home-based Leisure	family adaptation challenges adherence to public health guidelines	space sufficiency	no significant constraints
Creative Leisure	friend adaptation challenges affective leisure attitudes	no significant constraints	caregiving
Exercise Leisure	work adaptation challenges	no significant constraints	no significant constraints
Active Leisure	friend adaptation challenges cognitive leisure attitudes	no significant constraints	caregiving hours of work per week employment status

APPENDIX B

Table B.1

Rotated Factor Matrix – Seven Factor Solution

	Factor						
Variable	1	2	3	4	5	6	7
Media	0.37	0.00	-0.25	0.04	-0.06	0.20	0.11
Cooking	0.56	0.12	-0.01	0.13	0.13	-0.07	-0.02
Chores	0.63	0.08	0.14	0.12	-0.02	0.12	-0.01
Arts	0.09	0.72	0.10	-0.01	0.08	0.14	-0.10
Reading	0.11	0.32	0.11	0.20	-0.09	-0.01	0.07
Games	0.04	0.32	0.11	0.28	0.23	-0.05	0.23
Walks	0.13	0.16	0.01	0.53	0.13	0.16	-0.14
Physical activity	0.14	0.00	0.11	0.53	0.03	0.04	-0.07
Yardwork	0.02	0.08	0.62	0.12	0.04	0.19	0.10
Sports	-0.22	0.15	0.37	0.31	0.31	-0.19	0.09
Home projects	0.08	0.32	0.47	0.06	0.22	0.07	0.01
Alcohol use	0.06	0.01	0.09	0.07	0.49	0.07	0.02
Pets	0.08	0.10	0.14	0.11	0.08	0.54	0.06
Video games	0.01	-0.01	0.05	-0.09	0.02	0.05	0.43

Note. Rotation converged in 7 iterations.

Leisure Activity Inventory

For EACH of the following activities, please indicate the following:

How often do you CURRENTLY do this activity (hours per week)?
1 = Never
2 = <1 hr/wk
3 = 1-2 hrs/wk
4 = 2-4 hr/wk
= >4 hr/wk

Is this something you did BEFORE the pandemic?
1 = yes
0 = no

How does your time spent NOW compare to what you did BEFORE the pandemic?
1 = spend LESS time now
2 = SAME amount of time
3 = spend MORE time now

Activity

1. Playing video games
2. Watching media (e.g., TV, streaming shows or movies)
3. Cooking/baking
4. Household chores (e.g., cleaning, laundry)
5. Yard work (e.g., gardening, mowing)
6. Arts/crafts
7. Reading for pleasure
8. Games (e.g., board games, cards)
9. Spending time with pets (e.g., fostering, walking dogs)
10. Taking leisurely walks
11. Physical activity (e.g., working out or exercising)
12. Organized sports (e.g., on a team or individually)
13. Home projects (e.g., do-it-yourself projects)
14. Drinking alcohol/substance use

Leisure Constraints Measures

Intrapersonal constraints

<u>Adaptation Challenges</u>

How challenging to adapt family responsibilities during pandemic?
How challenging to adapt work responsibilities during pandemic?
How challenging to adapt school responsibilities during pandemic?

How challenging to adapt friend responsibilities during pandemic?

1 = not at all
2 = not very
3 = somewhat
4 = pretty
5 = extremely

Adherence

Which best describes the extent to which you followed social distancing guidelines?

I have not followed social distancing at all.
I occasionally followed social distancing.
I have mostly followed social distancing.
I have totally and completely followed social distancing.

What best describes the extent to which you have followed the 'shelter-in-place' order?

I have not followed 'sheltered-in-place' at all.
I occasionally followed 'sheltered-in-place'.
I have mostly followed 'sheltered-in-place'.
I have totally and completely followed 'sheltered-in-place'.

Cognitive Leisure Attitudes

Think about your life IN GENERAL: Read the following statements about LEISURE ATTITUDES and indicate the extent to which you agree or disagree.

leisure wise use of time
leisure beneficial
leisure contributes to health
leisure increases happiness
leisure renews energy
leisure helps relax

1 = strongly disagree
2 = disagree
3 = neutral
4 = agree
5 = strongly agree

Affective Leisure Attitudes

Think about your life IN GENERAL: Read the following statements about LEISURE ATTITUDES and indicate the extent to which you agree or disagree.

leisure gives pleasure
leisure good for me
take my time during leisure
leisure is refreshing
leisure not wasted time

like my leisure activities
1 = strongly disagree
2 = disagree
3 = neutral
4 = agree
5 = strongly agree

Interpersonal Constraints

# of people in home

How many people (not counting yourself) were living in your home?
Open-ended

Space Sufficiency

How would you describe the amount of space in your home and whether it is sufficient for you?
Perceptions of space sufficiency
There is definitely not enough space for me.
There is not very much space for me.
There is just enough space for me.
There is a lot of space for me.
There is definitely more than enough space for me.

Change in Residence

Has your living arrangement changed DURING the pandemic (e.g., you moved somewhere else, people who lived with you moved out, etc.)?
Yes
No

Structural Constraints

Caregiving
Do you have any of the following caregiver responsibilities? Select all that apply.
Caring for children under the age of 18.
Caring for parents or older adults.
Caring for spouse or partner.
Caring for friend or roommate who lives with you.

Virtual School Transition

What effect did your transition to online course have on your workload for school?
significantly decreased my workload
somewhat decreased my workload
my workload did not change

somewhat increased my workload
significantly increased my workload

Hours of Employment

Approximately how many hours per week did/do you work?
<10 hours/week
10-20 hours /week
20-30 hours/week
30 or more hours/week

Employment Status

Do you still have your job at the time of this survey?
Yes
No

Essential Worker

Did your employer deem you an "essential worker" who must report to work during the pandemic?
Yes
No
I don't know