Using The Reasoned Action Approach To Analyze Differences In Physical Activity Behaviors of College Student Athletes During The Early COVID-19 Shutdown.

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Abstract

Background: The purpose of this study was to utilize the Reasoned Action Approach (RAA) to evaluate the impact of COVID-19 on the physical activity (PA) behaviors of college student athletes, including aerobic, muscle strengthening, and sport-specific conditioning PA. Theory-based determinants of intentions to all three PA behaviors were assessed using multiple regression analyses.

Results: Outcomes demonstrated that perceived norms, perceived behavioral control, and attitudes predicted a significant amount of the variance of intentions for muscle strengthening PA (44.8%) and a moderate amount for aerobic PA (28.5%) and conditioning PA (35.2%). Additionally, intentions, attitudes, perceived norms, and perceived behavioral control were compared between PA type using a repeated measures ANOVA, and results showed there were significant differences.

Conclusion: These findings can assist public health practitioners, coaches, and trainers to develop and implement more effective interventions and training sessions for all types of PA with college athletes.

Introduction

The COVID-19 pandemic has largely impacted society since early 2020 (Downs, Van Hooymissen, Lafrenz, & Julka, 2014). This pandemic first began in Wuhan, China in December of 2019, then spread to other countries, eventually making its way to the United States (U.S.). COVID-19 is highly contagious and causes breathing problems, body aches, extreme fatigue, and many other serious health issues (CDC, 2020). The pandemic has made a significant impact on millions of lives worldwide, leading to closures of businesses, furloughing of employees, and suspension of sports. Mandatory lockdowns were used in an attempt to contain the spread; this forced individual to remain in their homes for any reason other than essential activities. Athletes at all levels were unable to continue traditional training and competition. Furthermore, as colleges closed campuses and transitioned to remote learning, student athletes' routines drastically shifted. Athletes were largely left on their own to continue training and remain physically active.

Past research has identified various factors that influence PA behaviors, such as time commitment and social barriers (Downs, Van Hooymissen, Lafrenz, & Julka, 2014). Further, college students involved in club or intramural sports were more likely to meet the recommended amount of moderate to vigorous PA compared to those not participating (Dinger, Brittain, & Hutchinson, 2014). While there is a multitude of research on PA behaviors among college students' pre-pandemic, little is known of how the pandemic altered these behaviors for college athletes. Gaining greater insight into how the pandemic influenced PA behaviors among college athletes will be beneficial to determine how outside factors can influence behavior.

There are multiple forms of PA that have been identified by the U.S. Office of Disease Prevention and Health Promotion (ODPHP). Currently, it is recommended that adults engage in at least 150 minutes of moderate-intensity aerobic exercise, 75 minutes of vigorous-intensity aerobic exercise, or a combination

of both intensities each week (Office of Disease Prevention and Health Promotion, 2016). Muscle-strengthening PA is another form of recommended exercise for adults. Adults should engage in exercise at least twice a week, working all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms) (Office of Disease Prevention and Health Promotion, 2016; CDC, 2020). Along with aerobic and muscle-strengthening exercises, sport-specific conditioning exercises for athletes can increase sport performance. The University of Rochester's Medical Center suggests athletes work out their major muscle groups and specifically target the muscles that are highly associated with peak performance (University of Rochester Medical Center, 2021). However, given the social environment COVID-19 created, not much is known about what determines athletes' participation in conditioning exercises. Therefore, the primary purpose of this study was to identify determinants of all forms of PA among college athletes, during the COVID-19 pandemic.

This study used the Reasoned Action Approach (RAA). This approach addresses determinants of behavior by implementing the following constructs: intentions, attitudes, perceived norms, and perceived behavior control (Fishbein, 2008). The RAA is useful in predicting and understanding health behaviors, as demonstrated in a meta-analysis that showed implementing the RAA in prospective tests on health behaviors was moderate to highly correlated with the constructs (McEachan et al., 2016). Conner, McEachan, Lawton, & Gardner, (2017) also found the constructs to be strong predictors of engagement in health behaviors, yet more research is needed to support this association. The current research offers further insight on the impact of COVID-19 relative to PA behaviors among college student-athletes.

Methods

Study Design & Participants

This study used a cross-sectional research design. All research related activities were approved by the sponsoring university's Institutional Review Board. The current sample included college athletes between the ages of 18 to 22 years attending a large midwestern university. This included those involved in university, club, and intramural sports. Participants were recruited via email, direct and group messaging, and social media. All participants provided informed consent and the study was approved by the institutional review board. As an incentive, participants were entered into a random drawing for a \$25 gift card.

Instrumentation

Variables were measured through an online, self-report survey. Questions focused on the RAA constructs for three different types of PA behaviors: aerobic PA, muscle strengthening PA, and sport-specific conditioning PA.

Before each set of questions, participants were given the definitions of the recommended amounts of aerobic and muscle strengthening PA. With regards to the conditioning PA behavior, they were given the following instructions.

The following questions are in regard to you engaging in conditioning exercises every week, to maintain your competitive skills, and prevent injuries while sports are suspended. We understand that this could mean a number of different things, depending on what sport you play, and what position you play within that sport. But, for the following questions, please think about what activities you and your coaches would expect you to do every week, to remain conditioned, in case sports are resumed.

Attitudes Towards the Behavior

Attitudes were measured using four items for each of the three PA behaviors. Relative to aerobic and muscle strengthening PA behaviors, items were phrased as, "Getting the recommended amount of PA behavior every week is:". Conditioning exercise items were phrased as, "Engaging in conditioning exercises every week is:". Paired responses included both instrumental (e.g., not at all Important to me/extremely important to me) and experiential attitude (e.g., extremely frustrating to me/extremely enjoyable to me) pairs. Items were evaluated using a 7-point Likert scale. The Cronbach's alpha score for each scale was adequate (aerobic PA (0.84); muscle-strengthening PA (0.92); and conditioning PA (0.90)).

Perceived Norms about the Behavior

Each PA behavior in relation to perceived norms was measured by four items, using both injunctive normative items (e.g., most people who are important to me want me engage in PA behavior every week) and descriptive normative items (e.g., most people similar to me get the recommended amount of PA every week). Responses were given on a 7-point Likert scale, determining how strongly participants agreed or disagreed with the statement. The Cronbach's alpha score for each scale was adequate. For aerobic PA the alpha was 0.70, muscle-strengthening PA was 0.79, and conditioning PA was 0.84.

Perceived Behavior Control over the Behavior (PBC)

PBC was measured by four items per PA behavior. Items included both elements of capacity/self-efficacy (e.g., I believe I have the ability to get the recommended amount of PA behavior every week) and autonomy (e.g., getting the recommended amount of PA behavior is out of my control). Each response was recorded on the 7-point Likert scale, with 1 = strongly disagree, and 7 = strongly agree. The Cronbach's alpha score for each scale was adequate, including aerobic PA (0.70), muscle-strengthening PA (0.89), and conditioning PA (0.77).

Intentions Towards the Behavior

Intentions for all three PA behaviors were measured using three items (e.g., I plan to get the recommended amount of PA behavior every week). Each response was recorded on the 7-point Likert scale, with 1 = strongly disagree, and 7 = strongly agree. The Cronbach's alpha score for each scale was adequate. Aerobic PA was 0.90, muscle-strengthening PA was 0.94, and conditioning PA was 0.94.

Statistical Analysis

All analyses were conducted using SPSS version 25. Means and standard deviations of the RAA constructs for each PA behavior were reported to describe the sample. The RAA constructs were compared between PA behaviors using a repeated measures ANOVA. If the test was significant ($p < 0.05$), then a post-hoc test was done to find which pair difference was significant. Multiple regression analyses were used to evaluate the RAA determinants of intentions.

Results

Overall, there were 108 participants who completed the survey. The sample was mostly female ($n = 74$; 68.5%), Caucasian ($n = 98$; 90.7%), and were split by current undergraduate class level. Specifically, freshman ($n = 28$; 25.9%); sophomore ($n = 27$; 25%); junior ($n = 23$; 21.3%); senior ($n = 25$; 23.1%) with one graduate student responding. In addition, the average age of participants was 19.8 (SD=1.3). Most students also participated in club or intramural sports ($n = 80$; 74.1%), compared to university sponsored sports ($n=23$; 21.3%).

Aerobic, Muscle Strengthening, and Conditioning in Relation to RAA

Table 1 demonstrates the results for the RAA constructs in relation to aerobic, muscle strengthening, and conditioning exercises. PBC had the highest mean scores for all three PA behaviors: aerobic (2.33), muscle strengthening (2.01), and conditioning (1.93). Alternatively, perceived norms had the lowest mean scores. When observing the differences between the types of PA, it appeared muscle strengthening PA had the lowest scores for all of the RAA constructs. Compared to aerobic and conditioning PA behaviors, muscle strengthening PA was significantly lower for intentions ($p < 0.001$), attitudes ($p < 0.001$), and perceived norms ($p < 0.001$). For PBC however, muscle strengthening, and conditioning PA were significantly lower than aerobic PA.

Theory-Based Correlates of Aerobic, Muscle Strengthening, and Conditioning PA

Multiple linear regression analyses were conducted to evaluate the prediction of intentions for aerobic, muscle strengthening, and conditioning PA. These results are displayed in Table 2. Results showed that perceived norms were the strongest predictor of intentions for aerobic ($\beta = 0.372$) and conditioning ($\beta = 0.367$) PA. Muscle strengthening PA attitudes was the strongest predictor ($\beta = 0.374$). Perceived norms and attitudes for all three types of PA were statistically significant, while PBC was the only significant predictor of conditioning PA ($\beta = 0.209$).

Discussion

Research related to the impacts of COVID-19 on PA is limited. The current research provides an understanding of the effects endured by student athletes during this time. Insight into how these behavioral shifts link to the constructs of the RAA was gained. While it is still unclear how much their overall physical activities were hindered by the pandemic, muscle strengthening was often viewed as less important than aerobic and conditioning behaviors. Further studies are needed to determine if these

findings would result in a decrease/increase in athletic performance. Current results demonstrated PBC had the highest mean scores for all PA behaviors while perceived norms had the lowest mean score, which supports previous research (McEachan et al., 2016).

While participants perceived themselves to have the ability to engage in the three PA behaviors, it can be surmised the strongest predictor in following through with these variables is the influence of those around them as demonstrated by perceived norms. This contradicted past research, which has labeled PBC as the highest regarded determinant of intentions (Yzer, 2012). Further research may reveal the isolating restrictions brought on by a pandemic accounted for the heavy influence of perceived norms on intentions that impacted PA behaviors. When student athletes are surrounded by teammates who consistently engage in PA, the perceived norms may be higher compared to a typical sample population of a college dorm.

The study used a convenience sampling technique at a single university. Additional insight might have been gained by breaking down data into sport specific categorizations to allow better data comparisons.

With cases of COVID-19 varying by state, restrictions and guidelines differ. This can influence PA behaviors as the suspension of sports may have lifted or remained for different durations. Obtaining data from other schools can provide a deeper insight into factors that may influence PA behaviors, specifically among student athletes. Due to perceived norms demonstrating a significant impact on intentions for PA, improving community level PA could have a positive impact on engaging in exercise regularly. During times of isolation, education and resources can be used to remotely connect student athletes and improve both attitudes and perceived norms.

Declarations

Ethics approval and consent to participate

All participants provided informed consent and the study was approved by the Miami University institutional review board. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Competing interests

Not applicable.

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Authors' Contributions

Olivia Branson collected the data and completed the initial draft.

Karly Geller contributed to the writing of the final manuscript and mentored Olivia Branson.

Paul Branscum contributed to the writing of the initial manuscript and mentored Olivia Branson.

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Authors' information

Not applicable.

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Tables

Table 1: RAA constructs/Differences between groups (n=108)

	Cardio PA Mean (SD)	Muscle PA Mean (SD)	Cond PA Mean (SD)	F	p-value
Behavioral Intentions	1.34 (1.4) ¹	0.76 (1.6) ^{1,2}	1.25 (1.6) ²	8.928	<0.001
Attitudes towards the behavior	1.38 (1.3) ¹	0.94 (1.5) ^{1,2}	1.51 (1.4) ²	15.176	<0.001
Perceived Norms about the behavior	1.16 (1.0) ¹	0.44 (1.2) ^{1,2}	1.01 (1.2) ²	20.775	<0.001
Perceived Behavioral Control over the behavior	2.33 (0.8) ^{1,2}	2.01 (0.1) ¹	1.93 (1.1) ²	8.262	<0.001

Notes:

Intentions: Cardio/Muscle¹ [p=0.001; d=0.xx]; Conditioning/Muscle² [p=0.01; d=0.xx]

Attitudes: Cardio/Muscle¹ [p=0.001; d=0.xx]; Conditioning/Muscle² [p=0.001; d=0.xx]

Perceived Norms: Cardio/Muscle¹ [p=0.001; d=0.xx]; Conditioning/Muscle² [p=0.001; d=0.xx]

PBC: Cardio/Muscle¹ [p=0.004; d=0.xx]; Cardio/Conditioning² [p=0.001; d=0.xx]

Table 2: Parameter estimates and model prediction to intentions for aerobic and muscle strengthening PA

	Adjusted R ²	Standardized coefficients β	t	P
<u>3-Component Model</u>				
<u>Predicting INT (Cardio)</u>	.285 (total)			
Perceived Norms		.372	4.180	<.001
Attitudes		.245	2.687	.008
Perceived Behavioral Control		.112	1.328	.187
<u>Predicting INT (Muscle)</u>	.442 (total)			
Attitudes		.374	4.500	<.001
Perceived Norms		.332	3.923	<.001
Perceived Behavioral Control		.141	1.754	.082
<u>Predicting INT (Conditioning)</u>	.352 (total)			
Perceived Norms		.367	4.022	<.001
Perceived Behavioral Control		.234	2.883	.005
Attitudes		.209	2.229	.028