PEER PRESCRIPTION PROGRAM FOR OUTDOOR PHYSICAL ACTIVITY AMONG COLLEGE STUDENTS

A Thesis
by
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Abstract

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Spending time outdoors and outdoor physical activity (OPA) has been shown to have various benefits to the college population. Engaging in nature can increase overall physical activity levels and improve one's affinity to nature. PURPOSE: The purpose of this study was to explore the feasibility of using a peer-prescribed park prescription for improving physical activity in a college-aged population. In addition, we sought to determine if physical activity and connectedness to nature were related among a college age population. METHODS: Twenty-three college students completed both the initial and follow up surveys for this study. The online surveys took approximately 10 minutes to complete and contained questions regarding their basic demographics, time spent outside versus inside, knowledge and engagement in guidelines for physical activity, the International Physical Activity Scale (IPAQ) and the Connectedness to Nature Scale (CNS). Participants were randomly assigned to one of three groups; control (C), prescription (RX) prescription and support (RXSUP). Only the RX and RXSUP groups received OPAP's, and only the RXSUP received support. Follow up surveys were provided 16 weeks after the first survey. RESULTS: Descriptive

statistics were completed for all variables. Means and standard deviations were reported for each group. Overall mean MET minutes increased for the C, RX, and RXSUP and time spent outdoors being physically active increased among the C and RXSUP group. Additionally, college students in this sample had relatively high CNS scores. CONCLUSIONS: The current study provides support for peer-counseling to increase general physical activity and outdoor physical activity levels. Increases in overall physical activity and outdoor physical activity, as well as the decrease of indoor physical activity time for the RXSUP were found. Future interventions should consider weather variability, longer intervention time, and measures beyond self-reported. The information provided from this analysis should be applied to future outdoor physical activity interventions with the intention of promoting outdoor physical activity during all months.

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Introduction

It is well known that regular participation in physical activity provides numerous health benefits and plays a key factor in preventing chronic diseases. While it is well established that physical activity improves muscular and cardiorespiratory fitness, bone, and overall functional health, many remain physically inactive.[1] Labeled as the biggest problem of the 21st century, physical inactivity leads to cardiovascular disease, type II diabetes, certain cancers, stroke, early death, depression, and decreased quality of life.[2] In addition to physical inactivity, sedentary lifestyle habits are also widely recognized as a dangerous and growing problem, particularly among college students.[3]

The establishment of healthy lifestyle behaviors are important during college years as they signify the transition between adolescence and adulthood, providing a foundation for lifelong health.[4] However, between the ages of 15 – 21 years, physical activity significantly declines while sedentary activity increases, and these trends continue further into adulthood.[5] Studies have shown that college students are participating in sedentary activities for 10-12 hours a day.[3] While most sedentary time of a college student is spent sleeping, the other large portions are spent studying, sitting in a lecture, and/or using a computer or smartphone, all of which could be grossly underreported.[6] While it is possible that some students have increased sedentary time but are also physically active, it remains that over 50% of college students are not meeting the recommended guidelines for physical activity.[7]

In addition to the lack of physical activity, spending time in nature has declined significantly.[8] Being in nature can reduce levels of mortality and illness, increase physical activity, and provide a greater sense of well-being.[9] Participating in physical activity

outdoors has been shown to elicit a greater increase in mood than indoor physical activity, such as decreased tension, confusion, anger, and fatigue.[10] Engagement in nature also allows mental restoration important for replenishing attention-directed mechanisms, which helps keep the brain focused even with external stimuli occurring at the same time.[11] This mechanism is particularly important among college students given that attentional fatigue can decrease school-related performance, such as test taking, and can cause poor decision making.[12] Over half of college students are reporting feeling sad, anxious, lonely, and hopeless often due to stressors such as academics, career-related issues, social relationships, finances, and sleep difficulties.[7] Given the stressors, stimuli, and emotions college students are faced with every day, exposure to nature has the potential to be a viable tool in depression and stress management while improving overall well-being.[13] Although there are many positive effects of nature, there must be a strong feeling of connection and ability to immerse oneself to nature in order to experience the benefits.[14] A connection to nature refers to the feelings, attitudes, thoughts, and experiences one has with the natural world.[15]

With the knowledge of the benefits of physical activity and being in nature, a nationwide movement has taken place to integrate park visits into disease treatment and prevention through "park prescription" programs.[16] A prescription that encourages individuals to get outside and/or visit a park can include resources such as frequency, location, and type of activities. In fact, physicians all over the country are beginning to discuss outdoor prescriptions as a form of treatment and prevention.[17] Additionally, insurance companies, such as Kaiser Permanente have begun to invest in parks as a prevention tool for health complications.[18] Even with physical activity and park prescriptions on the rise, possible barriers are still reported, including lack of time, access to parks in the

area, and transportation.[19] However, having resources, such as a support system or a park database to choose from, may be a viable solution to overcome barriers as it can provide support and motivation.[20]

Based on the social cognitive theory, physical activity is positively associated with social support.[21] College students often spend an increased amount of time in close contact with peers who often influence their behaviors.[22] When peers provide encouragement, praise, and other forms of support behavior, physical activity levels have a greater chance of increasing.[22,23] Peer support could also help decrease the barriers often reported as reasons for being physically inactive, such as a lack of self-efficacy or feeling unfamiliar in an environment. Although physical activity prescriptions are typically utilized by physicians, using peers may be more beneficial as they often share similar experiences and problems, thus providing unique support in a way that often times a physician cannot.[24] A peer intervention for physical activity often times includes providing education and advice that typically tend to affect self-efficacy, self-perception, and self-determination.[25] Thus, a peer-prescribed physical activity intervention has the potential to increase physical activity levels.

College students are a prime population for peer prescription type programs as they are often disconnected from nature and lacking physical activity. Peer prescriptions for outdoor physical activity could be helpful in increasing physical activity levels and connectedness to nature. The added benefits of engaging in nature which can produce feelings of restoration, improved focus, and increased physical activity have the potential to implement life-long behavior changes in a college student population. Therefore, the purpose of this study was to determine the feasibility of using a peer-prescribed park prescription on physical activity in a college-aged population. In addition, we sought to

determine how physical activity and connectedness to nature are related among a college-aged population.

Methods

Student Outdoor Champions

To utilize peer prescribed outdoor physical activity, we recruited a group of upper classmen termed Student Outdoor Champions (SOC). The SOC's were recruited through email and word of mouth from Recreation Management, Exercise Science, and Public Health majors. They were responsible for meeting with participants to promote outdoor activity and administer aspects of the study including providing the baseline survey, outdoor physical activity prescription, activity log, and additional information regarding the benefits of participating in physical activity outdoors.

Training of the SOC's was performed prior to any participant recruitment. The purpose of the SOCs was to provide the participants with an Outdoor Physical Activity Prescription (OPAP). Eight SOC's were trained during three training sessions administered by the Principal Investigator. Each session included the SOC's understanding the benefits of physical activity and being active outdoors, as well as practicing giving the prescription with one another and setting up on google calendar so each meeting with a participant was visible to the SOC.

Participants

A total of 62 college students enrolled at a university located in western North Carolina completed the initial survey. Only 52.3% completed the post survey, giving an $N = 23$. Participants had to be at least 18 years old, enrolled at the university, and physically able to participate at minimum in light to moderate physical activity. Data collection for the study began in November 2018 and finished in February 2019. Recruitment occurred using flyers,

the campus weekly newsletter, and word of mouth. Using the QR code that was provided on flyers or through an email link, participants directly signed up online for a time to meet with a SOC and receive an OPAP. Incentives donated from a local outdoor retailer (e.g., outdoor hammock, water bottle, hat) were randomly raffled off to participants who completed the study.

Participants were randomly assigned to one of three groups; control (C; $N = 8$), prescription (RX; $N = 9$) prescription and support (RXSUP; $N = 6$). The control group was only given the baseline survey; no prescription or support was provided. The prescription group was given the baseline survey, the OPAP, activity log, and additional information. The prescription and support group were given the baseline survey, the OPAP, activity log, information on the benefits on outdoor PA, and text message support every two weeks. Participants in the RX and RXSUP groups were asked to use the activity log to keep track of the date, time, park visited, activities preformed, and any additional comments they had each time they participated in outdoor physical activity.

The baseline survey consisted of several characteristics including age, sex, height, weight, class rank, ethnicity, knowledge of physical activity guidelines as well as estimates of physical activity, frequency of time spent outdoors compared to indoors, and connectedness to nature. To determine physical activity and sedentary behavior the International Physical Activity Questionnaire Short Form (IPAQ) was provided (see Appendix A). The IPAQ is a self-reported 7-item questionnaire that asks the individual to recall the last 7 days of physical activity. Questions are addressed for vigorous, moderate, and light physical activity by reporting days per week and hours/minutes per day they were physically active.[26]

Additional questions were also provided to estimate time spent outside and barriers or perceptions regarding spending time outside. There were four questions asked regarding time spent outside, time spent inside and whether that time was spent active. Total time spent outside during the previous week was also addressed using a 5-point Likert scale from 1 being never and 5 being always. Finally, affinity to nature was estimated using the Connectedness to Nature Scale (CNS; see Appendix B). This was a 13-item scale that was given to provide an indication of the relationship of the self with the natural environment.[27,28] Participants were asked to rate each statement on a 1 to 5 Likert scale in terms of how much they agreed with each statement, 1 being strongly disagree and 5 being strongly agree. At the end of the intervention, a follow up survey was provided. This survey was identical to the initial survey given.

Intervention

The intervention consisted of a total of 16 weeks over the winter months. In Week 1, all participants met with a SOC to complete the baseline survey while only the RX and RXSUP groups were provided with a personal OPAP. While the C group only completed the survey, the RX and RXSUP group continued with a 20-minute meeting with the SOC. The SOC asked several questions to determine the interest of the participant. Questions included "What is your favorite type of physical activity? Do you have any hobbies? Do you have a favorite hiking trail?". Based off these responses and using an online database of surrounding parks and trails, participants were given at minimum three outdoor environments to be active which were suited their interests. The online database provided information regarding parks in the surrounding area. Specifically, the database provided details such as what amenities were provided, the type of park/trail, mile length of trail, trail surface, trail difficulty,

trail/park activities, if pets were allowed or prohibited, directions on how to get there, and any additional facilities or comments. The OPAP's were recorded on an online form, and consisted of day of the week and time of day the participant was planning to visit these outdoor environments, as well as specific goals and activities they planned to do there.

Lastly, RX and RXSUP participants were given additional information on the importance of getting outdoors on mental and physical well-being. Other resources provided included workouts that can performed at a park. For example, bench planks, bench step-ups, and standing push-ups were suggested.

In order for the RX and RXSUP groups to log their activity, a QR code was printed for them to put somewhere easily accessible, such as their wallet or car. In addition, the activity log was sent to their university account and was provided again if the email was lost or needed. Lastly, all information discussed at the meeting with the SOC, including the prescription, was sent to their university email account.

The RXSUP group was provided with additional support in order to its impact on engagement in outdoor physical activity. Thus, participants in this group received the OPAP and sent text messages every two weeks throughout the course of the study. Text messages sent from the Principal Investigator included whether or not they had logged any activity, reminders of where they were prescribed to visit, and encouragement to log outdoor physical activity. Text messages were standardized and often included the following comments:

"Hi John! I see that you haven't logged any outdoor activity time this week! Try to get outside to walk your dog or go for a hike at Elk Knob and be sure to remember to log it!"

"Hi Jane! I see that you've logged some outdoor time at Price Lake! Keep up the good work! Make sure you continue to log your walks and hikes!"

Nonetheless, all participants were made aware that they could reply or send an email if they had any additional concerns or questions.

Statistical Analysis

Data was reduced as outlined in each survey. The IPAQ was divided into four categories: vigorous, moderate, walking, and sitting. In the category of vigorous intensity, the participant was asked: *During the last 7 days, how many days did you do vigorous physical activity like heavy lifting, digging, heavy construction, or climbing stairs at work, school, and at home for at least 10 minutes? How much time did you spend on one of those days doing vigorous physical activities as part of work?".* Similar questions were asked for moderate intensity. Participants were also asked to indicate how many days they walked for at least 10 minutes, and how many minutes in total they spent walking on those days. Lastly, they were asked how many hours they typically spent sitting on a weekday.

By summing the duration (minutes) and frequency (days per week) of the different physical activity intensities, MET minutes were calculated. Moderate intensity was categorized as ≥600 MET-min/week. Vigorous intensity was categorized as ≥3000 MET-min/week. The lowest level of physical activity was categorized as not meeting the moderate or vigorous criteria.[26]

The CNS was scored on a 5-point Likert scale, with 1 = strongly disagree, and 5 = strongly agree. Participants scored statements such as: "I often feel part of the web of life" and "I have a deep understanding of how my actions affect the natural world". Three negatively worded items were reversed prior to analysis. A total composite score was calculated, the higher score indicating a feeling of greater connectedness to nature [27]

Due the nature of this project, only descriptive statistics were performed. Means and standard deviations or frequencies were calculated, and variables were separated depending

on the independent variable (Control, RX or RXSUP). To estimate potential relationships of activity to being connected to nature a Pearson Product Moment Correlation was performed ($p<0.05$). IBM SPSS Statistics 21 software was used to perform all data analysis.

Results

A total of 44 participants completed the initial baseline survey, and a total of 23 participants completed the follow up survey (attrition rate 52.27%, $N = 23$). The participants age ranged between 18-20 years, and the mean BMI (24.2 ± 4.45 kg/m2) across all groups was classified as normal. Most of the participants were female ($N = 18$), white ($N = 17$), and were evenly split between lower and upperclassmen. Out of the 23 participants, 73.9% knew the correct recommended guidelines for physical activity for adults. The means and standard deviations for all basic characteristics are displayed in Tables 1 and 2.

Total composite scores were taken for each of the three groups (C, Rx, RXSUP) with the highest potential score being 70 points. Although no significant statistics were found, CNS was highest in the C group and lowest in the RXSUP group. However, CNS decreased in the C and RXSUP group post-intervention. Table 3 shows CNS scores in means and standard deviations from the initial and follow up survey.

Overall, participants were engaged in at least moderate amounts of physical activity prior to participating in the program. IPAQ results indicated total MET minute totals of ≥ 600 MET minutes in the pre-test. Physical activity increased across all groups as each group was above 5000 MET minutes post intervention. Additionally, the RXSUP group improved the greatest post-intervention, but also had the highest physical activity levels pre-intervention. Table 4 shows total MET minutes in means and standard deviations that were calculated from the IPAQ-Short Form

Time spent outdoors and outdoors being physically active did change slightly. However, groups reported only “sometimes” being outside and outside and active. The

RXSUP group actually had lower initial scores of being active outside to start (e.g., reported as “rarely”) and higher scores for being active inside (e.g., reported as “sometimes”). Time spent indoors decreased across all three groups, however, time spent indoors doing physical activity only decreased among the RXSUP group. Table 4 shows the means and standard deviations for outdoor and indoor time.

Finally, the Pearson Product Moment Correlation performed between post-intervention physical activity and total connectedness to nature for C, RX, and RXSUP were $r = 0.455$, $p < 0.257$, $r = –0.478$, $p < 0.193$, $r = –0.267$, $p < 0.609$, respectively. Thus, the only group that showed any correlation was the RXSUP group.

Discussion

The purpose of this study was to determine the feasibility of using a peer-prescribed park prescription on physical activity in a college-aged population. In addition, we sought to determine if physical activity levels and connectedness to nature are related among a college-aged population. Overall, we found that physical activity, time spent outdoors, and time spent outdoors doing physical activity increased across all groups. Interestingly, it was found that activity levels and connectedness to nature were negatively correlated among the RX and RXSUP groups, but not the C group.

Self-reported total physical activity increased across all three groups but increased the greatest among the RXSUP group. These results were concurrent with other studies that have found peer support be an effective intervention in improving self-reported physical activity.[29,30] The participants in our study were typical in terms of involvement in physical activity as compared to another study utilizing a college aged population.[31] However, it is important to note, our sample was relatively active at the beginning of the pre-test as indicated by the results of the IPAQ. Thus, improving their activity as a result of the OPAP may not have altered their current level of activity. Nonetheless, our focus was to determine if an OPAP would increase activity outside. With regards to time spent outdoors being physically active we noticed the greatest amount was in the RXSUP group. Although no specific studies were found in regards of peer support and outdoor physical activity in a college-aged population, one study looking at adolescents found that the greater usage of parks by peers increased the likelihood of another peers use.[32] Thus, there is some potential for using a peer to peer prescription program.

In regard to the influence of the OPAP, it has been reported that a prescription can be successful in increasing park visits among low-income families, but this has not been investigated in a college-aged population.[33] However, the same study also indicated that the supported group (e.g. structured outings) had less visits to green areas than the unsupported group. Razani et al. (2018) suggested that park prescriptions that were left open-ended were more beneficial than planning park outings. Our preliminary data also suggest mixed results. Considering our sample was college aged students there are various reasons why changes in physical activity outside may occur. These factors relate to the daily routine of college students which include studying, sitting in lectures, and spending time on computers or smartphones. The lack of free time, as often stated by college students as a factor for not being active could be at play in our sample. Finally, weather and location (e.g., mountainous region of North Carolina) could have also influenced our sample.

Given the increases that were seen among physical activity levels for both the RX and RXSUP, it can be inferred that the influence of the OPAP's were somewhat successful. Prescriptions for physical activity are composed of frequency, intensity, time, and type of exercise for each patient, as it was in this study.[17] The SOC's utilized an online database that provided some specific places the students could visit. This database was made available to the students, however the access after the SOC meeting was limited. Nonetheless, given that physical activity increased across all three groups but was greatest among the RXSUP group may be indication that peer support played a larger role than the OPAP itself.

Peer counseling proved to be somewhat challenging given that communication was bi-weekly and only through text-message. Face-to-face counseling may prove to be more effective, but it has been found to be dependent upon the level of social support continuum [34].

Those who already have a high in person social support may find online social support redundant and thus inefficient.[34] However, those at the lower end of the social support continuum may find text message and online support more comfortable and thus more efficient than in-person social support.[34] Those who prefer face-to-face support may receive more benefits from engaging in conversation in person rather than just reading a text message. Face-to-face support, such as a bi-weekly meeting could also prove to be beneficial in order to gather information about the on goings of the participants life, including any stress from classes, personal relationships, or lack of self-efficacy about the OPAP itself. However, the addition of a time commitment such as a bi-weekly meeting to a college-student's already busy schedule could potentially be reason to remove themselves from the study entirely.[35] Thus, social support is different for each individual and future interventions may find it beneficial to provide both in-person and online peer support.

There are many reasons why participating in outdoor physical activity can be challenging. Barriers reported in other studies include lack of time, transportation, and parks within a reasonable distance.[19] These findings were in line with our study, participants reporting that the main reason for lack of outdoor physical activity was that more time had to be dedicated to school work and studying. Other reasons included lack of friends that wanted to go outside, increased time spent on the internet or watching TV, and difficulty accessing transportation. In fact, one participant reported: "I work 6 days a week and don't usually have time or energy to go outside when I'm done with work." A question on the survey asked participants what could be done to increase their outdoor physical activity time, and participants responded that increased available free time, better time management, more outdoor programs, and warmer weather could potentially increase their time spent outdoors.

These items are similar to those found in other studies that report better weather and more free time would increase physical activity.[35]

Our second main interest in this study was observing the correlation between connectedness to nature and outdoor physical activity. We found no significant correlations between total MET minutes and Connectedness to Nature. These results could potentially be due to the fact we took into consideration total mean MET minutes, which encompasses both indoor and outdoor physical activity.

There is limited evidence regarding connectedness to nature and outdoor physical activity in a college-aged population. Most studies have focused on the role of nature relatedness and the impact on psychological well-being. However, from these studies, it has been established that the relationship between natural environments and improvement of well-being, including outdoor physical activity, has several complex variables that play an important role.[36,37] For example, past experiences in nature play a large role in the participation of outdoor physical activity.[36] Adults who reported a strong connectedness to nature also reported spending time in nature during childhood.[38] Thus, positive feelings about past experiences in nature increase efficacy to be in a natural environment, which may greatly contribute to connectedness to nature and outdoor physical activity. Other variables include life satisfaction, mood, and ability to engage in natural beauty.[39] Opposed to the studies mentioned, our results do not support this finding. We saw no significant correlations among physical activity and Connectedness to Nature.

Limitations

We performed this study as a pilot project and thus had several limitations, including small sample size and self-reported measures. An initial 62 signed up for the study, only 44 completed the initial survey, and only 23 completed the follow up survey. Self-reported measures included time spent outdoors and indoors, physical activity levels, and connectedness to nature. Future interventions may want to measure physical activity using a Fitness Tracker such as an Accelerometer or a FitBit to provide better data on physical activity levels. Another limitation of the study was that four weeks of the intervention took place over winter break given the time constraint. This was considered when providing the OPAP. Participants were asked to provide places at home where they could be physically active outdoors. Given that lifestyle at home is often different than when at college, it remains that this limitation could have increased or decreased the amount of outdoor physical activity that they participated in. Future studies should include a larger sample size as well as several other measures beyond self-reported physical activity.

Weather can often influence physical activity levels. Given the location (e.g., western North Carolina) and start date of this study (e.g, November), the study took place during the fall and winter months. It has been reported that the weather influences physical activity, showing a tendency to decline when the weather is poorer or cold.[40] When asked on the post-intervention survey about the influence of bad weather (rain, snow, cold temperature) on their engagement in outdoor activity, participants reported that their outdoor physical activity would be greater if the weather was warmer. Although most of our study took place during colder months, participation in winter activities such as skiing, snowboarding, or ice-skating were available. However, there may be increased barriers to participating in outdoor physical

activities during the winter months, such as inadequate clothing, transportation, and funding for gear and entry fees.

In regard to connectedness to nature, other options may have provided more information. These measures could include past perceptions of experiences in nature, mental-wellbeing, including stress, anxiety, and depression, and current barriers to general and outdoor physical activity. Future interventions should also use the Nature Relatedness Scale as a measure of connection to nature, as it takes into account several components of an individual.[15] These components include how one identifies with the natural environment, their attitudes and behaviors towards the natural environment, and their experience and familiar with nature.[15]

Another important measure to include in future inventions is the Theory of Planned Behavior (TPB). The TBP states that human behavior is influenced and guided by motivation and ability. It is distinguished between three psychological components: attitude toward the behavior, subjective norm, and perceived behavioral control. The theory states that "the greater the attitude and subjective norms, the greater the perceived behavioral control, the stronger the intention to perform the behavior in question."[41] TBP has been proven as a strong predictor in physical activity.[42] OPAP's and peer support can be strengthened by the addition and understanding of TPB in predicating physical activity by being able to "promote positive attitudes toward physical activity, gain a better understanding of the role of family and friends, and improved the control beliefs."[42] Thus, it remains crucial for the SOC to have high efficacy and attitude towards physical activity and being in nature so they can help implement changes in control beliefs, which include providing the knowledge, support, and opportunity for change to happen.

This intervention took place over a 16-week period. It has been found that true behavior change can take anywhere from 18-254 days.[43] Future interventions to increase outdoor physical activity should be longer in duration and should take place during the warmer and colder months to observe how the participants respond to change in weather. Although there are no studies focusing primarily on outdoor physical activity and weather changes in a college-aged population, one study looking at adolescents found that a frequent barrier to active transport was rainy or cold weather, and that leisure-time physical activity increased when the weather was sunny and warm.[44] This only enforces the notion that interventions specific to outdoor physical activity during the colder months is crucial so that participants still experience the benefits.

Peer to peer counseling regarding physical activity was a key component to this pilot project. We utilized students to be SOC's and thus administer the physical activity prescription. While the SOC's were trained and provided with adequate resources, additional training may have been helpful. An additional barrier in this study was the lack of SOC's that were recruited. The number of SOC's could potentially increase by creating an Outdoor Physical Activity Club that is managed and ran by the SOC's. This could increase interest within the college-population, as well as increase the potential benefits of peer-to-peer counseling by meeting monthly and creating a comfortable environment for communication. In order to maximize the benefits of peer-support, any student that is interested in becoming a SOC should be given a survey that measures physical activity levels, connectedness to nature, and mental well-being, and past experiences in nature and general physical activity. This can ensure that the intervention is being relayed by SOC's who support and participate in outdoor physical activity.

Conclusion

In summary, the current study provides some support for peer-counseling to increase general physical activity and outdoor physical activity levels. Increases in overall physical activity and outdoor physical activity, as well as the decrease of indoor physical activity time for the RXSUP were found. A negative correlation among connectedness to nature and physical activity levels were found, although lack of sample size and variables that were not measured play too great a role to infer this negative correlation. The information provided from this analysis should be applied to future outdoor physical activity interventions with the intention of promoting outdoor physical activity during all months.

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Appendix A

International Physical Activity Questionnaire Short Form

1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling,?

Think about *only* those physical activities that you did for at least 10 minutes at a time.

_____ **days per week** ⇨

1b. How much time in total did you usually spend on one of those days doing vigorous physical activities?

_____ **hours** _____ **minutes**

or

☐ **none**

2a. Again, think *only* about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week** ⇨

2b. How much time in total did you usually spend on one of those days doing moderate physical activities?

_____ **hours** _____ **minutes**

or

☐ **none**

3a. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ **days per week** ⇨

3b. How much time in total did you usually spend walking on one of those days?

_____ **hours** _____ **minutes**

or

☐ **none**

The last question is about the time you spent sitting on weekdays while at work, at home, while doing course work and during leisure time. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend *sitting* on a **week day?**

____ **hours** _____ **minutes**

This is the end of questionnaire, thank you for participating.

This is the final SHORT LAST 7 DAYS SELF-ADMINISTERED version of IPAQ from the 2000/01 Reliability and Validity Study. Completed May 2001.

Appendix B

Connectedness to Nature Scale

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I often feel a sense of oneness with the natural world around me.	○	○	○	○	○
I think of the natural world as a community to which I belong.	○	○	○	○	○
I recognize and appreciate the intelligence of other living organisms.	○	○	○	○	○
I often feel disconnected from nature	○	○	○	○	○
When I think of my life, I imagine myself to be part of a larger cyclical process of living.	○	○	○	○	○
I often feel a kinship with animals and plants.	○	○	○	○	○
I feel as though I belong to the Earth as equally as it belongs to me.	○	○	○	○	○
I have a deep understanding of how my actions affect the natural world.	○	○	○	○	○
I often feel part of the web of life.	○	○	○	○	○
I feel that all inhabitants of Earth, human, and nonhuman, share a common ‘life force’.	○	○	○	○	○
Like a tree can be part of a forest, I feel embedded within the broader natural world.	○	○	○	○	○
When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.	○	○	○	○	○
I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.	○	○	○	○	○
My personal welfare is independent of the welfare of the natural world.	○	○	○	○	○

Table 1

Means and Standard Deviations for Basic Descriptive Characteristics in College Students

	CONTROL (M ± SD)	**RX ONLY (M ± SD)**	**RX + SUPPORT (M ± SD)**
AGE (YEARS)	18.9 ± 1.64	19.2 ± 1.09	20.5 ± 0.837
WEIGHT (KG)	69.3 ± 19.3	66.5 ± 14.5	70.3 ± 19.7
HEIGHT (CM)	165.4 ± 7.62	167.6 ± 13.8	170.3 ± 15.9
BMI (KG/M^2)	25.3 ± 6.66	23.5 ± 3.39	23.8 ± 1.94

Table 2

Means, Standard Deviations, and Frequencies for Gender, Ethnicity, Class Rank, and Knowledge of Recommended PA Guidelines for College Students

Control	**Control (N=8)**	**Rx Only (N=9)**	**Rx + Support (N=6)**
Gender			
Female	6	7	5
Male	2	2	1
Ethnicity			
White	5	7	5
Black or African American		1	
Asian or Pacific Islander	1		
Hispanic or Latino	1	1	1
Other	1		
Class Rank			
Freshman	4	2	
Sophomore		4	2
Junior	4	3	3
Senior			1
Recommended PA Time			
75 mins of moderate to vigorous PA per week	3 (37.5%)	1 (11.1%)	
75-149 mins of vigorous PA per week	2 (25.0%)		
150 mins or more of moderate to vigorous PA per week	3 (37.5%)	8(88.9%)	6 (100%)
Total	**8 (100%)**	**9 (100%)**	**6 (100%).**

Table 3

Means and Standard Deviations for Total Connectedness to Nature Score in College Students

CNS PRE*	**55.9 ± 2.97 (N=7)**	**50.8 ± 5.4 (N=9)**	**47.5 ± 3.67 (N=6)**
CNS POST*	51.0 ± 5.89 (N=8)	50.6 ± 6.86 (N=9)	45.8 ± 5.11 (N=6)

Note:

Total composite scores based off 14 questions; highest potential score was 70
*5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*)

Table 4

Means and Standard Deviations for Total MET Minutes in College Students

	CONTROL (M ± SD)	**RX ONLY (M ± SD)**	**RX + SUPPORT (M ± SD)**
MET MIN PRE	1779 ± 1158 (N=8)	1954 ± 1077 (N=9)	2591 ± 1425 (N=6)
MET MIN POST	5008 ± 4158 (N=8)	5285 ± 5142 (N=9)	10524 ± 6738 (N=6)

Note:

Moderate physical activity ≥ 600 MET minutes,

Vigorous physical activity ≥ 3000 MET minutes

Table 5

Means and Standard Deviations for Time Spent Outdoors and Indoors in College Students

		CONTROL (M ± SD) (N=8)	RX ONLY (M ± SD) (N=9)	RX + SUPPORT (M ± SD) (N=6)
SPEND TIME OUTDOORS (BACKYARD, NEIGHBORHOOD, PARK, ECT.)?*	Pre	3.25 ± 1.04	3.11 ± .601	2.66 ± .817
	Post	3.50 ± .535	3.22 ± .667	3.00 ± .632
SPEND TIME OUTDOORS DOING ANY REGULAR ACTIVITY LONG ENOUGH THAT HEART BEATS RAPIDLY AND YOU WORK UP A SWEAT?*	Pre	3.00 ± 1.07	3.33 ± .866	2.17 ± .408
	Post	3.13 ± .835	3.22 ± .667	2.67 ± .816
SPEND TIME INDOORS (IN HOUSE, IN FRIENDS HOUSE, ETC.)?*	Pre	3.88 ± .354	3.78 ± .441	4.00 ± .00
	Post	3.63 ± .518	3.56 ± .527	3.67 ± .516
SPEND TIME INDOORS DOING ANY REGULAR ACTIVITY LONG ENOUGH THAT HEART BEATS RAPIDLY AND YOU WORK UP A SWEAT?*	Pre	3.25 ± 1.035	3.67 ± 1.00	3.50 ± .836
	Post	3.38 ± 1.19	4.11 ± .782	3.33 ± .516

Note:

*5-point scale from 1 (*never*) to 5 (*always*)

Vita

Rebecca Kay Hess was born in Freeport, IL to Pamela and William Hess. Rebecca spent most of her childhood growing up in the Midwest before moving to North Carolina. She graduated cum laude from Appalachian State University with a Bachelor of Science in Exercise Science in 2017. She continued her education at Appalachian State University and received a Master of Science in Exercise Science in 2019. Rebecca plans to continue to pursue a future career in the healthcare field.