

Impact of a Peer-Led Campus Recreation Program to Improve Student Wellbeing: Exploring Participation Outcomes of the Fitness Buddies Program

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Abstract

College students are experiencing substantial mental health challenges including depression, anxiety, and loneliness, while spending less time being physically active and more time sitting with screened devices. Physical activity and social connection with peers can improve psychological wellbeing in college students. This study explored the impact of Fitness Buddies, a peer-led physical activity program, on college students' (n = 19) psychological wellbeing, basic psychological needs satisfaction in relationships, physical activity behavior, and perceived academic performance. While most relationships between variables were not statistically significant, descriptive analyses showed increases in psychological wellbeing and basic psychological needs satisfaction. Weekly physical activity minutes did not increase. Participants reported increased enjoyment, energy, physical and social competence, and perceived academic engagement and success, as well as decreased stress and anxiety after sessions. Fitness Buddies is an effective, safe, and inclusive program that has potential to expand campus recreation usage and improve students' perceived wellbeing.

Keywords

mental health, college, social connection, physical activity, wellness, academic success

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Students on college and university campuses represent a cohort experiencing unprecedented rates of mental health challenges, prevalence rates of which have been on the rise for the past decade and were exacerbated by the circumstances of the COVID-19 pandemic (American College Health Association [ACHA], 2021; David et al., 2022; Liverpool et al., 2023; Son et al., 2020). Most college students are also navigating the critical development life stage of emerging adulthood (Arnett, 2000) in which it is imperative to establish healthy behaviors, including quality relationships and lifestyle choices that enhance lifelong psychological wellbeing (PWB). PWB has been described in varying ways over time but was specifically presented by Ryff and Keyes (1995) as a multidimensional model consisting of six dimensions: (1) purpose in life, (2) self-acceptance, (3) personal growth, (4) autonomy, (5) positive relationships, and (6) environmental mastery. Social connection (Baumeister & Leary, 1995) and physical activity (PA; Durden-Myers et al., 2018) are considered essential to longevity and flourishing, and have been shown to support the dimensions of PWB in college students (Alsubaie et al., 2019; Bray & Kwan, 2006; Brown et al., 2022; Dogra et al., 2018; Mickley Steinmetz et al., 2022; VanKim & Nelson, 2013). While national reports on college student health show students reporting good levels of flourishing and PWB, students are also reporting low rates of PA, high rates of loneliness, and stress and mental health challenges that negatively impact academic performance (ACHA, 2021; Lipson et al., 2022). Emerging adults who are sedentary, lack healthy relationships, and report loneliness and compromised mental health, are more likely to continue to experience these behaviors and challenges into adulthood (Newcomb-Anjo et al., 2017). When poor health factors are carried into adulthood, they can have negative lifelong implications on health and wellbeing, as well as significant population-level social and economic consequences (O'Connor et al., 2011). Emerging adulthood is also a time of high risk for increases in body weight and rates of obesity (Daw et al., 2017; Nelson et al., 2008), and onset of psychiatric disorders (Baggio et al., 2017).

Supporting college student health and wellness has become a strategic priority for campus administrators, faculty, and staff (Anderson, 2015; Zentner et al., 2022). Students who experience higher levels of stress, depression, and/or anxiety can have a reduced sense of wellbeing that negatively impacts their academic performance and diminishes rates of persistence and retention (ACHA, 2023; Deroma et al., 2009; Douce & Keeling, 2014; Eisenberg et al., 2009; Hutchinson, 2016; Zentner et al., 2022). National survey data from the ACHA and the Healthy Minds Network indicated an increase in the prevalence of both depression and anxiety among college students over the past decade (ACHA, 2021; Lipson et al., 2022). In 2023, many college students reported that experiences of stress (43.4%), anxiety (36.9%), and depression (26.8%) had a negative impact on their academic performance in the past 12 months (ACHA, 2023). Additionally, a staggering 76.3% reported moderate to serious levels of psychological distress in the past 30 days, to include 30.9% at risk for suicide ideation (ACHA, 2023). Curiously, as part of the same dataset, college students did not report a low mean score for PWB, measured by the Flourishing Scale embedded in the National College Health Assessment-III (NCHA-III) survey. The mean score of flourishing for undergraduate students was 44.29 (SD 8.75) on a scale that ranges 8 to 56, with higher scores indicating better PWB (ACHA, 2023).

More specifically in considering opportunities for PA and social connection, only 43.3% of college students were reported to be meeting minimum recommendations for aerobic and strength-based PA (ACHA, 2023), and a systematic review found that college students in the United States had 8 to 10 h a day of sedentary time when measured by ActiGraph devices (Moulin et al., 2021). A majority (53.3%) of undergraduate college students surveyed nationally in 2023 reported experiences of loneliness, isolation, and lack of companionship “some of the time” or “often” that classified them as “positive for loneliness” using the UCLA three-item Loneliness Scale within the NCHA-III survey (ACHA, 2023). Furthermore, establishing lasting, quality, and deeper connections to

people in one's actual physical midst has become challenging in a technological age where individuals can digitally connect to people around the globe with a single click (Capecchi, 2018). Extant research, however, suggests that PA interventions that intentionally foster social support, social networks, community engagement, social connection, and/or friendships have positive and sometimes longer lasting results (Dollman, 2018; Graham et al., 2017; Jago et al., 2009; Nielsen et al., 2014; Sims-Gould et al., 2017).

The magnitude of these statistics combined with the challenges college campuses contend with to support the growing number of students with complex factors impeding their PWB cannot be understated. Even with increases in staffing and funding, college counseling centers struggle to meet the demand for services (Xiao et al., 2017), which underscores the reality that institutions of higher education desperately need evidence-based preventative programs and interventions to support student wellness that do not rely solely on clinical mental health services after symptoms of mental illness have developed. It must not be overlooked that emerging adults have excellent capacity and potential to learn and develop health behaviors and coping skills that contribute to resilience and flourishing in adulthood (Padilla-Walker & Nelson, 2017) when campus programming is developed with the intention to do so.

Campus recreation sports (CRS) centers and programs have a vital role to play in addressing these challenges that hinder the wellbeing of college students through sports, fitness, and wellness programming that facilitates the establishment of a physically active lifestyle, as well as being a place on campus for students to engage in community building. In a national survey, college students reported that CRS participation contributed to improved perceptions of overall health and wellbeing, ability to manage stress, sense of belonging, time management, and academic success (Forrester, 2015). One study even reported that CRS participation prior to the COVID-19 lockdown resulted in students feeling more competent to handle the stressors of college and life during the lockdown period (Abdeahad & Mock, 2023). Although many

studies have shown that college students experience enhanced wellbeing through CRS participation (Wilson, 2022), students may still experience barriers to participation. An interview study of undergraduate students found that barriers to CRS participation included lack of time due to competing academic, work, and personal responsibilities, as well as anxiety about social evaluation and perceived lack of acceptance in that CRS setting (Eubank & DeVita, 2021). COVID-19 also caused reduced access to CRS centers and some students hesitated to use campus recreation services during this time if they perceived participation to be too risky or their personal health conditions to be too high risk to recreate in a public space (Anderson et al., 2022).

The Fitness Buddies Program

Fitness Buddies (FB) is a peer-led PA program developed at the University of Colorado Colorado Springs (Kirby et al., 2022; UCCS, 2024). FB was initiated as a free campus recreation program with the aim of cultivating quality peer relationships through peer-led PA sessions to improve the PWB of students by reducing experiences of "loneliness, stress, anxiety, depression, and low PA engagement" (Kirby et al., 2022, p. 2). The FB program was intentionally created to be a welcoming and inclusive program where students who would typically not utilize campus recreation facilities due to perceived social evaluation and intimidation would instead feel safe and supported by a buddy, or "peer leader" to engage in weekly PA. FB is unique in that it provides participants peer connection, accountability, and support, without focusing on the provision of any prescriptive coaching or personal training. Peer leaders are typically students in health and exercise science programs or students in other areas of study who are passionate about sharing PA with their peers. All peer leaders participate as volunteers or interns and are not paid. Peer leaders complete a basic training to cover expectations of the role but are not required to have any certifications. FB was designed using Relationships Motivation Theory (RMT) as the guiding

theoretical framework. RMT, as a mini theory of the larger meta-theory of Self-Determination Theory (SDT; Deci & Ryan, 2014), contends that interpersonal relationships are of greatest quality when the three basic psychological needs of autonomy, competence, and relatedness are satisfied within the dyadic relationship.

Findings from the initial study of FB participant experiences revealed that involvement increased both physical and social competence, helped reduce stress and anxiety, improved ability to focus on course work, and provided the opportunity to establish quality peer relationships and a sense of belonging on campus (Kirby et al., 2022). Improved competence, quality peer relationships, and a sense of belonging are outcomes that are in congruence with the tenets of RMT (Deci & Ryan, 2014). To our knowledge, no other studies have evaluated RMT in PA or recreation settings. However, from the broader context of the SDT lens, satisfaction of competence, autonomy, and relatedness needs in healthy and active spaces has great potential to have a positive, multiplicative effect on not only health factors, but also on the PWB of college students (Deci & Ryan, 2008; Fortier et al., 2007; Lin et al., 2022; Neufeld & Malin, 2019). The purpose of the present study was to extend previous research on the FB model (Kirby et al., 2022) to better understand how peer-led PA programming impacted college students' PWB, basic psychological needs satisfaction (BPNS) in PA-based peer relationships, PA behavior, and perceived academic performance. Specifically, we aimed to explore the impact of FB participation on college students and to determine if any significant changes in PA behavior were observed. We hypothesized that participants would report increased PWB and BPNS after participation in the program and that participants would report improved mood and reduced stress and anxiety after FB sessions. Given the unusual circumstances of the time during which data were collected due to the COVID-19 pandemic, the semester of participation was also used as an independent variable in quantitative analysis. Even though it was not part of the study's hypothesis or focus, this allowed us to control for the effects of both semesters (Spring 2020, Fall 2021).

Methods

A mixed-methods design (Creswell & Plano Clark, 2011) using multiple quantitative and qualitative measures was utilized to better understand the experiences of college students participating in FB for one semester and to enhance understanding of the impact of the FB model on college student wellbeing (Kirby et al., 2022). A fixed, embedded mixed methods design was chosen in which measures were predetermined before the start of the study, and qualitative data was intentionally collected during and after the program to better understand students' experiences of participation within the real-life everyday context of college life (Creswell et al., 2011) and to see if outcomes described by participants aligned with FB's theoretical framework of RMT. Students that registered to participate in FB were paired with a student peer leader for one weekly 1h PA session based on common activity interests and complementary schedules. FB sessions consisted of a variety of activities such as walking, running, hiking, swimming, weight training, interval training, or recreational sports such as basketball or ping pong. Each week peer leaders would communicate with their buddy to discuss and mutually agree upon what activity to do together. Most often buddies met at the campus recreation center for their sessions, while some opted for outdoor recreation in and around campus.

All students and peer leaders that participated in the FB program during the two semesters when data collection took place were recruited via email. Recruitment emails were sent after students registered to participate in FB, or when a new peer leader was on-boarded into the FB program. The study was approved by the Institutional Review Board at the lead researcher's institution and participants completed an informed consent before data were collected. This study was funded by the NIRSA Foundation.

Participants

Twenty-six students consented to participate in the study. Individuals ($N=19$; peer leaders $n=8$, program registrants $n=11$) that had

complete data across all quantitative measures were retained in the final sample for analysis. Participants' age averaged 23.9 years ($SD = 4.9$) and identified primarily as female (73.7%) and White (78.9%). Average age of this sample reflected the same as the campus average age for all students, while the sample's distribution for gender and race were overrepresented when compared to the campus demographics for females (52.8%) and White students (64.9%). Participants reported a range of fitness levels with 21% identifying as beginner, 58% as intermediate, and 21% as experienced. Most participants (68%) reported their largest barrier to PA in the past was not having anyone to stay active with or hold them accountable, while 42% also reported a lack of time as a barrier.

Data Collection

Data were collected from students who participated in FB during two different semesters. The first semester of data collection (S1) took place in the Spring 2020 semester for 8 weeks until the COVID-19 campus closure. The second semester of data collection (S2) took place in the Fall 2021 semester after social distancing precautions ended and campus returned to more in-person offerings. The second semester of data collection also spanned the first 8 weeks of the semester to match the first semester of data collection more closely, rather than collecting data for the S2 group for a full 16 weeks. With the second semester of data collection, the researchers aimed to increase the total sample size after the first semester of data collection had substantial attrition with incomplete postparticipation data after the campus COVID-closure and rapid dispersion of students moving away from campus and not responding to researchers' attempts to collect survey data.

Interested participants met with a member of the research team in person to complete and sign consent forms, take the preparticipation survey, and be issued a Fitbit Inspire™ device to wear for the duration of the study. Consent included agreement for researchers to use participants' program registration and program session data. Participants scanned a QR code to complete the

electronic preparticipation survey via Qualtrics that included measures for PWB and BPNS. At the conclusion of 8 weeks, participants met with a research team member again, at which time they returned their Fitbit™ device, took the postparticipation survey, and were invited to join an end of semester focus group. Participants were also given an FB branded t-shirt and water bottle as a participation incentive at the conclusion of the study.

Measures

Program Data. Program registration data for peer leaders and program registrants included age, gender identity, race/ethnicity, year in college, self-reported fitness level, and previous challenges to engagement in PA from a list of fixed responses.

Session Data. Before and after each FB session, participants and peer leaders completed a brief check-in and check-out survey to provide a qualitative measure of pre-session and post-session situational affect. Situational affect was measured using emojis and corresponding feeling words of happy, sad, frustrated, meh, stressed, excited, anxious, tired, connected, energized, confident, and relaxed (Kirby et al., 2022). Participants were asked to self-report how they felt upon arrival to the session, as well as, how they felt immediately following the session. Participants could select as many emojis as they perceived applied to them at the time of response. The frequencies of each emoji/feeling at check-in and check-out were summed for the sample across all sessions. The emoji data was chosen as an embedded descriptive data source to provide insight into how changes in situational affect before and after each session could contribute to enjoyment and value of the FB experience, and enhanced PWB.

Participation Surveys. Surveys given at the start and end of program participation included questions from the PWB Scale (Ryff & Keyes, 1995) and the BPNS in Relationships (La Guardia et al., 2000) scale. The postparticipation survey questionnaire also included an open-ended

question for participants to share anything about their FB experience and an open-ended question that asked them to describe any impact FB may have had on their ability to be academically successful.

Psychological Wellbeing Scale. The 18-item version of the PWB Scale (Ryff & Keyes, 1995) was used. This scale measures six variables relating to wellbeing and happiness and results in scores for six subscales: (1) autonomy, (2) environmental mastery, (3) personal growth, (4) positive relations with others, (5) purpose in life, and (6) self-acceptance. The items are answered according to how strongly the respondent agrees/disagrees with each item, on a seven-point Likert scale, from 1 (strongly agree) to 7 (strongly disagree). Item examples include, “*I judge myself by what I think is important, not by the values of what others think is important*” and “*I think it is important to have new experiences that challenge how I think about myself and the world.*” Items pertaining to each subscale were summed after any reverse worded items were reverse scored. Possible scores for each subscale range from 3 to 21, with higher scores indicating greater PWB. Previous research using the PWB scale reported moderate reliability for the subscales with alpha scores ranging from 0.33 to 0.56 (Ryff & Keyes, 1995).

Basic Psychological Needs Satisfaction in Relationships. BPNS in Relationships is a nine-item scale that measures the degree to which the three basic psychological needs of autonomy, competence, and relatedness are satisfied through specific interpersonal relationships (La Guardia et al., 2000). The questions are answered regarding how true they are for the respondent, on a seven-point Likert scale, from 1 (not true at all) to 7 (very true). Scores for each subscale pertaining to autonomy, competence, and relatedness were obtained by averaging the items for each subscale, after negatively worded items were reversed scored. For this study, the items were modified to reflect the specific relationships in the FB program, for example, “when I am with a fitness buddy, I feel free to be who I am” and “when I am with a fitness buddy, I feel very capable and effective.”

Previous research using the scale to measure satisfaction in interpersonal relationships among college students showed adequate subscale reliability with Cronbach’s alpha score ranging 0.85 to 0.94 (La Guardia et al., 2000).

Physical Activity Minutes. Weekly total active minutes were measured from each participant’s Fitbit Inspire™ device for each of the 8 weeks they participated in FB.

Focus Groups. Two focus groups, one at the end of each semester, were held to allow participants to share about their experiences and the benefits and impact of involvement in FB. Participants were asked open-ended questions that began with asking participants to “tell the story of their FB experience,” followed by additional questions that addressed motivation to participate, description of the relationship with their buddy compared to other peers on campus, ability to manage stress, perceived impact on academic performance, and overall benefits of involvement. Focus group questions were intentionally developed with the aim of evaluating if participant experiences were similar to those in the previous study of FB (Kirby et al., 2022) and with considerations of the theoretical framework of RMT and the research aims. The S1 focus group ($n = 8$) was virtual, took place during the COVID lockdown period, was recorded using Microsoft Teams™ and lasted 67 min, while the S2 focus group ($n = 3$) took place in a conference room on campus, was audio recorded, and lasted 49 min. All participants were invited to take part in the focus groups and the difference in group size reflects having less participants interested in S2. The focus groups were facilitated by the lead researcher using the same interview guide for both groups.

Data Analysis

Emoji session data were descriptively analyzed for frequencies of each mood/feeling state at check-in and check-out across all sessions for the sample as a whole using the same descriptive analysis and graphic representation method previously published by Kirby et al. (2022). Survey

data and PA minutes were analyzed using SPSS version 28. After basic descriptive statistics were complete, bootstrapped Pearson product moment correlations were used. Pearson's correlation coefficients are used to establish relationships between outcome variables for multivariate analysis. A factorial multivariate approach was used to determine the effect of FB participation on PA minutes, BPNS, and PWB. The rationale for this was that each of the outcomes were related to at least one other outcome at the 0.3 level in at least one time point. Additionally, the cohort was divided by the semester in which they participated. These groups were defined as the S1 group, who participated in the semester campus closed due to the COVID-19 pandemic (Spring 2020), and the S2 group who participated after COVID restrictions were relaxed and in-person campus programming resumed (Fall 2021). Of note, we did not evaluate differences between peer leaders and FB participants in subsequent statistical analyses after point-biserial correlation showed no significant differences between them for PWB, BPNS, or PA minutes. Point-biserial correlation is the standardized measure of the strength of relationships between dichotomous (peer leader vs. participant) and continuous (PWB, BPNS, and PA) variables (Field, 2013).

Factorial multivariate analysis of variance (MANOVA) was used to analyze the effect of time (before vs. after) and group (S1 vs. S2) upon the three variables of BPNS, the six variables of PWB, and PA minutes. A significant factorial MANOVA was followed by follow-up factorial analyses of variance (ANOVAs) for each outcome. If the factorial ANOVAs were not significant, main effects (i.e., either group or time) were analyzed (Field, 2013).

Focus groups were transcribed verbatim from audio recordings. Transcripts, along with the open-ended survey responses were analyzed using thematic analysis (Sparkes & Smith, 2013). Multiple researchers read the transcripts and survey responses several times to become immersed in the data and then individually coded the data for significant statements, keywords, and patterns. Researchers met and came to consensus on emergent themes from the qualitative data.

Following initial analyses of all data sources, the resulting outcomes were then integrated and analyzed together to ascertain how the quantitative and qualitative outcomes compared and how descriptive outcomes might inform gaps in understanding of the complexity and nuances of the participants' experiences in FB. This is in line with best practices for mixed methods research that utilizes an embedded design, in which multiple data sources are integrated for consideration and interpreted with consideration of the research aims and theoretical framework of the study (Creswell et al., 2011). The results of this integrated comparison of data sources are presented in the discussion.

Results

Emoji Check-In and Check-Out Session Data

A total of 189 sessions (143 from 2020, 46 from 2021) were descriptively analyzed to consider participants' situational affect measured by emojis and matching feeling words at check-in and check-out of every session. For brevity, results are represented for the total sample in Figure 1, with the lighter colored bar representing total frequency of each emoji choice at check-ins, and darker bars representing frequencies of each at check-outs. The emojis representing positive affect are grouped on the left side of Figure 1 and the emojis representing negative affect are grouped on the right side of Figure 1.

When compared to check-in, participants at check-out more often reported feeling happy, energetic, confident, relaxed, and connected, while of feelings of stress and anxiety were reported far less often at check-out, as displayed in Figure 1. These patterns were consistent for both peer leaders and FB participants. Notably, peer leaders and FB participants would come to sessions with similar levels of stress and anxiety and mutually benefit from improved mood after their sessions. For some participants, feelings of stress or tiredness would remain constant from check-in to check-out, but no participants reported new feelings of negative affect at check-out that weren't present at check-in except for three sessions in which a participant reported feeling sad at check-out.

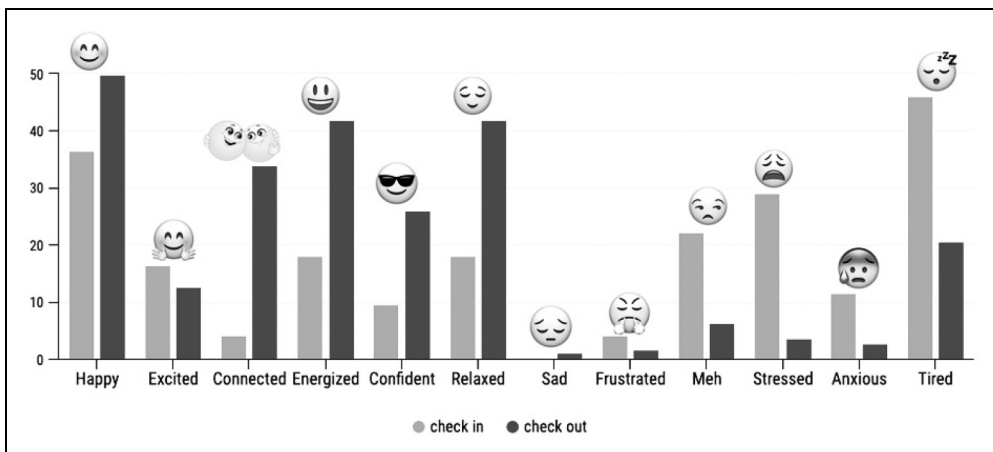


Figure 1. Percentage of responses for situational affect for session check-in and check-out.

Table 1. Descriptive Statistics of PA, PWB, and BPNS subscales (M ± SD)

T1	Autonomy (BPNS)	Competence	Relatedness	Autonomy (PWB)	Physical Activity
S1	6.1 ± 0.9	6.1 ± 1.0	5.7 ± 0.9	15.5 ± 3.8	274.71 ± 104.6
S2	6.3 ± 0.8	6.2 ± 0.7	5.6 ± 0.8	18.0 ± 1.4	381.8 ± 277.7
Total	6.1 ± 0.9	6.2 ± 0.9	5.6 ± 0.9	16.2 ± 3.5	302.9 ± 165.5
	Environmental Mastery	Personal Growth	Positive Relations	Purpose in Life	Self-Acceptance
S1	16.4 ± 2.5	19.6 ± 1.9	15.4 ± 5.2	17.4 ± 2.2	16.9 ± 3.2
S2	16.6 ± 3.2	19.6 ± 1.9	15.8 ± 3.6	16.6 ± 2.4**	18.0 ± 4.0
Total	16.5 ± 2.6	19.6 ± 1.8	15.8 ± 4.7	17.2 ± 2.2	17.2 ± 3.4
T2	Autonomy (BPNS)	Competence	Relatedness	Autonomy (PWB)	Physical Activity
S1	6.3 ± 0.9	6.4 ± 1.0	6.1 ± 1.2*	16.7 ± 3.2	239.3 ± 76.1
S2	6.1 ± 0.9	6.1 ± 0.5	4.9 ± 1.1*	18.2 ± 3.4	426.8 ± 315.8
Total	6.2 ± 0.9	6.3 ± 0.9	5.8 ± 0.9	17.0 ± 3.2	288.6 ± 183.1
	Environmental Mastery	Personal Growth	Positive Relations	Purpose in Life	Self-Acceptance
S1	16.5 ± 3.3	14.6 ± 0.9	15.6 ± 4.4	17.6 ± 1.8	16.9 ± 2.9
S2	17.8 ± 2.7	15.8 ± 3.0	16.2 ± 2.3	19.0 ± 2.0**	18.4 ± 3.7
Total	16.8 ± 3.1	15.0 ± 1.7	15.8 ± 3.9	18.0 ± 1.9	17.2 ± 3.0

*sig. ≤ 0.05, **sig. ≤ 0.01

Descriptive Statistics

Descriptive analysis of the survey data is presented in Table 1 for all survey subscales and can be compared from start of participation (T1, first week in program) to postparticipation (T2, at the end of 8 weeks of participation), as well as for participants from Semester 1 (S1; 2020) and Semester 2 (S2; 2021). Changes in mean scores for most variables were not significant,

but descriptively increased in the sample from T1 to T2, while mean scores for personal growth and self-acceptance remained the same. Significant differences in start of program to postprogram scores were noted for purpose in life in the S2 group when compared to S1 group, and at T2 for relatedness in both groups. Changes in PA minutes were not significant and varied considerably with increases and decreases throughout each semester for every participant.

Overall, PA minutes decreased from T1 to T2 in the sample, however most participants met minimum PA recommendations of 150 min of moderate PA per week at both time points.

Factorial MANOVA

Factorial MANOVA revealed that the interaction of time (pre vs. post) versus period (S1 vs. S2) had an effect on the multivariate outcome of BPNS and PWB [$\Lambda = .169$, $F(10, 8) = 3.95$, $p < .05$, $\eta_p^2 = .831$].

Factorial ANOVAs

Follow up tests included 2×2 factorial ANOVA on each of the outcomes of BPNS, PWB, and PA. The null hypothesis for time versus period was rejected for the two outcomes variables of relatedness [$F(1, 17) = 5.4$, $p < .05$, $\eta_p^2 = .24$] and purpose in life [$F(1, 17) = 6.0$, $p < .05$, $\eta_p^2 = .26$]. Bonferroni post hoc tests were used to follow up ANOVA analyses. The S1 group had higher relatedness at the end of the program than the S2 group, whereas purpose in life was higher for the S2 group at the end of the semester (T2). No other statistically significant interactions were observed.

Main Effect ANOVAs

The null hypothesis for the main effect of time was rejected for two PWB outcomes. Personal growth [$F(1, 17) = 38.3$, $p < .001$, $\eta_p^2 = .69$] decreased, and purpose in life [$F(1, 17) = 7.7$, $p < .05$, $\eta_p^2 = .31$] increased. No other main effect null hypotheses were rejected.

Following all statistical analyses, only two variables supported our hypothesis of increased BPNS and PWB postparticipation, with the S1 group reporting significantly greater relatedness than the S2 group at T2, S2 group reporting significantly greater purpose in life than S1 group at T2, and both groups analyzed together reporting significantly greater purpose in life at T2. PA behavior varied widely among participants and no significant changes in PA behavior were observed for participants from T1 to T2, regardless of group.

Focus Groups and Open-Ended Responses

The qualitative data revealed that FB had a positive impact on participants' PWB, BPNS, motivation, and perceived academic success. Three themes emerged from thematic analysis: (1) fun and enjoyment, (2) authentic relationships that supported personal growth, and (3) accountability and academic success.

Fun and Enjoyment. Both peer leaders and FB participants from both semesters consistently expressed they experienced fun and enjoyment in the program. They conveyed value for FB providing them with a break from everyday challenges and an outlet for reducing stress. One participant described how the FB session decreased the magnitude of their worry, "*It was beneficial to my stress level more than anything. Once you start working out and exercising, most struggles go away, there's not much else to worry about.*" Participants and peer leaders found new enjoyment in PA that they hadn't experienced before FB, as one participant noted, "*Having someone to encourage me and that I could also encourage was really helpful and made exercise more enjoyable*" while another said,

I liked working out with someone and doing things that I normally wouldn't do, like I had a lot of fitness buddies that just loved to play ping pong and... it was just fun to be able to do things other than what I would normally do if I was going to the gym by myself.

Peer leaders explained a shift in motivation from an external motive, the obligation to earn internship credit, to a more internally regulated motive, enjoyment of each session, where they "*pretty much laughed the whole time, just had fun, and looked forward to [meeting their buddy] each time.*"

Authentic Relationships That Supported Personal Growth. Participants reported development of quality peer relationships that were grounded in trust, authenticity, and unconditional support. As a result of a trusted and supportive peer, participants described increased physical and social competence, becoming more comfortable in the

gym, and overcoming their fear of social evaluation in the campus recreation setting that increased confidence. One peer leader reflected,

It's been really cool to see people come out of their shell over the course of the semester and be a lot more prideful in their workouts and grow confident together knowing you helped build this relationship. I feel like that's helped me as well, become a more well-rounded person. It's helped me grow in my social skills and being able to trust others.

Another participant added, *"I didn't have to put on a filter or anything 'cause we know each other pretty well. We would just talk about anything and everything."* Participants said that a key factor in developing authentic friendships with their buddy was due to the absence of cell phones while working out. As one participant recounted, *"We built a solid friendship pretty fast, versus classroom friends where if there's an awkward silence, you can just whip out your phone, but at the gym you can't."* Of note, while peer leaders were asked to have their phones put away as part of their onboarding training, there was no rule in place for FB participants, but potentially by one person not having their phone out, or by the nature of the session's activities, the decreased use of phones during sessions enhanced the experience.

FB peer relationships also provided support for participants to be *"motivated in doing different things and trying new things"* during their sessions that were just outside their comfort zone. Participants found enjoyment in providing one another with praise and encouragement as their skills and confidence improved, as they reflected on their shared personal growth, *"seeing how I've grown over the course of fitness buddies and also seeing how my buddies have grown, I think has been pretty cool."*

COVID-19. The impact of COVID-19 on the way the peer relationships were valued was described by participants in the Spring 2020 (S1) group, who participated in a virtual focus group during the lockdown period. They reflected on how the quality relationship that was established with their buddy while on campus carried over and

remained a valued source of social support while stuck at home. Participants shared that they did not enjoy or find useful the idea of trying to work out together over a video call, as it was *"a lot less personal and it kind of felt weird"* and they *"didn't have as much fun and there wasn't as much enthusiasm on both our parts."* However, participants described the value of texting one another to *"check-in on each other,"* offer encouragement and share at-home workout ideas, as one participant explained, *"it was nice to share what we were doing at home with each other and get creative about what we were gonna do for exercise and for training while we were stuck at our houses."*

Accountability and Academic Success. Participants emphasized the importance of being accountable to one another each week in the FB program and described being motivated to show up for their buddy on days when they would've normally hit the snooze button. The structure and accountability of the FB schedule was explained as a facilitative structure in their week that translated into better time management throughout the week. One participant noted, *"FB helped me stay leveled and focused on my academic responsibilities. I performed exceptionally well this semester,"* while another said, *"I already had my workout in, so I was motivated to do homework and study more."* Participants expressed a noticeable improvement in their capacity to study and focus after an FB session. Participants also shared that they were more likely to attend classes if they had an FB session scheduled, as one participant shared and others agreed, *"Even if I didn't want to go to class, I would want to go to Fitness Buddies, and once I'm already on campus, I might as well go to class."* This was especially salient due to some students' hesitation to resume attending classes on campus after social distancing restrictions were relaxed in 2021.

Discussion

The impacts of FB participation on PWB, BPNS, PA behavior, and academic success were the focus of this study. Significant challenges in data collection and attrition were encountered due to

the onset of the COVID-19 pandemic and year-long freeze on in-person research. Despite that these challenges impacted the sample size and possibly reduced statistical power for the quantitative measures of PWB and BPNS, the mixed methods integrated analysis of quantitative and qualitative data demonstrated that FB participation contributed to improved student wellbeing and academic engagement. Our findings of improved wellbeing via peer relationships in a PA setting reinforce previous studies that found peer-led PA improved depression symptoms (Keeler et al., 2021) and improved mental wellbeing and perceived ability to study (Leary et al., 2023) in college students.

Findings from this study did not show significant increases in BPNS and PWB across all outcome variables of the survey measures, however descriptive analyses showed a nonsignificant increase in most outcome variables after participation in FB, and a significant increase in purpose in life for all participants as well as in relatedness need satisfaction for participants in the 2020 (S1 group). Since participants in 2020 took their postparticipation survey at home at the beginning of the COVID-19 lockdown, the appreciation and salience of their FB peer relationship may have impacted the significant difference in that group's reported relatedness need satisfaction. Personal growth decreased for participants after participation and self-acceptance remain unchanged. Not seeing a significant increase in self-acceptance is appropriate for the developmental stage of emerging adulthood that college students are progressing through. Emerging adulthood (Arnett, 2000) is a time when young adults are still discovering and exploring their values and identity, while satisfaction with life achievements and feeling confident in one's personality is not often achieved until later stages of adulthood with additional years of life experience. These survey results were mixed and did not necessarily improve understanding of the participation experience in FB without the additional consideration of the qualitative data.

The integrated analysis of the survey data with the embedded qualitative data sources in this study, provided a more in-depth understanding of the impact of FB participation. Results of the focus groups, open-ended survey responses, and emoji data demonstrated that substantial improvements to participants'

perceived wellbeing happened as a result of improved physical and social competence, increased enjoyment in PA, development of quality peer relationships, improved PWB via reduced feelings of stress and anxiety, improved time management, and increased perceptions of academic success. Increased confidence and enjoyment in being challenged to try new activities and seeing progress in strength and fitness were something participants repeatedly described, which makes the numerical decrease in the personal growth variable interesting. However, survey items on the PWB scale for personal growth ask more about being challenged to learn and grow in life more broadly, while participants' descriptions of improvement aligned more with the theoretical construct of competence gained through the mastery of new skills (Ryan & Deci, 2017), which increased in this sample, albeit without statistical significance. Additionally, participants completed postparticipation surveys during a time in the semester when midterm exams and projects increase stress and students may have felt they were just getting by from week to week, with less cognitive capacity to see the broader perspective of their overall personal growth.

The increase in perceived physical and social competence through a quality peer relationship, that translated to increased perceived academic competence described by participants is supported by the tenets of SDT (Ryan & Deci, 2017) and aligns with the original FB program mission (Kirby et al., 2022). The FB peer relationship was described as especially meaningful for participants in 2020 after they left campus and returned home to lockdown but could still connect with their buddy for support and at-home PA ideas. This finding reinforced the survey findings of participants in 2020 having significantly greater relatedness need satisfaction after program participation when compared to the participants in 2021. Additionally, peer leaders reported a shift from externally regulated to internally regulated motivation to participate in FB via satisfaction of basic psychological needs in FB peer relationships, which is supported by the tenets of SDT (Deci & Ryan, 2008; Ryan & Deci, 2017). These findings corroborate previous research on the FB model (Kirby et al., 2022) and provide encouraging evidence for congruence between theory and

practice to improve PWB and opportunities for thriving for college students.

Importantly, improved PWB via reduced feelings of stress and anxiety and increased feelings of happiness, confidence, and connection, with greater ability to focus, engage in studying, and manage time, were reported similarly by both peer leaders and FB participants. Peer leaders experienced comparable benefits to their PWB from the development of a new peer relationship and the consistency and accountability of the weekly FB sessions. This corroborates national data on college student wellbeing regarding the frequent stressors college students face that challenge their PWB (ACHA, 2023) and reaffirms the benefits of CRS participation (Forrester, 2015). Ultimately, college students can greatly benefit from developing quality peer relationships in PA and recreation settings. Similarly, we observed in our sample that both peer leaders and FB participants were interested and motivated to engage in PA but lacked someone to workout with (68%) or struggled with finding time in their schedule to do so consistently (42%). This aligns with the barriers cited in national surveillance of college students participating in CRS (Forrester, 2015).

The robust improvements in wellbeing that participants described were experienced despite no significant increase in participants' PA minutes. In fact, the total minutes of PA varied greatly among participants and weekly PA minutes oscillated up and down for all participants. This is an important contribution to the literature and suggests that linear increases in PA minutes may not be the most impactful factor to consider when designing PA interventions intended to positively impact college students' PWB. Findings from this study affirm recommendations to utilize peer-led programming to increase program effectiveness for college student wellness (Harmon et al., 2016; Shook & Keup, 2012; Zentner et al., 2022) and extend previous findings on the benefits of FB as an effective and valuable peer-led campus recreation program model (Kirby et al., 2022).

Limitations

The onset of COVID-19 and the challenges of reengaging students in recreation programming

when campus re-opened created limitations in this study. Human subjects research was halted and caused attrition due to the abrupt campus closure in 2020. Although postparticipation data were collected electronically, not all participants responded to emails to complete those surveys. Student engagement in campus programming of all types was slow to resume in 2021 when the second phase of data collection took place and as a result significantly less participation in the FB program and the study occurred. This was a phenomenon also cited by others evaluating CRS participation during COVID-19 (Anderson et al., 2022). Additionally, we observed that the number of FB program participants that were interested and willing to participate in the research study was much smaller than the number of students that were active in the program at the time of data collection. Collectively this led to a moderately smaller and less diverse sample which may have limited the statistical significance revealed through analyses, as well as resulted in a much smaller focus group for S2. Although the focus group sizes were disparate, it did not reduce the data quality, as both groups gave rich, detailed, and very similar accounts of their experiences.

Objective measurement of PA with a wearable device like the Fitbit™ created limitations as some participants had less active days due to forgetting to charge their device for part of a day and the Fitbit Inspire™ device in particular does not capture heart rate data and calculates active minutes based on an estimation of metabolic equivalents (METs) (Fitbit, 2023) and therefore may not register lower impact activities like yoga and weightlifting as active minutes. All participants in this study were meeting minimum PA recommendations, which may suggest this sample represented a group of students that were already physically active, and a different sample of less active students may have garnered different participation experiences. While we did not control for or measure PA levels before program participation, we do not anticipate this would have played a substantial role in the results given the large variability and oscillations in weekly PA behavior that was observed as students moved through the dynamics of the semester. Additionally, we did

not include quantitative measures to directly assess the impact of COVID-19 on PWB, but comparative analysis did not show any significant differences in survey measures between participants in 2020 compared to 2021. However, the qualitative findings from the focus groups in each semester helped to enhance our understanding of the impact of FB for these participants, how the relationships between buddies were navigated during the COVID-19 quarantine period, and how the FB program helped students reengage with campus after the pandemic closures.

Implications for Campus Recreation Programming and Future Research

The FB model can evidently increase campus recreation usage by providing students a safe and inclusive space to foster joy and confidence in the PA experience, while simultaneously developing peer relationships that can improve mental wellness, sense of belonging on campus, and academic engagement. This program model is one that can be readily adopted and implemented in its current format or in an adjusted format across college campuses nationally. The central focus on PA-based peer relationships to improve PWB and reduce stress and anxiety, shifts more traditional aims of recreation programming to primarily enhance physical fitness and integrates a more holistic wellness approach that still includes PA, but more directly addresses the mental health challenges facing today's college students. FB is also a program model with potential to reach the many non-rec users on campus, who may not feel comfortable engaging in typical CRS programming such as intramural sport leagues, group fitness classes, or personal training sessions due to intimidation and low physical and social competence. However, students who participate in peer-led PA programming like FB and are supported to build competence through peer support to seek challenge without fear of shame or embarrassment, may be more likely to engage in other campus recreation programming over time. The literature is clear that CRS participation improves student wellbeing, academic engagement, the quality of students'

experience on campus, and supports student retention (Forrester, 2015; Milton et al., 2020; Wilson, 2022) and FB is excellent way to reach and support even more students on campuses to become successful and thriving emerging adults.

Researchers should continue to evaluate the impact of peer-led PA programming to improve PWB and BPNS and understand how engagement contributes to students' persistence and academic success. Additional research is needed to evaluate the FB model in larger and more diverse samples, ideally by conducting multi-institution implementation and evaluation of the FB model to compare student outcomes between different sized institutions in diverse geographic regions. Consideration of ways to simplify data collection or reduce the number of measures may increase the number of program participants willing to participate in the research side of PA programs. Subsequent studies of the FB model should consider alternative ways to measure PA behavior that are more reliable. Further research is also needed to compare the impact of peer relationships in different types of campus wellness programs that include and don't include PA components, to better understand the impact of peer relationships on student wellbeing and what role PA plays.

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