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Engaging in physical activity is a critical part of an individual's life and can be the precursor for well-being and a method of disease avoidance. Yet, many American college students fail to engage in adequate amounts of physical activity during their daily lives. To compound the issue, little has been published regarding physical activity promotion practices on American college campuses.

The aims of this dissertation are twofold. The first aim of this dissertation will be to provide a review of literature that will (1) highlight various determinants of physical activity among American college students; (2) provide rationale for promoting physical activity during the college years; (3) present a review of student physical activity promotion programming on American college campuses; (4) summarize the results of the review and provide direction for future research and practice. The second aim of this dissertation will be to describe a qualitative investigation into physical activity promotion practices conducted on UNC system campuses and provide recommendations for future research and practice.

"Pub Med," a collection of databases for articles from medical and health-related journals, was used to identify appropriate literature for the first aim of the dissertation. Search terms included: physical activity, promotion, college, college students, campus, intervention, programming, environment, and policy. Studies that included promotion

programs for the general public were not included nor were any policies implemented by non-college affiliated organizations.

This review of literature uncovered 14 published articles from 1999 to 2008 related to physical activity promotion on American college campuses. Results of the literature review suggest that of the studies attempting to promote physical activity among college students, most target intrapersonal factors and provide little evidence regarding the effects of institutional, community or policy factors on physical activity behaviors of college students. Furthermore, additional research is needed to assess the effects of scientifically established determinants of physical activity on college student behaviors. Finally, results of this review underscore the need for continued research that will provide a comprehensive understanding of how physical activity promotion on a college campus is currently accomplished.

To accomplish the second aim of this dissertation, participants were recruited from North Carolina's multi-campus university system. Nonprobabilistic purposive sampling followed by snowball sampling was conducted to identify a total of 22 semi-structured interview participants across 15 state universities located in North Carolina. Interviews were digitally recorded, transcribed verbatim into a word document and subsequently uploaded into NVivo 8 qualitative software for analyses.

The qualitative investigation into student physical activity promotion on University of North Carolina multi-campus system campuses lead to the uncovering of several key findings. First, participant responses suggest that there is currently an unspecified definition of physical activity promotion. Second, it was uncovered that most

efforts to promote physical activity to students do not target scientifically established determinants of physical activity outside of intrapersonal level determinants. In addition, descriptions of current physical activity promotion practices provided by participants made evident the limited use of a social ecological approach to promote physical activity among college students. Ultimately, these findings lead to the development of several recommendations for both research and practice including the establishment of a standard definition of physical activity promotion for university practitioners as well as continued research regarding the effects of targeting social ecological factors on physical activity behaviors of students.

BEHAVIOR, THEORY AND PRACTICE: PROMOTING
PHYSICAL ACTIVITY AMONG AMERICAN
COLLEGE STUDENTS

by

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≈ To my family: Mom, Burns, Dad, Marg, Scott, Andrea, Mark, Keivin, Nancy, Ryan and Jay; thank you for your love and encouragement. You believing in me gave me the strength to persevere. Above all, to my wife Stefanie; when nights were long and days were stressful, your smile and positive attitude brightened my days. I cannot thank you enough for standing by my side throughout this endeavor. I love you all. ≈

APPROVAL PAGE

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CHAPTER I

INTRODUCTION

The Center for Disease Control and Prevention (CDC) affirm that regular physical activity is a critical part of an individual's overall health.¹ Still, many Americans do not engage in regular physical activity.^{2,3} It is suggested that regular physical activity is a precursor for wellbeing and a means to health risk reduction and disease avoidance. Consequently Healthy People 2010 physical activity as one of the leading health indicators and it is currently a proposed objective for Healthy People 2020.^{3,4} The United States Department of Health and Human Services (USDHHS) prescribe regular physical activity as a preventative measure for chronic diseases among men and women of all ages and conditions.^{2,3} Benefits of regular physical activity include the reduction of blood pressure among individuals with hypertension; the maintenance of healthy bones, muscles and joints; and the development of lean muscle.² In particular, regular aerobic activities like brisk walking and jogging have been associated with a reduced risk of colon cancer, coronary heart disease and or premature death. Furthermore, health care expenditures in 2007 surpassed \$2.2 trillion and it is estimated that the costs associated to chronic disease treatment account for over 75% of these expenditures.^{5,6}

In addition to the physiological benefits of physical activity, regular physical activity is also linked to the reduction of psychological symptoms related to stress, anxiety and depression. It can enhance an individual's capacity to interact positively among social groups and has the ability to foster positive moods or feelings of well-being.^{2,3,7} While it is evident that there are numerous health benefits of regular physical activity, it is important to understand that if unmonitored, practiced unsafely, or initiated too quickly this behavior can also lead to possible injury.⁸ Despite potential injury, physical activity is a crucial part of optimal health and in most cases the benefits outweigh the risk of injury.⁶

Due to the many health benefits of regular physical activity, efforts nationwide have been put forth to promote the engagement of regular daily physical activity among 18-65 year olds. Although the goals of these efforts may be similar, it is important to acknowledge that promotion efforts can differ from one another in many ways. Examples include theoretical foundation, design, approach, mode of implementation, and or target population. Empirical evidence suggests that physical activity promotion programs are effective when scientifically established determinants of physical activity are targeted among the general population of 18-65 year olds.^{9,10} In Particular, Sallis & Owen uncovered several physical activity promotion programs that reported moderate to high effect sizes.⁹

While the findings regarding physical activity promotion for the general public are promising, research regarding physical activity promotion among college populations is limited. This lack of evidence presents many challenges for both researchers and

practitioners. However, a better understanding of physical activity promotion practices on college and university campuses could potentially lead to the development of innovative research as well as the establishment of best practices most suitable for college and university populations.

Statement of Problem

Physical activity behaviors reported by American college students are a public health concern. In particular, one study found that 54.1% of the study's sample of college students did not meet the American College of Sports Medicine and American Heart Association's recommendation for physical activity.¹¹ This same study noted that 30% of the sample reported no engagement in physical activity during their freshman year. It was concluded that this proportion did not significantly change by the end of the college student's sophomore year.¹¹ The American College Health Association-National College Health Assessment (ACHA-NCHA) found findings similar to those presented in the Racette study. The ACHA-NCHA identified that among a representative sample of American college students, 24.2% reported no days of moderate intensity cardio or aerobic exercise of at least 30 minutes in the last 7 days.¹² Additionally, 55% of that sample reported only 1-4 days of moderate intensity cardio or aerobic physical activity of at least 30 minutes in the last 7 days. The ACHA-NCHA also revealed that 41.1% of college students reported zero days of vigorous intensity physical activity of at least 20 minutes in the last 7 days.¹²

While it is evident that a proportion of American college students are engaging in regular physical activity, these findings suggest that far too many students are not

engaging in adequate amounts of regular physical activity. To better understand why this is, one must consider the role of physical activity promotion. However, amidst published research, articles related to physical activity promotion on a college campuses both lack in quantity and provide little evidence of successfully influencing physical activity behaviors of college students.¹³ Specifically, it is unclear how physical activity promotion on a college campus is actually accomplished. Minimal research in this area provides little direction for campuses who value the physical well-being of their students, as well as makes evident the need for further research to better understanding physical activity promotion practices carried out by U.S colleges and universities.

Purpose

The broad aim of this dissertation is to explore student physical activity promotion programming conducted by American colleges and universities. Specifically, this dissertation intends to (1) present the results of a literature review regarding physical activity promotion on U.S. college and university campuses and (2) present and discuss the results of a qualitative investigation into physical activity promotion practices conducted on State University campuses located in North Carolina.

First, the review of literature will highlight determinants of physical activity among adult and college student populations, followed by an in-depth review of published literature related to college physical activity promotion practices in the U.S. The results of this review will be used to provide recommendations for both future research and practice.

Second, the presentation of a cross-sectional investigation conducted on UNC system campuses will provide a means for better understanding current student physical activity promotion practices carried out in North Carolina. Qualitative procedures will be employed to answer the following research questions:

Central Question: What is being done on UNC system campuses to promote physical activity among students?

Ancillary Questions:

1. Who are the key personnel at each UNC institution that are responsible for promoting physical activity to students?
2. What factors influence how student physical activity promotion is accomplished on UNC system campuses?

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CHAPTER II

REVIEW OF LITERATURE

This literature review will apply concepts related to the Social Ecological Model for Health Promotion's framework to ensure that all relevant factors associated with physical activity promotion are considered and addressed. Many suggest that a method to promote optimal health is to target individual level characteristics in an attempt to encourage healthy behavioral change. Others advise that this philosophy promotes victim blaming and neglects to acknowledge the role of social ecological factors. The latter proposes that a form of reciprocal causation occurs between the individual and the environment. Specifically, The Ecological Model for Health Promotion (SEMHP) implies that behavior is determined by intrapersonal, interpersonal, institutional, community, and public policy factors.¹ Not only can this framework be used to develop and direct comprehensive health promotion programs, it will also guide various sections of the following review of literature.

This review will first compare determinants of physical activity among the general population of adults to determinants of physical activity among college students. Following this, a comprehensive review of published literature related to physical activity promotion conducted on American college and university campuses will be discussed, including a brief discussion of common theories and or models used to target physical activity behaviors of college students as well as how the college campus provides an

appropriate time and place to promote physical activity to students. Ultimately, results of this review will provide sound argument for the need of additional research related to college student physical activity promotion as well as provide recommendations for future practice.

Determinants of Physical Activity in Adults

The causal web of physical activity is complex.² Research suggests that influential factors leading to physical activity may be biologically determined, exist in the physical and social environments or both.^{2,3,4} Sallis & Owen characterize determinants of physical activity as either facilitators or barriers; facilitators are those that support physical activity participation and or contribute to an environment conducive of physical activity.⁴ Facilitators may also support the reduction of sedentary behaviors. In contrast, barriers are the determinants of physical activity that discourage behavioral change and may contribute to lower levels of physical activity engagement.⁴ Understanding the mechanism of physical activity participation can be useful when developing effective programs designed to promote physical activity engagement.^{2,4} A comprehensive analysis of said determinants revealed specific factors linked to physical activity engagement in adults and were later substantiated by a more recent review.^{4,5} In both reviews, determinants of physical activity in adults were organized based on their point of influence; demographic (biological), psychological, behavioral, social/cultural, environmental and physical activity characteristic. Only those determinants of physical activity with repeated documentation of a positive association with physical activity, repeated documentation of a negative association with physical activity, or a repeated

documentation of a lack of association with physical activity will be discussed. For a complete list of all determinants of physical activity in adults see Sallis & Owen, *Physical Activity and Behavioral Medicine*, 1999, p. 115-116.

Determinants with a Positive Association with Physical Activity in Adults

Demographic factors with repeated documentation of a positive association with physical activity in American adults include higher education, being male, and higher socioeconomic status.^{4,5} Generally speaking, genetics or heredity were also noted as having a positive association with physical activity.

Psychological determinants with repeated documentation of a positive association with physical activity in adults include high enjoyment of exercise,^{4,5,6} greater expected benefits of physical activity,^{4,6,7} greater intent to become physically active,^{4,5,6} and a positive perception of health and or fitness.^{4,5} Additional psychological determinants include high self-efficacy for physical activity,^{4,5,6} greater motivation for physical activity,^{4,5} high self-schemata for exercise,^{4,5} and the stage of change one is classified to be, within the framework of the Transtheoretical Model.^{4,5,6}

Behavioral determinants with repeated documentation of a positive association with physical activity in adults include having a history of being physically active as an adult, practicing positive dietary habits and process of change.^{4,5} Process of change refers to stages found within the context of the Transtheoretical Model.

The social/cultural context was also noted to influence physical activity in adults. Repeated documentation of a positive association with physical activity included physician influence, support from family and, or support from friends.^{4,5,6,7}

Some research suggests that the physical environment has the potential to influence physical activity behaviors of adults;^{7,8} however, there are gaps within the research regarding before and after effects of environmental factors on physical activity in adults.⁵

Lastly, no physical activity characteristics were shown to have repeated documentation of positive associations with physical activity in adults.^{4,5}

Determinants with a Negative Association with Physical Activity Behaviors in Adults

In contrast to factors with repeated documentation of a positive associated with physical activity in adults, there are determinants with repeated documentation of a negative association with physical activity in adults.^{4,5} Demographic determinants with repeated documentation of a negative association with physical activity include age, race/ethnicity, and overweight/obesity.^{4,5} These findings suggest that as one gets older, physical activity levels decrease, non-whites engage in less physical activity than whites, and those who are overweight or obese engage in less physical activity.

Psychological determinants negatively associated with physical activity in adults include the perception of barriers to exercise^{2,4,5,6,9} and mood disturbance.⁴ A 2002 update and review noted the perception of a lack of time as an additional psychological determinant negatively associated with physical activity in adults.⁵

There were no behavioral or social/cultural determinants identified to have repeated documentation of a negative association with physical activity in adults. However, individuals living in geographic regions not conducive to physical activity (poor climate), are associated with a decrease in physical activity engagement.^{4,5,9}

Finally, one physical activity characteristic with repeated documentation of a negative association with physical activity in adults is perceived effort.^{4,5} Essentially this suggests that the greater effort an individual perceives they will need to produce, the less likely they are to engage in that activity.

Determinants that Lack of Association with Physical Activity Behaviors in Adults

While positive and negative determinants of physical activity in adults are important to be familiar with, identifying factors with repeated documentation of a lack of association with physical activity in adults can be just as valuable. Psychological determinants with repeated documentation of a lack of association with physical activity include knowledge of health and exercise, normative beliefs, and perceived susceptibility to illness/serious illness.^{4,5} In addition, activity during childhood, participation in school sports and or being a smoker are all factors with repeated documentation of a lack of association with physical activity in adulthood.^{4,5} A 2002 update and review listed attitudes as an additional determinant with a lack of association with physical activity in adults.⁵

There were no social/cultural factors that had repeated documentation of a lack of association with overall physical activity in adults. Sallis and Owen's review revealed that *actual* availability of recreation facilities has repeated documentation of weak or mixed relationship to physical activity, and Trost's update suggests that the perception of available facilities also has repeated documentation of weak or mixed evidence of association with physical activity in adults.^{4,5}

No physical activity characteristics were identified that have repeated documentation of a lack of association with physical activity.^{4,5}

Determinants of Physical Activity in College Students

In comparison to the research published on the determinants of physical activity in adults, research regarding determinants of physical activity among the college student population is limited. While the breadth of research is narrow, there are a few studies that have uncovered various determinants of physical activity specific to college students. The following section will be organized into two parts; the first section will discuss determinants of physical activity among college students that are similar to those in adults and the second section will discuss the determinants of physical activity specific to the college student population (Table 1).

Determinants of Physical Activity in College Students Similar to Those in Adults

Similar to the findings highlighted in the review of determinants in adults,^{4,5} increasing age and being non-white were found to be negatively associated with physical activity in a sample of college students.¹⁰ In addition, like the general adult population,^{4,5} greater perceived barriers were found to be negatively associated with physical activity in college students.^{9,12} Furthermore, in another study, lower levels of perceived barriers were found to be associated with higher levels of physical activity in college students.¹¹

As noted previously, social support from both friends and family are positively associated with physical activity in adults. This is also true for college students; living with friends^{8,10,12} or being a member of an organization^{8,10} were both associated with more physical activity in college students. These findings are also consistent for family

support; students with greater support from family were more likely to be physically active compared to their counterparts.^{10, 12}

Findings regarding psychological attributes such as self-efficacy to be physically active, perceptions of consequences, attitudes regarding physical activity and intent to be physically active in college students parallel those found in adults. Specifically, self-efficacy to overcome barriers associated with physical activity was also found to be positively associated with physical activity levels among a college student population.^{11, 12} Finally, similar to findings among adults, attitudes regarding physical activity and the intent to exercise were closely related to increased physical activity levels among college students.¹³

Determinants of Physical Activity Specific to College Students

Among adults, being male was positively associated with level of physical activity;^{4, 5} however among the college population mixed findings are present. While few studies have attempted to study the relationship between gender and physical activity in college students, some suggest that it does not exist.¹⁴ Others, propose that males are more likely to be physically active than females.^{10, 12}

There are several determinants of physical activity related to the unique living environment present on a college campus. First, living on a campus with accessible recreation facilities is positively associated with physical activity among college students.⁸ Second, studies suggest that a campus set amidst a city environment not conducive to pedestrian use, negatively influences student physical activity.⁸ Furthermore, being a single college student is related to greater physical activity.⁸

Lastly, unique to the college experience, academic year has shown to be predictive of varying levels of physical activity among college students. For example, being an undergraduate student, rather than a graduate student, is positively associated with greater physical activity.⁸

Physical Activity Promotion on U.S College Campuses

In comparison to the literature regarding physical activity promotion among the general U.S population, research on physical activity promotion among college students is limited. Dishman and Buckworth¹⁴ published a meta-analysis regarding the efficacy of 127 interventions to promote physical activity among 131,000 subjects across all types of populations. While this meta-analysis did not focus on the college population, it provides a foundation regarding physical activity promotion across many different populations. As part of their findings, the authors report mean weighted effect sizes of 0.75; suggesting that overall, physical activity can be promoted successfully. Others support these findings and suggest physical activity can be promoted among varying communities and sub-populations.⁴

Based on Dishman and Buckworth's meta-analysis¹⁴ and the works of others, general recommendations for future physical activity promotion have been established. First, interventions should be developed using one or more established theories in mind. Second, interventions should target scientifically established determinants of physical activity.^{2, 4, 8, 14-22} Therefore, if scientifically established determinants of a behavior are targeted, ultimately the behavioral outcome will be influenced.⁴

The following section will provide a comprehensive review of student physical activity promotion conducted on American college campuses. It will provide a review of interventions that have employed various implementation methods to promote physical activity among the college population, as well as highlight the effect sizes associated with those interventions. As stated in the introduction, The Ecological Model for Health Promotion (SEMHP) suggests that behavior can be influenced via intrapersonal, interpersonal, institutional, community, and or public policy factors.¹ The SEMHP's framework will be used to organize the following review of college student physical activity promotion interventions.

Intrapersonal Factors

Intrapersonal factors are individual level attributes that may influence physical activity.¹ Highlighted previously, it is proposed that the scientifically established determinants of physical activity among college students include perceived barriers, self-efficacy for physical activity, attitudes and intentions.^{4, 5} However, this review uncovered that the most common intrapersonal factor targeted was knowledge.²³⁻²⁷ For example, interventions informed students about current recommendations for physical activity, fitness nutrition, lifestyle physical activity, recommended daily steps and goal setting.^{24, 26, 27} Others informed students about more specific topics such as principles of holistic wellness,²⁵ time perspective cognition²³ and various behavior change strategies²⁷ related to physical activity. Of the studies that reported significant findings regarding changes in knowledge due to the intervention,^{24, 25} effects sizes ranged from .35 to .82. Yet, few studies tested the relationship between increased knowledge and increases in physical

activity.^{24, 25} Of the two studies that did, increases in holistic wellness knowledge²⁵ and increases in overall physical activity knowledge²⁴ were predictive for increases in resistance training.

This review discovered only one study that attempted to promote physical activity by targeting student attitudes and intentions regarding physical activity.²⁸ This study assessed the effectiveness of positively framed messages (PFM) versus negatively framed messages (NFM) on psychological constructs associated with the Theory of Planned Behavior. This included attitudes of physical activity and intentions to be physically active. Overall, this study found that when compared to the control group, the PFM and NFM groups had significantly higher scores for intentions at 2-week post intervention follow-up ($p = <.001$ & $.016$ respectively). Similar trends were found for intentions, affective attitudes, instrumental attitudes, subjective norms and perceived behavioral control at 2-week post intervention follow-up ($p = <.05$ for all). PFM messages were the only intervention piece to influence actual exercise behavior scores; at both 2-week post intervention follow-up and 3-week post intervention retention measures the PFM group had significantly higher Exercise Behavior scores than the control group ($p = .05$).

A part of a student's decision making process involves weighing the pros and cons of engaging in physical activity. This review identified four studies that targeted student perceptions or expectations regarding the benefits of physical activity.²⁹⁻³² While these interventions aimed to influence a student's perceived benefits of physical activity, only one study actually reported changes in this variable.³² This study found that at post

test, intervention group perceived benefits were significantly greater ($p=.004$; effect not reported) than the perceived benefits held by those in the comparison group.

Much like perceived benefits, enjoyment of physical activity has been identified as a possible determinant of physical activity in adults.⁴ While it has not been determined whether this variable has the same influence on college student physical activity, this review identified one program that targeted enjoyment of exercise among a group of college students; however it did not significantly change as a consequence of the intervention.^{29, 30}

Self-efficacy for physical activity is a determinant that is commonly targeted by practitioners.⁴ Consequently, many of the interventions attempted to promote physical activity among college students by targeting this particular determinant; 8 of the 14 studies targeted self-efficacy for physical activity.^{24-26, 28-32} Of these studies, two reported significant results.^{25, 32} D'Alonzo reported significant differences in self-efficacy for physical activity between high-attende and low-attende participants at post-test ($p < .001$).³² Gieck & Olsen reported significant pre to post test increases in self-efficacy to employ principles of holistic wellness among the intervention group ($p < .001$; effect size .59). In addition, this study reported that self-efficacy for physical activity was predictive of increases in resistance training ($p < .05$; effect size .55).²⁵

Promoting behavior change in some cases is done through the development of new skill-sets. This review uncovered various attempts to improve student skills in an effort to promote physical activity engagement. Interventions attempted to target skills related to goal setting,^{23, 26, 27, 29} self monitoring,^{24, 26, 29} record keeping,^{25-27, 33} problem

solving,^{29, 30} decision making,²³ and self-instruction and relapse prevention.²⁹ Of these studies, only one reported any notable significant changes among the aforementioned skill-sets. Suminski & Petosa found significant decreases in self-regulation ($p = <.05$) reported by the control group at post test when compared to the treatment group.²⁴ Additionally, post-test analyses revealed significant increases in self-regulation for both the treatment and comparison group when compared to the control group ($p = <.005$ & $p = <.001$ respectively).

Interpersonal Factors

The next factor in the Social Ecological Model for Health Promotion is interpersonal processes; these may include formal and informal social networks as well as social systems.¹ Specific interpersonal determinants related to physical activity in college students include social support from friends and family, being involved with campus organizations and relationship status. This review of literature uncovered three interventions that attempted to influence social networks among the college student population; however only one reported significant results related to interpersonal factors.^{24, 29, 30} Suminski & Petosa reported that from pre to post test measures, in both the treatment and control groups, social support from friends significantly decreased ($p = <.005$ & $<.05$ respectively; effect sizes not reported).²⁴

Institutional Factors

Institutional factors are those found within social institutions, consisting of organizational characteristics such as rules, regulations, and mandates. Institutional factors may also be linked to environmental attributes of the campus with regard to

physical activity.¹ Assessing the effects of institutional, and or environmental change on a college student's physical activity can be time intensive and pose challenging issues related to experimental designs. Because of this, very few studies have assessed before and after affects of institutional or environmental change on college student physical activity levels. Although institutional and environmental factors have been shown to influence behaviors outside of a college campus, this review confirmed that there is a dearth of published literature examining the before and after effects of institutional or environmental changes to a college campus on physical activity behaviors of college students. Only one study in this review assessed before and after effects of institutional/environmental change on student physical activity. This study assessed the influence of educational signage to promote stair use as an alternative to taking the elevator.³⁴ This study found that a significantly greater number of individuals (students, faculty, staff and campus visitors) took the stairs during, and after stair-use promotion signs were posted ($p = .017$) compared to when stair-use promotion signs were not posted. While these results seem promising, before and after measures were only of stair use and not overall physical activity. This study, due to its limited scope of physical activity measures provides little regarding the effect institutional and environmental factors have on physical activity levels of college students.

Community/Campus Factors

As part of The Social Ecological Model for Health Promotion, factors concerning relationships among organizations, institutions and groups within defined boundaries have been linked to behavior change.¹ It may be hypothesized that physical activity

norms created by influential groups or organizations on a college campus may have an affect on physical activity behaviors of all students. However, this review failed to identify any interventions aiming to influence community or campus factors in hopes to influence student physical activity. Because of the limited research in this area, it is unclear whether community or campus factors actually influence physical activity behaviors of students. This level of ambiguity reveals a gap in the research regarding before and after effects of community/campus factors on physical activity behaviors of college students.

Public Policy

With regard to The Social Ecological model for Health Promotion, public policy refers to local, state, and national laws that govern a particular issue that may consequently influence individual or population level behaviors related to health.¹ Due to the time-intensive nature of policy change, studies assessing the before and after effects of policy change on levels of physical activity in college students are scarce.

Intervention Effects on Physical Activity as an Outcome

Across the 14 studies identified in this review, a wide variety of physical activity measures were collected. Studies measured self reported general physical activity, daily activity, volume of physical activity, total lifestyle physical activity, number of steps taken, aerobic fitness, strength and resistance training, and flexibility. Overall, nine studies reported significant findings related to intervention effects on physical activity as the behavioral outcome. Six of the nine studies found significant changes between groups from pre to post test. Between-group analyses uncovered significantly greater physical

activity among the intervention/treatment group when compared to the comparison or control group at post test.^{20, 26, 28, 29, 32, 33} Five of the nine studies reported significantly greater physical activity among the intervention/treatment group when compared to the control group at follow-up.^{23, 25, 28, 30, 32} Within-group analyses revealed that in five of the nine studies, significantly greater physical activity was measured at post test when compared to pre test measures within the intervention/treatment group.^{20, 23, 25, 29, 30}

With respect to effect size analyses, guidelines for physical activity interventions range from small (.10), medium (.30) to large (.50).⁴ Of the 14 studies reviewed in this paper, five reported effect sizes for physical activity.^{25, 26, 28, 29, 30} These effects ranged from very small (<.30)^{26, 28-30} to medium or large (.36 to .50)²⁵. In general, of the studies reporting effects on physical activity, the majority were small. These findings contradict those of Sallis & Owen whom reported large effects on physical activity among interventions designed for *non-college* populations.⁴ Essentially this suggests that replicating interventions designed for non-college populations may not be the most practical way to develop interventions to increase physical activity among the college student population.

Common Theories used in Physical Activity Interventions for College Students

It is essential that interventions promoting behavior change are based on tested theoretical frameworks to increase the likelihood of behavior modification or maintenance.^{2, 15, 16, 35} Specifically, only tested theories should direct interventions so that scientifically established determinants of physical activity can be targeted. This review identified that the most commonly utilized theories to promote physical activity to

college students were Ajzen's¹⁵ Theory of Planned Behavior,²⁸ Prochaska & DiClemente's³⁷ Transtheoretical Model,^{29-31, 36} and Bandura's³⁸ Social Cognitive Theory.^{24, 26, 29-32}

According to the Theory of Planned Behavior (TPB) human behavior is guided by three kinds of considerations: behavioral, normative, and control beliefs.¹⁵ The TPB has most successfully been used to influence physical activity when targeting psychological factors such as attitudes and cognitive factors like decision processes.

The Transtheoretical model (TTM) suggests that behavior change related to health, involves four constructs; stages of change, decisional balance, self-efficacy, and situational temptation.³⁷ Most commonly used in physical activity promotion are the constructs related to stage of change and self-efficacy. The stages of change include precontemplation (no motivation to change); contemplation (intention to change within next 6 months); preparation (planning change to occur within the next month); action (implementation of change has occurred and has been for up to 6 months); maintenance (new behavior has been in place for more than 6 months); and termination (this indicates that there is no temptation to relapse or go back to original behavior). The self-efficacy construct refers to an internal state in which and individual feels competent to perform a task; in this case engage in physical activity in a particular context or setting. Furthermore, self-efficacy for a particular behavior combined with the sense of belief must be present in the individual for change to occur.

The Social Cognitive Theory consists of the reciprocal nature and relationship between the person, behavior and environment.³⁸ Noted by Bandura, principles including

reinforcement and punishment, people learn from observing others and cognitive processes that mediate behavior influence behavior change and or adoption.³⁸ With regards to physical activity, Bauman suggests the SCT is closely associated with variables such as expected benefits, self efficacy, activity during childhood, skills related to coping with barriers, and external influences including interpersonal relationships and social support; all of which have been “repeatedly documented with positive association with physical activity” among adults.² Key concepts of the SCT include *reciprocal determinism*: interaction between the person, the environment and the behavior; *symbolizing capability*: through symbols and or images humans are able to give meaning and continuity to their experiences while storing information to guide future behaviors; *vicarious capability*: the concept of learning by observation and not just direct experience; *forethought capability*: the ability to motivate and guide behavior based on prediction of the outcome; *self-regulation*: the ability for an individual to control over their personal thoughts, motivations and behaviors; *self-reflection*: the ability to analyze experiences and manipulate their thinking according to these experiences. In particular, this review identified that with regards to physical activity, practitioners targeted expected benefits of physical activity, coping skills related to overcoming barriers to physical activity, and external influences including interpersonal relationships and social support.

College: An Appropriate Time and Place to Promote Physical Activity

There many reasons why college presents an appropriate time and place to promote physical activity. First, based on population size, the United States Census

Bureau reported that in the fall of 2000 there were an estimated 15.9 million students enrolled in the nation's colleges and universities.³⁹ There are thousands of new students attending college each year and this alone presents an opportunity to promote healthy behaviors like physical activity to a large captive audience.⁴⁰

In addition, college is a period of time when young adults experience various changes in their lives.⁴¹ In particular, a college student will continue to develop behaviorally as well as experience ongoing cognitive, psychological, and psychosocial development.⁴¹ The following sub-sections will highlight these specific changes in a student's life during college as well as discuss how they are associated with physical activity. Following this, a subsequent section will highlight how the college campus provides an opportune environment for physical activity promotion.

Behavioral Changes Occurring During College

The transition from high school into and throughout college is one where behaviors leading to an increase in chronic disease risk factors have been shown to increase.⁴² Specifically, this transition period is related to a significant decline in self reported physical activity by students.^{42, 43} Thus, this transition period is an extremely important time to promote physical activity. This is so because behaviors developed during the college years can lead to behaviors carried out in adulthood where associated comorbidities related to physical inactivity typically present themselves.⁴⁴⁻⁴⁵ During the college years, students are presented with many behavioral choices; some associated with positive health consequences and others associated with negative health outcomes. Literature suggests that what is practiced during college can ultimately have a lasting

affect on an individual's health and quality of life post graduation.⁴¹ Therefore, a goal of the university should be to assist students in making choices that will lead to more positive health outcomes. Having access students on a college campus presents an opportune time to promote physical activity; a behavior that can lead to many positive health outcomes during and after college.

Cognitive, Psychological, and Psychosocial Development

Beyond the many behavioral changes that occur during a student's life in college, it is also a time where cognitive, psychological and psychosocial attributes are continually developing.⁴¹ Skills such as thinking ahead, envisioning future consequences of a decision, balancing risks and rewards, and controlling impulses are still being developed into the 20's.^{40, 46} In addition, the college years are a period when the development of self-concept, self-efficacy and self-esteem are continuing to progress. In general, existing attitudes are changing and new ones are being developed.⁴¹ Many of these cognitive, psychological and psychosocial attributes are also associated with physical activity engagement. Therefore, it would be efficient to both cultivate these characteristics while also promoting physical activity engagement. Furthermore, physical activity can aide in the positive development of cognition and brain functioning as well as help improve the psychological well-being of students during this significant stage in their lives.^{43, 47} Physical activity can also support the reduction of stress and anxiety related to developmental changes occurring during college.⁴⁸ This too exemplifies how the college years are a fitting time to promote physical activity.

Physical Environment

The college campus provides a supportive physical environment as well as a developed infrastructure that is conducive to the promotion of physical activity.^{40, 49, 50} In adults, studies indicate that accessibility, opportunities, and aesthetic attributes of the physical environment have a significant association with individual physical activity participation.⁴⁹ If theoretically this notion holds true for the college student population, a campus presents the ideal setting for college students to follow-through with behaviors they have learned via physical activity promotion efforts. Specifically, the physical layout of a college campus offers opportunity to engage in physical activity. This may be in the form of indoor or outdoor recreation facilities.⁵⁰ Therefore, a safe environment consisting of various recreation facilities provides a unique opportunity to initiate physical activity promotion programming.

Administrative Structure of a College or University

The following section will discuss the administrative structure of a college or university; highlighting those who may be involved with physical activity promotion. Proposed by this dissertation, there is limited research regarding physical activity promotion on a college campus and this suggests that further exploration into physical activity promotion is necessary. However, it is essential for researchers to understand the administrative structure of a college or university. Not only will this help with the identification individuals involved with physical activity promotion but it may also provide an explanation as to how or why physical activity promotion is currently accomplished.

Typically, institutions of higher education will have similar administrative positions such as presidents/chancellors, provosts, deans, department heads/chairs etcetera. However, the likelihood of having the same types of positions responsible for promoting physical activity to students at each institution is low. For example, many institutions have a Student Health Center that conducts physical activity promotion programming, or provides physical activity related educational material to the study body. In contrast, another institution may have a Student Wellness Center in addition to a Student Health Center that collaboratively serves the student body. In addition, staff positions within those two centers may differ. Institutions equipped with both a Student Health Center as well as a Student Wellness Center may have several trained staff qualified to implement physical activity promotion programming, when other institutions may not. This leads to an additional difference that is important to acknowledge. Many institutions have a director of recreation; however, this individual's responsibilities can vary drastically from one institution to the next. For example, at one institution the director of recreation may be entirely responsible for increasing recreation center usage by faculty, staff and students. While at another institution this same position is responsible for increasing club sport and intramural participation. Furthermore, it may be just as likely that at another institution, the director of the recreation center is responsible for intramural sports, club sport organization, recreation center safety, in addition to responsibilities related to physical activity promotion.

Regardless of how experienced individuals are with regards to physical activity promotion, it is possible that what is actually implemented is primarily directed by the

level of funding available. While it is not the goal of this section to detail each and every funding line that exists within the college or university context; it is necessary to make evident the role funding plays with regards to physical activity promotion on a college or university campus. Staff, resources, incentives, and adequate facilities all require funding. Therefore, available funding to support these resources may differ from one institution to another. For example, a private college or university may have more flexibility with student health and wellness funding, where as a public institution part of a larger state university system may have less flexibility.

Discussion and Future Directions

Steps are being taken nationwide to promote physical activity among the general population. In particular, the National Coalition for Promoting Physical Activity's National Plan consist various steps to promote social change. They include the use of evidence-based actions to promote physical activity, and the promotion of physical activity in all sectors, settings and populations. These steps also include both immediate and sustained actions that promote coordinated efforts to influence all levels of an ecological model.⁵¹ In addition, the Center for Disease Control and Prevention published the 2008 Physical Activity Guidelines for Americans. This document provides similar instructions for communities to promote physical activity effectively. The CDC recommends that community efforts to promote physical activity also use a social-ecological framework; this includes targeting individual factors by promoting the use personal goal setting, interpersonal factors such as mechanisms to improve social support, organizational factors by targeting worksite health promotion, community

factors by promoting the improvement of parks and recreational facilities in neighborhoods, and finally targeting the promotion of policies that support families who want to incorporate physical activity into their daily lives.⁵² These recommendations can be translated into effective physical activity promotion guidelines for colleges and universities. This notion is supported by the American College Health Association's explicit proposal to use a social ecological approach to influence Healthy Campus 2010's leading health indicator; physical activity.⁵³

Efforts to improve physical activity promotion on college campuses have already commenced; however, results of this review reveal gaps in the literature. Although intervention results appear to be promising, these gaps generate multiple implications for future research. As such, identifying what is actually being conducted on college campuses with regard to physical activity promotion would benefit both practitioners and researchers alike. While the 14 studies identified in this review provide a snap-shot of what has been attempted, a clear picture of what is *actually* being practiced by American colleges and universities are still unknown. Specifically, future studies should concentrate on developing a model or theory of how college student physical activity promotion is currently accomplished. Results of this type of study would provide a much needed description of what college campuses actually do to promote physical activity, how well institutions meet the guidelines for physical activity promotion recommended by national organizations and potentially uncover unforeseen empirical questions that have yet to be addressed.

In addition to the current lack of published literature regarding physical activity promotion conducted on American college campuses, it is clear that efforts need to be made to ensure that promotion programming efforts target physical activity as the main behavioral outcome. While this review advocates the importance of influencing and measuring specific determinants of physical activity in college students, it is evident that some physical activity promotion attempts failed to measure actual physical activity as a main outcome. In addition, this review identified that greater lengths should be made to track intervention effects over time.

To advance the field's understanding of college student physical activity participation, a meditational analysis determining strength of prediction of each currently identified determinant would support future physical activity promotion development. A better understanding of this would also assist programmers target the most effective and possibly most cost efficient predictors of physical activity among the college student population.

Finally, this review uncovered a significant lack of evidence concerning the before and after effects of institutional, community and policy factor changes related to physical activity behaviors of college students. If the recommendation of government health organizations is to use a social-ecological approach to guide promotion efforts, it is essential that future research attempt to focus on the effects of institutional, community and policy factors on physical activity behaviors of college students.

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TABLES

TABLE 1

Determinants of Physical Activity in College Students Similar to Those in Adults	Determinants of Physical Activity Unique to College Students
<ul style="list-style-type: none"> - Age - Being non-Caucasian - Greater perceived barriers - Social support (friends & family) - Self-efficacy for overcoming barriers to physical activity - Attitudes regarding physical activity - Intentions to be physically active 	<ul style="list-style-type: none"> - Campus Environment: <ul style="list-style-type: none"> - Living on campus with accessible recreation centers (+ association) - Living on a campus set amidst a urban environment (- associated) - Relationship status (being single is + associated with physical activity) - Academic year (inverse relationship)

CHAPTER III

PROMOTING STUDENT PHYSICAL ACTIVITY ON AMERICAN COLLEGE CAMPUSES: A LITERATURE REVIEW

Introduction

Low physical activity rates among American college students parallel those of 18-65 year olds among the general U.S population. Physical activity has the potential to influence an individual's health based on the amount they engage in on a regular basis.¹ Yet, many Americans still do not achieve the recommended amount of regular physical activity their daily activities.^{2,3} Consequently, Healthy People 2010 identified physical activity as one of the leading health indicators.³ Major benefits of regular physical activity include blood pressure and blood sugar management, muscle development, cardiovascular improvement and healthy bone maintenance.² In particular, regular aerobic activities such as brisk walking and jogging have been associated with a reduced risk of colon cancer, coronary heart disease and or premature death.

While physiological benefits of physical activity are frequently publicized in popular media, regular physical activity can also help minimize psychological symptoms related to stress, anxiety and depression. It has the ability to promote positive social interaction among groups of individuals as well as cultivate positive moods.²⁻⁴ Recognizing the benefits of physical activity is important, yet there is potential for injury

if done unsafely.⁵ Nevertheless, if guidelines are followed and medical professionals are consulted, the benefits of physical activity typically outweigh the risk of injury.⁶

While the benefits of regular physical are apparent, many college students nationwide continue to neglect to engage in this healthy behavior. In particular, one study found that more than half of its sample of college students did not meet the American College of Sports Medicine and American Heart Association's recommendation for physical activity.⁷ Also noted was that almost one third of the same sample reported that they did not engage in physical activity during their entire freshman year. To compound this problem, findings also suggested that this proportion of students did not significantly change their physical activity behaviors by the end of their sophomore year.⁷ The American College Health Association-National College Health Assessment (ACHA-NCHA) reported similar findings. Among a representative sample of American college students, 24.2% reported that in the past 7 days, they engaged in zero days of moderate intensity aerobic exercise of at least 30 minutes.⁸ Also noteworthy, 41.1% reported zero days of vigorous intensity aerobic physical activity of at least 20 minutes in the last 7 days. Not only are there established physical benefits of regular physical activity, but among the college student population it can support cognitive development as well as lead to an increased likelihood of healthful living post graduation.

To support individuals on American college and university campuses charged with promoting physical activity to students, greater efforts to publish college student physical activity promotion literature should be put forth. However, in contrast there is a current lack of published literature that has assessed physical activity promotion

conducted on American college campuses.⁹ The evident low levels of physical activity engagement reported by college students and the limited research regarding physical activity promotion practice on American college campuses underscores the need for a comprehensive review of college physical activity promotion in an effort to inform the field as well as advance research.

This article will draw attention to characteristics associated with physical activity behaviors of American college students as well as provide a comprehensive review of student physical activity promotion literature. To begin, determinants of physical activity in American college students will be discussed, followed by the presentation of a rationale for promoting physical activity during the college years. Once the determinants of student physical activity engagement and a rationale for physical activity promotion on a college campus have been established, methods related to the subsequent literature review will be covered. Results of the literature review will be organized into sections based on the Social Ecological Model for Health promotion (i.e., intrapersonal, interpersonal, institutional, community and policy factors). A brief introduction into the Social Ecological Model for Health Promotion (SEMHP) will be provided. Finally, major findings of the review will be summarized and recommendations for future research and practice will be presented.

Determinants of Physical Activity in College Students

Determinants of Physical Activity in College Students Similar to Those in Adults (Table 1)

Similar to the findings for adults,^{10, 11} increasing age and being non-Caucasian were found to be negatively associated with physical activity in a sample of college

students.¹² Additionally, psychological factors similar to those in the general adult population, such as greater perceived barriers, were found to be negatively associated with physical activity in college students.^{10, 11, 13-15}

Social support from both friends and family are positively associated with physical activity in adults.^{10, 11} This is also true for college students; living with friends^{12, 14, 16} and being a member of a Greek organization. This suggests that living with or having daily contact with people who are regularly physically active is positively associated with increased levels of physical activity in college students.^{12, 16} These findings are also consistent for support from family; students with greater support from family were more likely to be physically active compared to their counterparts.^{12, 14}

Similar to findings among adults, self-efficacy to overcome barriers associated with physical activity was found to be positively associated with “leisure (physical) activity”¹⁴ and physical activity levels among college student populations.¹⁵ Also, similar to findings among adults, positive attitudes regarding physical activity and greater intent to exercise were closely related to greater physical activity levels among both adult and college student populations.¹⁷

Determinants of Physical Activity Unique to College Students (Table 1)

Being male was positively associated with level of physical activity in adults;^{10, 11} however among the college population there are mixed findings. While few studies have attempted to study the relationship between gender and physical activity in college populations, some suggest that this relationship does not exist.¹⁸ Others propose that male students are more likely to be physically active than female students.^{12, 14}

Several determinants of physical activity are related to the unique living environment of a college campus. First, living on a campus with accessible recreation facilities is positively associated with physical activity among college students.¹⁶ Additionally, a campus set amidst an urban environment not conducive to pedestrian use negatively influences student physical activity.¹⁶ Furthermore, dissimilar to findings among the general population,^{10, 11} being single rather than in a relationship is related to greater physical activity in college students.¹⁶

Lastly, academic year has been found to be predictive of physical activity among college students. This relationship suggests that the further a student is in their academic career, the less physically active they will be. For example, undergraduate students are more likely to be physically active than are graduate students.¹⁶

College: An Appropriate Time and Place to Promote Physical Activity

In the fall of 2000 there were an estimated 15.9 million students enrolled in the nation's colleges and universities.¹⁹ Each year, thousands of new students attend college; this presents the opportunity to promote healthy behaviors to a large captive audience.²⁰ In addition, college is a time when young adults experience various changes in behavior, cognition, psychological and psychosocial development.²¹

The following sub-sections will highlight the relationship between specific changes occurring in a student's life during college and physical activity, as well as discuss how the college campus can provide a suitable environment for effective physical activity promotion.

Behavioral Changes Occurring During College

Transitioning from high school into and throughout college is one where behaviors linked to chronic disease risk factors have been shown to increase.²² Specifically, this transition period is related to a significant decline in self reported physical activity by students.^{22, 23} It becomes increasingly important when one considers how behaviors developed in college can continue into adulthood where comorbidities associated with physical inactivity typically present themselves.^{24, 25} During the college years, students are presented with many behavioral choices; consequences of these choices may result in positive or negative health outcomes. Moreover, what is practiced during college can have a lasting affect on an individual's health and quality of life post graduation.²¹ Essentially, ongoing engagement with students on a college campus presents an opportune time to promote healthy behavioral choices including physical activity engagement.

Cognitive, Psychological, and Psychosocial Development

In addition to the many behavioral changes that occur for students during life in college, it is also a time when cognitive, psychological and psychosocial attributes continue to develop.²¹ Skills related to thinking ahead, envisioning future consequences of decisions, balancing risks and rewards, and controlling impulses are still being developed into a student's twenties.^{20, 26} Furthermore, the development of self-concept, self-efficacy and self-esteem continues to progress. In general, existing attitudes are changing and new attitudes are developing.²¹ Many of these cognitive, psychological and psychosocial attributes are also associated with physical activity engagement. Therefore,

it would be efficient to both cultivate these characteristics while simultaneously promoting physical activity engagement. Most importantly, physical activity has been shown to aide in the positive development of cognition and brain functioning as well as help improve the psychological well-being of students during this significant transition in their lives.^{23, 27} Because these developmental changes are occurring during a condensed period of time, attending college or university can be very stressful. Yet, physical activity can support the reduction of stress and anxiety related to developmental changes occurring during college.²⁸ Essentially, this evidence suggests not only can physical activity help to cultivate overall healthy students, it must be promoted on campus.

Campus Environment

The college campus can provide an environment as well as a developed infrastructure that can support the promotion of physical activity.^{20, 29, 30} Studies indicate that accessibility and opportunistic attributes of a campus' physical environment have a positive association with physical activity participation of students.¹⁶ In particular, the layout of a college campus can offer ample opportunity to be physically active as well as promote this healthy behavior. For example, recreation facilities may be close in proximity to residence halls that allow students to be physically active on their own time or allow practitioners the opportunity to conduct promotion programming. Typically the college campus also provides a safe environment to be physically active outdoors as well; therefore promotion programming is not bound to indoor activities.³⁰ Ultimately, the availability of adequate facilities and a safe environment provides the opportunity to conduct student physical activity promotion.

Methods

The primary aim of this literature review is to examine research describing the promotion of student physical activity on American college campuses. The second aim will be to compare the methods, theories and approaches of these efforts.

For this review, student physical activity promotion on college campuses is defined as any effort put forth by an institution to 1) implement programs to influence physical activity behaviors of students; 2) implement new policies in an attempt to influence physical activity behaviors of students; 3) make changes to the campus' physical environment in an attempt to influence physical activity behaviors of students. A critical piece of this definition is that any or all of these efforts must be implemented with at least one primary purpose being to directly target physical activity behaviors of students.

A thorough literature search of physical activity promotion programs, policies and environmental changes was conducted using "Pub Med," a collection of databases for articles from medical and health-related journals. Search terms included various combinations of the following words or phrases: physical activity, promotion, college, college students, campus, intervention, programming, environment, and policy. Studies discussing physical activity promotion programs developed for the general public (i.e., non-college populations) were not included, nor were any articles discussing the execution or assessment of policies implemented by organizations unaffiliated with a college or university (e.g., town/city/county/state established ordinances).

Results

The literature search as described above uncovered 14 published articles from 1999 to 2008 that met the definition of physical activity promotion as described above, were developed and implemented with a college or university student population in mind and did not describe programming, policy or environmental changes implemented by organizations unaffiliated with a college or university.

Theoretical Foundation

Interventions promoting behavior change should be based on tested theoretical frameworks to increase the likelihood of behavior modification or maintenance.³¹⁻³⁴ Specifically, by framing physical activity promotion programs around grounded theories, appropriate determinants positively influencing physical activity behaviors can be targeted. The most commonly utilized theories or models used as a basis for college student physical activity promotion were Ajzen's³¹ Theory of Planned Behavior (TPB),³⁵ Prochaska & DiClemente's³⁶ Transtheoretical Model (TTM)³⁷⁻⁴⁰ and Bandura's⁴⁰ Social Cognitive Theory (SCT).^{38, 39, 41, 42}

The TPB was commonly used to create programs to influence physical activity by targeting psychological factors such as attitudes related to physical activity and cognitive factors like decision processes. In comparison, the TTM and SCT were commonly used to target self-efficacy for physical activity. Furthermore, almost half of the articles included in this review targeted variables related to the SCT; including expected benefits of physical activity, self efficacy for physical activity, skills related to coping with barriers, interpersonal relationships and social support. Most of the physical activity

promotion efforts in the reviewed literature were typically directed by one theory or model; however it is important to note that this review also discovered that three studies chose to use constructs of multiple theories when promoting physical activity to students.³⁷⁻³⁹

Implementation Strategies

There are various ways in which health promotion is conducted. It may be directed by a particular philosophical view or the result of other influential factors. Because physical activity is individualistic, some propose that the most effective way to influence this behavior is by targeting individual level characteristics of behavior change. Others advise that this philosophy neglects the role that social ecological factors have on behavior. Ecological models propose that there is a distinct relationship between the individual and the environment regardless of behavior or outcome.⁴⁴ In particular the Social Ecological Model for Health Promotion (SEMHP) implies that behavior is determined by intrapersonal, interpersonal, institutional, community, and public policy factors.⁴⁴ Due to its appropriateness and practical application, factors related to the promotion of physical activity found in the literature will be discussed using the SEMHP as an organizing guide. The results section will conclude with a discussion of intervention effects on physical activity as an outcome.

Intrapersonal Factors

Intrapersonal factors are individual level attributes that have the potential to influence physical activity engagement.⁴⁴ Intrapersonal factors that may positively influence physical activity behaviors of college students include knowledge, attitudes,

perceptions, self-efficacy for physical activity, enjoyment of physical activity and intentions.¹⁰ This review uncovered that the majority of promotion activities attempted to increase physical activity behaviors of students by targeting knowledge.^{42, 43, 45-47} In particular, these interventions taught students about current recommendations for physical activity, fitness, nutrition, lifestyle physical activity, recommended daily steps^{43, 46, 47} and goal setting.⁴⁷ Others educated students on more specific topics such as principles of holistic wellness,⁴⁶ time perspective cognition⁴⁵ and a number of behavior change strategies related to physical activity.⁴⁷ Of the studies that reported significant findings regarding changes in knowledge,^{43, 46} associated effects sizes ranged from .35 to .82. However, few studies tested the relationship between knowledge gain and changes in physical activity levels.^{43, 46} Of the two studies that did test this relationship, increases in holistic wellness knowledge⁴⁶ ($p < .05$; effect .60) and increases in overall physical activity knowledge⁴³ ($p < .05$) were predictive for increases in resistance training.

Only one study attempted to promote physical activity by targeting student attitudes and intentions regarding physical activity.³⁵ This study assessed the effectiveness of positively framed messages (PFM) versus negatively framed messages (NFM) on psychological constructs associated to the Theory of Planned Behavior including attitudes of physical activity and intentions to be physically active. Overall, the study found that when compared to the control group, the PFM and NFM had significantly higher scores for intentions at follow-up ($p = <.001$ & $.016$ respectively). Similar trends were found for intentions, affective attitudes, instrumental attitudes, subjective norms and perceived behavioral control at follow-up ($p = <.05$ for all). The

PFM messages were the only intervention piece to influence actual exercise behavior scores; at both follow-up and retention the PFM group had significantly higher exercise behavior scores than the control group ($p=.05$).

A part of a student's decision making process involves weighing the pros and cons of engaging in a particular behavior; in this case physical activity. Four studies targeted student perceptions and or expectations regarding the benefits of physical activity.^{36-38, 47} While these interventions aimed to influence a student's perceived benefits of physical activity, only one study actually reported changes in this variable.⁴⁸ Specifically, this study found that at post test, intervention participants perceived benefits were significantly greater ($p=.004$) than the perceived benefits held by those in the comparison group.

Evidence suggesting enjoyment of physical activity has a positive effect on college student physical activity is limited. Yet, only one study in this review attempted to target this determinant; however, physical activity behaviors of participants did not significantly change as a consequence of the intervention.^{37, 38} While this does not confirm nor deny the effect enjoyment of physical activity may have on college student physical activity, it provides initial evidence that this potential relationship may be weak.

The majority of the interventions covered in this review (8 of 14) attempted to promote student physical activity by targeting self-efficacy for physical activity.^{35, 37-39, 42, 43, 46, 48} Of these studies, only two reported significant results.^{46, 48} D'Alonzo reported significant differences in self-efficacy for physical activity between high-attende and low-attende participants at post-test ($p= <.001$)⁴⁸ whereas Gieck & Olsen reported

significant pre to post test increases in self-efficacy to employ principles of holistic wellness among the intervention group ($p = <.001$; effect size .59).⁴⁶ In addition, Gieck & Olsen reported that self-efficacy for physical activity was predictive of increases in resistance training ($p = <.05$; effect size .55) and intervention effects were found to be large (.55 & .59).⁴⁶

In general, the development and execution of new skill-sets have the potential to influence behavior change. Particularly, this review uncovered multiple examples of interventions attempting to target skills related to goal setting,^{37, 42, 45, 47} self monitoring,^{37, 42, 43} record keeping,^{42, 46, 47, 49} problem solving,^{37, 38} decision making,⁴⁵ self-instruction and relapse prevention.³⁷ Of these studies, only one reported any notable significant changes among the aforementioned skill-sets.⁴³ Suminski & Petosa reported significant decreases in self-regulation ($p = <.05$) reported by the control group at post test when compared to the treatment group.⁴³ Additionally, post-test analyses revealed significant increases in self-regulation for both the treatment and comparison group when compared to the control group ($p = <.005$ & $p = <.001$ respectively).

Interpersonal Factors

The SEMHP also proposes that there are interpersonal factors and processes related to behavior change. Interpersonal factors may include formal and informal social networks as well as social systems.⁴⁴ Examples of interpersonal factors related to physical activity among college students include social support from friends and family, participation in campus organizations and relationship status.^{12, 14, 16} This review uncovered three interventions that attempted to influence social networks among groups

of college students.^{37, 38, 43} However, only one study reported significant findings; Suminski & Petosa reported that from pre to post test, in both treatment and control groups, social support from friends significantly decreased ($p = <.005$ & $<.05$ respectively).⁴² As literature suggests, a decrease in social support may not act in favor of physical activity engagement; yet among treatment group participant self-regulation scores significantly increased ($p = <.005$). This may suggest that in the treatment group a decrease in social support potentially lead to increased self-regulation (i.e., managing behavior without the support of others). However, regardless of the feasibility of this relationship, neither had any influence on physical activity outcomes of college students.

Institutional Factors

Institutional factors of the SEMHP are those found within social institutions; consisting of organizational characteristics such as rules, regulations, and mandates.⁴⁴ In this case, institutional factors may also be linked to environmental attributes of the campus with regard to physical activity. Assessing the effects of institutional, and or environmental change on a college student's physical activity can be time intensive and pose challenging issues related to experimental design. Consequently, very few studies have assessed effects of institutional or environmental change on college student physical activity levels. In this review, only one study assessed the effects of educational signage to promote stair use as an alternative to taking the elevator.⁵⁰ Results of this study showed that a significantly greater number of individuals (students, faculty, staff and campus visitors) took the stairs during, and after stair-use promotion signs were posted ($p = .017$) compared to when stair-use promotion signs were not posted. While these results seem

promising, measures were only of stair use and not overall physical activity. Given that only one study assessed the influence institutional or environmental factors have on college student physical activity, it confirms that there is a dearth of published literature examining the effects of institutional or environmental change on student physical activity.

Community/Campus Factors

Regarding the potential community factors have on human behavior, the SEMHP suggests that relationships among organizations, institutions and groups within defined boundaries are viable sources for change.⁴⁴ As such, the SEMHP proposes that the relationships between intramural sport teams on a college campus may potentially influence physical activity behaviors of other student groups. It may be hypothesized that physical activity norms shaped by various influential groups on a campus may have an ultimate affect on physical activity behaviors of all students. However, this review failed to identify any such interventions aiming to influence community or inter-campus relationships in an attempt to influence student physical activity. Limited research in this area challenges the notion that college or university organizational relationships actually influence physical activity behaviors of students. This level of ambiguity reveals a gap in the research regarding effects of inter-campus organizational relationships on physical activity behaviors of college students and suggests that further research is needed to assess this possible relationship.

Public Policy

The SEMHP suggests that public policy (i.e., local, state and national laws that govern a particular issue) can influence individual and or population level behaviors related to health.⁴⁴ Due to the time-intensive nature of policy change, studies assessing the effectiveness of public, local and or state policy on levels of physical activity in college students are scarce. This is also true for effects of institutional policies on physical activity behaviors of college students. Limited research in this area, as confirmed by this literature review, exposes a gap in the research regarding campus policy change and its influence on physical activity behaviors of students.

Intervention Effects on Physical Activity as an Outcome

Many of the studies included in this review noted significant within-group pre to post test changes as well as between-group differences at post test. However, not all reported significant intervention affects on physical activity as the primary outcome. Of the studies that did, a wide variety of physical activity measures were used. Studies measured self reported general physical activity, daily activity, volume of physical activity, total lifestyle physical activity, number of steps taken, aerobic fitness, strength and resistance training, and flexibility. Nine of the fourteen studies reported significant findings related to intervention effects on physical activity as the primary outcome. Between-group analyses uncovered significantly greater physical activity among the intervention/treatment group when compared to the comparison or control group at post test in six of the nine studies.^{35, 36, 42, 47, 49, 51} In five of the nine studies, it was reported that when compared to the control group at follow-up the intervention/treatment group had

significantly greater physical activity levels.^{35, 38, 45, 46, 48} Within-group analyses revealed that in five of the nine studies, significantly greater physical activity was reported at post test when compared to pre test measures within intervention/treatment groups.^{37, 38, 45, 46, 51}

With respect to effect size analyses, guidelines for physical activity interventions range from small (.10), medium (.30) to large (.50).¹⁰ Of the 14 studies reviewed in this paper, five reported intervention effects on physical activity.^{35, 37, 38, 42, 46} Effects ranged from very small (<.30)^{35, 37, 38, 42} to medium or large (.36 to .50).⁴⁶ In general, of the studies reporting intervention effects on physical activity, the majority were small. Different from meta-analysis results of physical activity interventions designed for non-college populations that reported overall large effects.¹⁰

Finally, with few exceptions most interventions reviewed in this paper employed quasi-experimental designs. There was a variety of data collection protocols, including measures collected at 1 and 2 years post intervention; however most studies included in this review collected a physical activity measure once at baseline and then one other immediately post intervention. Thus overall, it would be expected that some of the results provided by these studies would experience a degradation of effect over time. While the demonstration of sustained intervention effects over time is not evident, the methods employed by these studies provide an initial foundation of reliable data that will potentially support the development and initiation of additional studies assessing the affects of physical activity promotion on college student behavior

Limitations

While this article provides a comprehensive review of literature related to physical activity promotion on American college campuses, three specific limitations emerged.

First, it would be imprudent to presume that the literature included in this review are the only efforts being made on American college campuses to promote physical activity among students. It is likely that the individuals who develop and carryout promotion efforts on their respective campuses do not have the time nor interest to publish data surrounding the effects of their programs. Furthermore, considering the nature of scientific publication, it is possible that even if submitted for publication, only those with significant findings would be accepted.

Second, the inclusion criterion of this review was quite specific. Due to the research interests of the authors, literature regarding physical activity promotion conducted on university campuses outside of the United States was excluded. It is possible that physical activity promotion research conducted outside of the United States could have influenced the results of this review. However, staying committed to reviewing research that would be most generalizable to the American college student was of great importance to the authors.

Lastly, inherent to many types of literature reviews, issues related to key word definitions have the potential to limit the scope of the studies included. Physical activity promotion in particular can be defined in various ways. The definition of physical activity promotion used for this review may have lead to the omission of research that potentially

could have informed this area of research. In addition, this review only included promotion activities that were implemented with the primary purpose of directly influencing physical activity behaviors of college students. Therefore, it is possible that institutional, community and policy interventions implemented to target some other issue on campus may have indirectly influenced physical activity behaviors of students.

Conclusion and Future Directions

This review uncovered various findings related to the promotion of physical activity on American college campuses. Most studies included in this review targeted intrapersonal level factors associated with physical activity among college students while few studies targeted interpersonal factors associated with physical activity among college students. Furthermore, it was discovered that very little published research is available that discusses the effects of Institutional, Community/Campus and Policy level changes on physical activity outcomes of American college students.

Efforts are being put forth nationwide to promote physical activity across all populations. The National Coalition for Promoting Physical Activity and the Center for Disease Control and Prevention offer similar guidelines for best practices. According to these two organizations, physical activity promotion best practice should include the implementation of evidence-based actions to promote physical activity as well as be directed by an ecological framework to guide social change.^{52,53} Specific to the college campus, these recommendations are echoed by the American College Health Association through its explicit proposal to use a social ecological approach to influence Healthy Campus 2010's leading health indicator; physical activity.⁵⁴

While individual intervention results appear to be promising, there is still little known regarding the effects of institutional, community and policy factor changes related to physical activity behaviors of college students. If the recommendations of government health organizations are to use social-ecological approaches to guide promotion efforts, it is essential that future research attempts to focus on the specific effects of institutional, community and policy factors on physical activity behaviors of the college student population.

As previously emphasized, targeting scientifically established determinants of physical activity in college students is an essential piece to promoting physical activity effectively. As a result of this review, it became evident that better efforts need to be made by practitioners to ensure that the most appropriate determinants of physical activity in college students are targeted. Continued research in this area (e.g., meditational studies) could provide evidence to support targeting some determinants over others (i.e., strength of prediction). The authors of this paper also recommend that physical activity should be the primary outcome amidst research attempting to promote greater physical activity among college students. Furthermore, greater lengths should be made to track intervention effects over longer periods of time (e.g., multiple semesters).

Ultimately, the results of this review suggest the need to conduct research that aims to identify what is actually being accomplished on college campuses with regard to physical activity promotion. While the 14 studies identified in this review provide a snapshot of what has been attempted, it does not provide the context in which physical activity is accomplished and excludes useful details. A study of this sort would support

the development of a theory or model that depicts how physical activity promotion is currently accomplished on American college campuses.

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TABLES

TABLE 1

Determinants of Physical Activity in College Students Similar to Those in Adults	Determinants of Physical Activity Unique to College Students
<ul style="list-style-type: none"> - Age - Being non-Caucasian - Greater perceived barriers - Social support (friends & family) - Self-efficacy for overcoming barriers to physical activity - Attitudes regarding physical activity - Intentions to be physically active 	<ul style="list-style-type: none"> - Campus Environment: <ul style="list-style-type: none"> - Living on campus with accessible recreation centers (+ association) - Living on a campus set amidst a urban environment (- associated) - Relationship status (being single is + associated with physical activity) - Academic year (inverse relationship)

CHAPTER IV

A QUALITATIVE INVESTIGATION INTO STUDENT PHYSICAL ACTIVITY PROMOTION AMONG NORTH CAROLINA'S MULTI-CAMPUS UNIVERSITY SYSTEM

Introduction

There is sufficient evidence that suggests that physical activity behaviors of American college students should be of concern to many. More than ever students are not engaging in adequate amounts of physical activity on a daily basis and these rates do not improve as a student progresses through college. The Centers for Disease Control and Prevention (CDC) affirm that regular physical activity is a critical part of an individual's overall health.¹ In particular, regular physical activity is a precursor for wellbeing and a means to health risk reduction and disease avoidance.^{2,3,4} Benefits of regular physical activity include improved cardiovascular health, blood pressure management, the maintenance of healthy bones, muscles and joints, and the development of lean muscle mass.⁵ Aerobic activities like brisk walking and jogging have been linked to a reduced risk of colon cancer, coronary heart disease and or premature death. Yet, many Americans do not engage in regular physical activity.^{5,6} To compound the problem, not only can limited levels of physical activity become dangerous at the individual level, it can potentially produce adverse affects at the population level. For example, health care expenditures in 2007 surpassed 2.2 trillion dollars. It was estimated that the costs

associated with treatment of chronic conditions like those associated with physical inactivity (e.g., heart disease) accounted for over 75% of these expenditures.^{4, 7}

The importance of incorporating regular physical activity into daily life is supported by the American College of Sports Medicine's and American Heart Association's physical activity recommendations for 18-65 year old Americans. The ACSM guidelines recommend that individuals between the ages of 18-65 perform at least 30 minutes of moderate physical activity on 5 or more days during the week, or 20 minutes of vigorous physical activity on 3 or more days per week. The ACSM notes that these guidelines can be met by doing a combination of both moderate and vigorous physical activity. In addition to aerobic activities, the ACSM guidelines also recommend that individuals engage in 8-10 strength conditioning activities (8-12 repetitions) 2 times per week. These recommendations should all be done in addition to activities of daily living.

While the positive benefits of regular physical activity are evident, it is also important to recognize that unsafe and unmonitored physical activity can lead to possible injury.⁸ However, if practiced safely the risk of injury is low and can be an integral part to a healthy lifestyle.^{2, 3}

A variety of efforts have been made to increase the number of people who adhere to the ACSM physical activity guidelines. Although the objective is most often to increase participation in regular physical activity, promotional efforts often vary in theoretical foundation, design, approach, mode of implementation, and target population. A significant predictor of the success of efforts to promote physical activity includes

targeting evidence-based determinants (e.g., self-efficacy, attitudes, and social support).⁹

¹⁰ There is evidence of this approach for promoting physical activity across several different populations and settings, however, very few examples have been purposively implemented and assessed with the traditional college student population.

Statement of Problem

There is sufficient evidence that suggests that physical activity behaviors of American college students should be of concern to many. More than ever students are not engaging in adequate amounts of physical activity on a daily basis and these rates do not improve as a student progresses through college.¹¹ The American College Health Association-National College Health Assessment (ACHA-NCHA) corroborate these findings. According to their data, a substantial proportion of college students are reporting that in the last 7 days they do not engage in moderate or vigorous intensity aerobic physical activity.^{12, 13}

While data regarding physical activity behaviors of college students are well established, documentation of efforts aimed at curbing these trends are limited.¹⁴ In general, it is currently unclear how physical activity is promoted on a college campus. Limited research in this area not only provides little support for campus practitioners who value the physical well-being of their students, it makes evident the need for a comprehensive understanding of physical activity promotion practices conducted by U.S colleges and universities. A better understanding of physical activity promotion conducted on U.S. campuses could potentially lead to the establishment of best practice guidelines specifically suited for the college/university population.

Aim of the Study

The broad aim of this study was to explore student physical activity promotion conducted by institutions that are a part of the University of North Carolina (UNC) multi-campus system. Specifically, this study investigated physical activity promotion practices implemented by each UNC System institution, identified key personnel charged with promoting physical activity to students, and uncovered factors that influence the implementation of physical activity promotion programming on a UNC system university campuses.

Methods

To explore how physical activity promotion is addressed by administration and staff on UNC system university campuses, qualitative procedures were employed so that context and meaning behind physical activity promotion practices could be best understood.¹⁵

Participants

Participants were recruited from the University of North Carolina's multi-campus system. This study was restricted to four-year traditional universities. Initially, nonprobabilistic purposive sampling¹⁵ was used to select one potential participant from each of the 15 universities. Based on their job title, these individuals were most likely to be responsible for promoting student physical activity (e.g., director of campus recreation). Potential participants were first contacted by phone to provide them with the initial details of the study. During this conversation participants were given the opportunity to voluntarily participate in the study. If contact was not made during the first

phone call, follow-up calls were made and emails were sent until the potential participant was reached. Once each potential participant agreed to participate, a time and date for a semi-structured interview was scheduled. If the potential participant was reached but declined participation, they were asked to suggest other individuals at their institution who may be appropriate for the study. If the potential participant disregarded contact attempts, declined participation or refused to suggest others on their campus, their institution was excluded from the study. On average, each institution was contacted either by phone or email approximately 2 times before communication was initiated.

Snowball sampling¹⁶ was used to identify additional individuals on each campus who were involved with promoting physical activity to students. Guidelines of the snowball sampling technique prescribe that each interview participant be asked to identify any other individuals on their campus who are also responsible for promoting physical activity to students. While this process initially produced an unknown final sample size, identifying additional interview participants in this manner reduced the likelihood of omitting key participants. This technique was initiated during each interview until all those responsible for student physical activity promotion on each campus were identified and interviewed. To encourage interview participation, an incentive of \$50.00 was offered to each potential participant during the time a request for an interview was made. Funding for this project was provided by Be Active North Carolina.

Data Collection & Data Recording

To increase the likelihood of trouble-free scheduling, 30-45 minute semi-structured interviews were conducted via telephone. As per The University of North Carolina Greensboro's Institutional Review Board direction and approval, consent to participate was obtained orally (digitally recorded) at the commencement of each interview (Appendix A).

Interviews were conducted using a semi-structured protocol that asked participants to respond to questions related to: (1) who are the key personnel on campus who promote physical activity to students, (2) how student physical activity promotion is conducted and (3) what factors influence how physical activity promotion is accomplished (Appendix B). In particular, questions related to physical activity promotion practices conducted on campus were framed around factors related to the Social Ecological Model for Health Promotion (SEMHP).¹⁷ To ensure that questions were appropriate and presented in a way that they would elicit detailed information from participants, interview questions were presented to an expert panel and underwent multiple rounds of review.

Each participant was asked the same questions; however interviews were conducted in a flexible manner and provided an opportunity for the participant to discuss issues they felt to be most relevant. In addition to recording interviews using a digital device, short hand notes were taken during each interview.

Data Analysis Plan

Qualitative data analysis steps as prescribed by Creswell were followed;¹⁵ data were first transcribed verbatim onto a word document and then uploaded into the NVivo 8 computer software package. The use of NVivo allowed for ongoing coding and recoding of data in an organized manageable format. Once uploaded into NVivo, participant responses were confirmed by comparing transcribed responses with shorthand notes taken by the interviewer. Once prepared, multiple sections of transcribed data were given a code (see code development) that best represented that particular segment. As advised by Creswell,¹⁵ the option for recoding was present so that each segment of the data could be coded accurately.

Code Development

Due to the structure of the interview protocol, general categories that emerged from participant responses appeared to fit well within the context of: (1) key personnel on campus who promote physical activity to students, (2) how student physical activity promotion is conducted and (3) what factors influence how physical activity promotion is accomplished. Essentially, each theme that emerged from participant responses was appropriately coded and used to provide insight into one of the three areas of physical activity promotion highlighted above (i.e., themes related to key personnel on campus responsible for physical activity promotion, themes related to student physical activity promotion activities conducted on UNC system campuses and themes related to factors that influence student physical activity promotion activities implemented on UNC system campuses). Assessing each code's noteworthiness was directed by the total number of

times referenced over the course of all interviews and by the total number of sources (participants) who commented on that particular theme. Using this method of code development lead to results that informed the development of key findings providing a comprehensive understanding of physical activity promotion practices conducted on UNC system campuses.

Results

Sample

14 of the 15 schools (93%) targeted for recruitment were included in this study. One institution was excluded because the scheduling of a potential interview occurred after the completion of the study. Over half of the schools represented in this sample had 2 participants representing their respective institution.

General Findings

The subsequent findings will be organized into the three major sections; these sections are based on the categories that stem from the data analysis plan and code development described in the previous methods section. First, themes related to key personnel responsible for promoting physical activity to students will be discussed. Second, themes related to physical activity promotion implemented on UNC system campuses will be presented. Lastly, themes related to factors that influence the implementation of physical activity promotion programs on UNC system campuses will be discussed. The amalgamation of these three sections will provide a comprehensive understanding of student physical activity promotion conducted on state university

campuses located in North Carolina, provide the grounds for key findings as well as support consideration for future research and practice.

Key Personnel

Key personnel are individuals as well as collaborative relationships that result in the promotion of physical activity to students. At the conclusion of data collection, 22 semi-structured interviews were completed; 54% of the final sample were directors of campus recreation; 13% of the sample included physical activity/health program coordinators (e.g., for-credit physical activity course coordinators); 13% of the sample were current faculty members; 8% represented university administration; 8% were directors of campus wellness; 4% of the sample were facility managers (Figure 1).

Participants were asked if their job description included specific language that stated that it was their responsibility to promote physical activity to students. Most participants indicated that promoting physical activity to students was not specifically stated in their job description. All participants noted that the absence of specific language regarding physical activity promotion was absent from their job description was likely due to additional administrative or managerial responsibilities they held, however promoting physical activity was implied. In contrast, less than half of the study sample noted that promoting physical activity to students was in fact specifically stated in their job description. Of the participants that stated physical activity promotion was specifically outlined in their job description believed this was so because they were either the only unit on campus responsible for promoting physical activity to students or because it was a part of their department's mission. In particular, one participant stated:

I think that our major purpose on our campus is to promote physical activity because we're the only unit on campus that promotes actual physical activity for the majority of the student. It's our unique mission we have.....

When asked to discuss the role of interdepartmental collaboration on campus, most stated that they collaborate with at least one other department. Participants described collaborative relationships with various academic departments, multicultural affairs, the department of athletics, campus recreation, student health services, student life and student affairs. The most common motive for collaboration described by participants was to share resources. Depending on the nature of the relationship, participants suggested that they could share such resources as money, manpower, and space/facilities. In addition to resource sharing, participants also noted that collaborations facilitated positive interdepartmental relationships. Those who confirmed that collaboration was an important part of their operations also suggested that collaborating with others on campus was essential to their own department's success and was an integral part to conducting their job.

Physical Activity Promotion Activities

Depending on the environment or even the target population, physical activity promotion activities in general can vary in many ways. However, when open-ended questions were posed, most participants described physical activity promotion approaches that most resembled marketing strategies (i.e., the promotion of a service) rather than the implementation of a program or intervention. Specifically, one participant said:

...we don't necessarily offer workshops, but we do promote physical activity with fliers, listservs and emails throughout the community [and] in this facility we have different brochures to promote different activities.

Like this example, participants described campaigns that promoted campus recreation services like group fitness classes and or personal training opportunities. These services were communicated to students via paper fliers, electronic media (listservs and emails), online social networking (facebook, myspace, and twitter), electronic-boards, posters, word of mouth, and ads seen on the department of campus recreation's website. One participant noted:

...the calendar that is detailed with everything that we do and offer [and] promotion tables in the lobby share information with students. Students can also find information on the [campus recreation] web site

Another participant stated:

Actually we don't have to [promote physical activity], because they just come and they take fitness through weight training, physical education classes and then when they learn how to exercise then they start coming in. Then we help them with their workouts.

When specifically asked to comment on physical activity promotion efforts such as programs or interventions, the most common responses included incentive programs, student recreation center physical activity group fitness classes, for-credit courses (e.g., freshman success classes/first year experience), or intramurals (Figure 2).

Participants were also asked to comment on physical activity promotion efforts that targeted specific determinants of physical activity in college students. Of the 11

participants who commented, less than half stated they in fact do target specific determinants of physical activity in college students. Of those participants, all stated that they target self-efficacy for physical activity. In particular one participant stated:

Sure I think that outdoor recreation targets self efficacy...we know that because they are physically active in an outdoor sport learning how to paddle, how to climb how to be self reliant [and] they learn how to do it on their own.

In contrast, the majority of participants stated they either do not target any specific determinants of physical activity in college students, or if they did, it was done unintentionally.

Many participants agreed that there are particular students on campus who would not be physically active on their own accord. When asked to comment on these types of college students, few participants stated they target these individuals in a unique way. However, those who did target this sub-population of students stated that they typically place marketing material such as pamphlets and posters in different places on campus, venture off campus to promote special events, or use incentive programs to entice the inactive to become more involved. In particular, some participants noted that they try to take suggestions from inactive groups of students, as well as try to create an enjoyable first experience around physical activity to promote future engagement. Participants also suggested that flexible recreation center hours in addition to offering different types of programming (e.g., salsa and belly dancing classes) were done to entice these individuals.

The SEMHP¹⁷ suggests that modifications in policies that govern a population can influence individual behavioral outcomes. When participants were asked to comment on

campus policy initiatives implemented to directly influence physical activity behaviors of students, they all stated that either there were no policies initiated on campus to directly influence physical activity behaviors of students, or if there were, they were unaware of such policies. However, some suggested that there were other policies implemented on their campus that had potential to indirectly influence physical activity behaviors of college students. Regulations surrounding campus parking was one policy in particular that participants believed could have such an influence. Anecdotally, participants believed that mandating students to park on the outside boarder of campus forced students to walk further to class; therefore engage in more daily physical activity. Others believed that new smoking policies on campus may have an effect on physical activity behaviors of students. While only a few felt this way, those who did felt as though more stringent smoking policies may be contributing to the development of norms on campus that promote healthier living, including physical activity. In particular, one participant said:

Um, they are more active, walking 100 feet away from the building (laughter). I would say that it hasn't directly affected PA but hopefully it has made them more conscious about why the policy exists and it's for the individuals improved health and [then the student thinks] oh by the way it can lead them to think about PA and health

Finally, participants commented on for-credit courses that students are mandated to take before graduating. Over 80% of the participant sample stated that their institution has a mandatory course that incorporates components of physical activity into its curriculum. While few participants said that their institution did not mandate a course that covers

components of physical activity, these same individuals stated that taking a course of this sort was strongly recommended. When participants were asked to describe the mandatory courses that incorporated components of physical activity into the curriculum, variance from one course to the next was great. Some participants described courses that spent multiple classes on physical activity, while others described courses that spent less than half a class on the topic.

Similar to the effect policy can have on behavior; the SEMHP encourages practitioners to target attributes of the community's environment in an effort to influence behavior. When asked to comment, the majority of participants stated that environmental changes have been made on their campus in the past year and were done so to directly influence physical activity behaviors of students. Examples of environmental changes on campus included the addition of a new student recreation center, improvements to outdoor student recreation facilities, newly painted walking routes (indoors and out), signage to increase stair usage, and general improvements to increase the walkability of campus. One participant said:

Well we actually are in the process for a new outdoor field complex; we purchased 129 acres which was awesome [and] we've been doing some inside walking maps and that's probably the newest thing within the last year that has been completed

A few institutions commented on environmental changes to campus that may have indirectly influenced student physical activity behaviors. A small number of participants suggested that changes to campus bus routes forced students to walk greater distances to bus stop areas. Other examples include an increase in the number of bike racks on

campus, as well as a school owned bike shop. In contrast to the positive influence environmental changes may have on physical activity, some participants thought that lengthy construction jobs have negatively influenced student physical activity behaviors of students. Entrances to the recreation center have been obstructed and access to the recreation center has become more difficult, thus making it more difficult for students to negotiate unfamiliar entrances to the recreation center.

As students progress through their college career, there may be times when they are provided with health information from the institution (outside of an academic class). Educational material related to campus alcohol policies, institutional code of conduct and mental health are typically presented to students in the form of a student-handbook provided to them at the commencement of each academic year. However, the majority of interview participants stated that they were unaware of something similar that provided students with information related to the importance of physical activity during their time in university. Of the few participants that stated there may be such a resource, they indicated that it was not necessarily presented to the students in the form of a handbook. Yet, they continued by stating physical activity educational material was presented through various other outlets on campus such as the school website, campus recreation calendars and fliers distributed by the institution's student health services. The majority of participants affirmed that there was at least one resource on campus for students to access that informed them on the importance of physical activity during their college years; however, students would have to take the initiative to access it.

Factors Influencing Physical Activity Promotion on Campus

Carrying out activities or initiatives on a university environment campus can be complex and challenging. There may be factors that support physical activity promotion activities, or possibly impede a department's ability to promote physical activity to students effectively. It is important to identify what factors support physical activity promotion on campus so that they can be used by practitioners in the future. Conversely, it is equally as important to identify the factors that make physical activity promotion on campus challenging so they can be minimized or avoided in the future.

Of the 18 participants who commented on factors that supported their efforts to promote physical activity on campus, most said the number one factor was support from administration. Two participants state that:

Yes, they have been the support from upper administration; mutual cooperation between of the faculty, staff and the students. There's just been overwhelming support even though um it's sometimes policy changes (very difficult) but as far as support for new programs (wellness passport program); so that's been the best support is just coming from I think collaboration in the truest sense.

Yeah, yeah basically an initiative by our chancellor; we have a new chancellor and when [they] came on board and [he/she] is kind of a fitness person and from them it's the idea that the university needs to be more fit and more focused on wellness; kind of along the lines of what I have been thinking all along which the previous admin did not focus on. [He/She] then passed it along to all the divisions to do something about wellness

Administrative support was followed by support via supplementary resources like money, personnel, and space. As previously highlighted, participants affirmed that interdepartmental collaborations were essential to the success of their department's goals

and objectives. This was confirmed by several participants suggesting that this type of interdepartmental support facilitates physical activity promotion on campus. Lastly, some of the participants noted that the growing enrollment at their respective schools was also important when arguing for increased funding and space. They suggested that as enrollment increased each year, it led to the emphasis placed on the need for more space as well as increased funding to provide adequate services to their students. Figure 3 displays the four most common factors that supported student physical activity promotion on campus.

In contrast, 19 participants commented on factors that impeded their efforts to promote physical activity on campus. Interestingly, one of the most common supporting factors mentioned is also the number one factor that challenged the participants' ability to promote physical activity; funding levels. When asked to discuss this further, it appears that the main reason for desiring additional funding is not necessarily for equipment or materials, but to acquire staff that would support additional programming activities. In addition, many participants indicated that having to share facilities with others hindered their ability to provide more services to students. Related to cohabitating with other departments, participants stated that limited space and resources also generated conflict that made promoting physical activity challenging (Figure 4).

Many participants declared that support from the institution is critical to their ability to successfully promote physical activity to students. In some cases, it was evident that institutional support was present; however, when asked whether physical activity is a primary or secondary responsibility of their institution most said it was not a primary

responsibility. Nearly all participants felt comfortable with this because most agreed that education and or academics should in fact come before physical activity promotion on campus. Other priorities that precede physical activity promotion included student safety, service learning, retention and graduation. While most agreed that student physical activity promotion is not a primary responsibility of their institution, a minority of the participants felt otherwise. Grounded by their experiences, these participants believe that recent support from upper administration suggests that physical activity is a top priority on campus. These discussions lead to follow up questions that asked participants to comment about the value that is placed on student physical activity promotion by their institution. While less than half of the participants commented on this issue, those who responded suggested that even if physical activity promotion is not a primary responsibility of the institution, it is valued by upper administration. Contrary to this, several participants noted that upper administration at their institution does not value physical activity promotion and this has led to institutional concern regarding the current culture of the university.

Discussion

Key Findings

Responses to the interview questions provided insights into the broader context of student physical activity promotion and several key findings emerged. It is evident that the lack of specific physical activity promotion language in participant job descriptions suggests that physical activity promotion could be a part of their responsibilities but it does not imply that physical activity promotion must be a part of their responsibilities.

This alone suggests that institutionally, more could be done to encourage staff and administration to promote student physical activity more aggressively.

Possibly the most significant findings of this study underscore theoretical and scientific limitations of physical activity promotion practice currently carried out on UNC System university campuses. While some schools promote physical activity by targeting intrapersonal and environmental factors on campus, little can be said regarding efforts to target other factors of the SEMHP such as interpersonal, community and policy factors. Great efforts are put forth to encourage individuals to attend fitness classes, or join incentive programs but these all hinge on the individual's choice to do so or not.

As previously noted, those promoting physical activity on UNC system university campuses are putting efforts forward to encourage students to become more physically active. However it has become evident that the majority of institutions are unintentionally omitting the use of scientifically established determinants of physical activity in college students. Promotion practices are targeting individual characteristics like knowledge of physical activity and self-motivation to encourage behavior change, when it is unknown whether either of those characteristics contributes to increases physical activity engagement among the college student population.

Finally, results of this study suggest that support from administration influences physical activity promotion activities conducted on a college campus. Specifically, responses from participants suggest that administration has the ability to set cultural norms by projecting their physical activity promotion values across all pertinent

departments as well as actively support those conducting physical activity promotion activities on campus in various ways.

Strengths and Limitations

There is a well established foundation of research regarding physical activity behaviors of 18-65 year old Americans. Consequently, research regarding physical activity promotion best practice for these populations continues to grow. However, while physical activity behaviors of college students are well documented, physical activity promotion research for this unique population is limited. Little has been done to investigate the ways in which college campuses face student physical inactivity.

A major strength of this study is that it takes the first step to better understand student physical activity promotion conducted on a university campus. This study specifically investigates how an entire university system attempts to promote student physical activity. Unlike a study that may try to quantify physical activity promotion practice, this study explores the intricacies of physical activity promotion using qualitative methodology. Not only did this promote in depth conversation into important topics via semi-structured interviews, it provided a way for context and explanation to emerge. This process also allowed for an examination of university physical activity promotion using the Social Ecological Model for Health Promotion.

While successful at meeting its aims, this study was not free from limitations. In particular, the sampling technique used in this study has various limitations. The first challenge of snowball sampling is identifying an initial contact (i.e., first potential participant).¹⁶ It is possible that the use of a nonprobabilistic purposive selection that

initiated participant recruitment may have identified individuals who were not the most appropriate individuals to begin with. However, to ensure that these individuals were in fact the most appropriate to speak with, each participant was specifically asked up front if they were in fact the most suitable person to start with. A second limitation of snowball sampling is related to the verification of potential participant eligibility.¹⁶ However, this did not become an issue in this study because no participants were denied eligibility (i.e., all responses were considered to be important and useful). The last potential limitation associated with snowball sampling relates to challenges associated with controlling the types and number of potential participants. In this study, the need to control the number of interviews did not present a problem; at no point were the researchers forced to terminate or limit the length of each participant chain. In fact, the lack of extensive participant chains emphasized how physical activity promotion is likely to be the responsibility of only one or two individuals on each UNC system campus.

Amidst various qualitative strategies of inquiry there are different procedures of data collection to choose from. In this study, researchers opted to use semi-structured telephone interviews. The goals of these interviews were to elicit information regarding physical activity promotion activities conducted on UNC system campuses. Limitations of this technique include limited control of the interview environment and the inability of the interviewer to assess non-verbal cues or behavior. However, when considering the lack of sensitive questioning integrated into the interview protocol, as well as the limited influence the interview environment could have on participant responses, neither of these limitations were of concern. Furthermore, the benefits of ease and cost associated with

telephone surveying outweighed potential limitations associated to this data collection technique.

The combination of available incentives for participants and the implementation of successful recruitment strategies established a sound representation of a single state university system. However, findings from this study cannot be generalized to the rest of the country. It is possible that geographic, cultural and or social norms related to physical activity promotion may have elicited different responses from these same types of individuals in other states. However, this study adequately represents state universities located in North Carolina. This study's sample represent a full cross-section of the types of public universities located in North Carolina including multiple Historically Black Universities, small institutions as well as large institutions and universities that represent a variety of geographical locations in North Carolina. While the lack of generalizability outside of the state of North Carolina may be a potential limitation of this study, it adequately provides evidence to continue similar research among additional college or university populations across the country.

While this study investigated the types and forms of physical activity promotion activities conducted on UNC system campuses, this study can only speak to the experiences and practices as described by participants. Methods to confirm whether activities described by participants were in fact conducted on their respective campuses were not included in this study. However, the researchers feel confident that the recruitment and sampling strategies integrated into this study lead to the identification of reliable participants.

Finally, a potential limitation of this study lies within the authors' intent to use the Grounded Theory strategy. Grounded Theory suggests that multiple stages of data collection are necessary, including constant comparison of categories across multiple population samples.¹⁵ Cresswell suggests, that this would then lead to the development of a theory of a process, action or interaction grounded in the views of participants. While the results of this study did not immediately assist in the production of a model of physical activity promotion on college campuses, it is the intent that this study will be the first of multiple studies aimed at better understanding physical activity promotion on college campuses and ultimately aide in the development of a model or theory that best describes the process by which physical activity promotion is conducted on university campuses.

Conclusions

Although recommendations on how exactly student physical activity promotion on a college campus should be conducted cannot be formulated from the results of this study, recommendations will be made to assist continued development of potential best practices.

Typically, institutions of higher education have specific individuals who are designated to conduct alcohol, tobacco and other drug (ATOD) awareness programming. While ATOD prevention programming is an important task to be carried out on a college campus, so too should physical activity promotion; possibly more practically named physical inactivity prevention. First, it is recommended that institutions make efforts to hire individuals who are familiar with established health promotion theories that that can

be integrated into social ecological frameworks related to student physical activity promotion. Next, it would be useful for institutions to take direct actions to elaborate and specify current job descriptions of those who have the responsibility of promoting student physical activity to include specific objectives and outcomes related to physical activity promotion.

Essential to the revision of current job descriptions of those who are charged with promoting student physical activity would be the establishment of a standard definition of university physical activity promotion. This definition would need to include standard language that would clearly illustrate how effective physical activity promotion is to be conducted and would encourage the use of the SEMHP to promote physical activity on a college campus. In addition, this definition would need to emphasize the importance of targeting scientifically established determinants of physical activity in college students. While the previous recommendations focus on physical activity promotion practice, recommendations will be made to encourage additional research in this area. First, due to the scope of this study, it is recommended that participant recruitment cross state lines as well as includes private institutions to generate a study sample more representative of the entire country. In addition it would benefit this type of research to purposively identify institutions who may currently be evaluating their own efforts and whom are believed to be successful at encouraging student to be more physically active through promotional activities conducted on campus. This type of research would potentially provide an unprecedented investigation of student physical activity promotion practices on college campuses nation wide. In addition, this national study would benefit from a mixed

methods approach that would potentially provide the means to establishing relationships between types and doses of physical activity promotion activities and physical activity behaviors of students.

Like the establishment of a clearly developed definition of physical activity promotion, research to determine the strength of association between currently identified determinants of physical activity in college students and their relationship to behavioral outcomes is needed. Although there are a number of determinants of physical activity in college students that have been identified, assessing the strength of prediction each determinant has on physical activity levels would be critical. This study could potentially be conducted in the form of a meditational analysis. A study of this sort would provide program developers with determinants of physical activity that have the greatest potential to encourage increased physical activity engagement.

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FIGURES

Figure 1. Study Participants

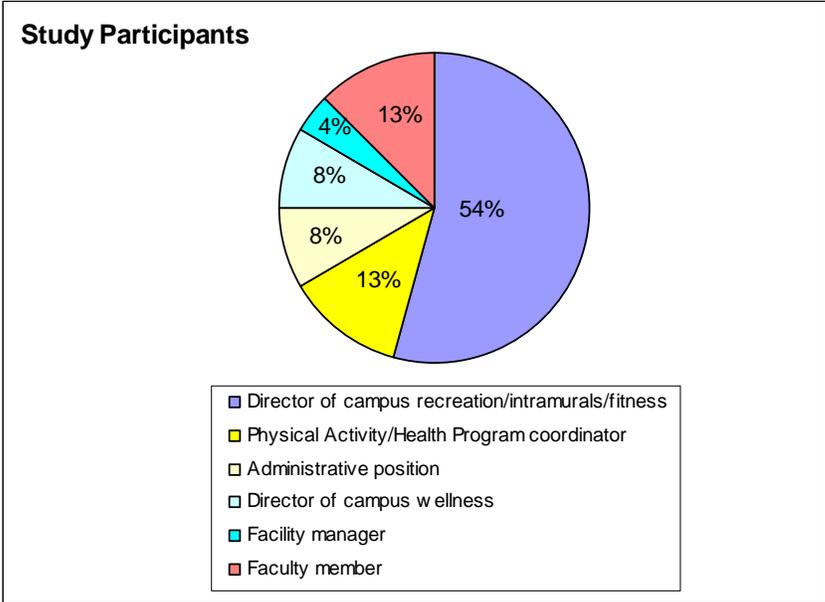


Figure 2. Type of Physical Activity Promotion

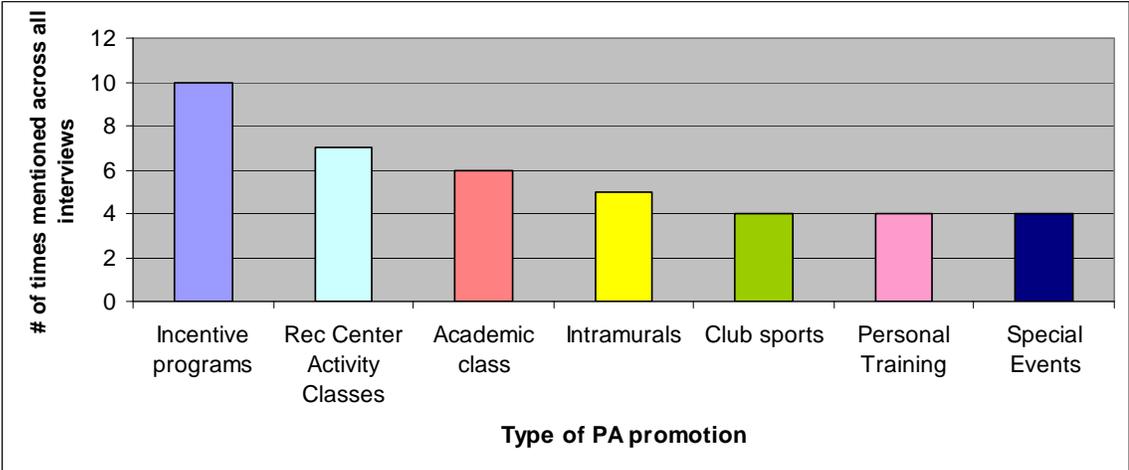


Figure 3. Factors that Support Student Physical Activity Promotion

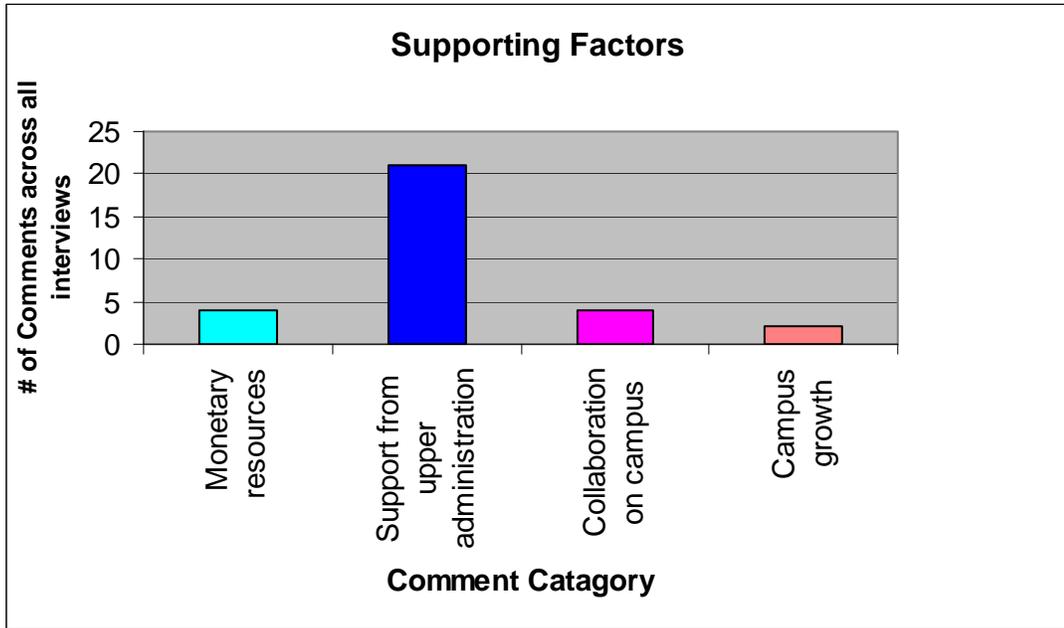
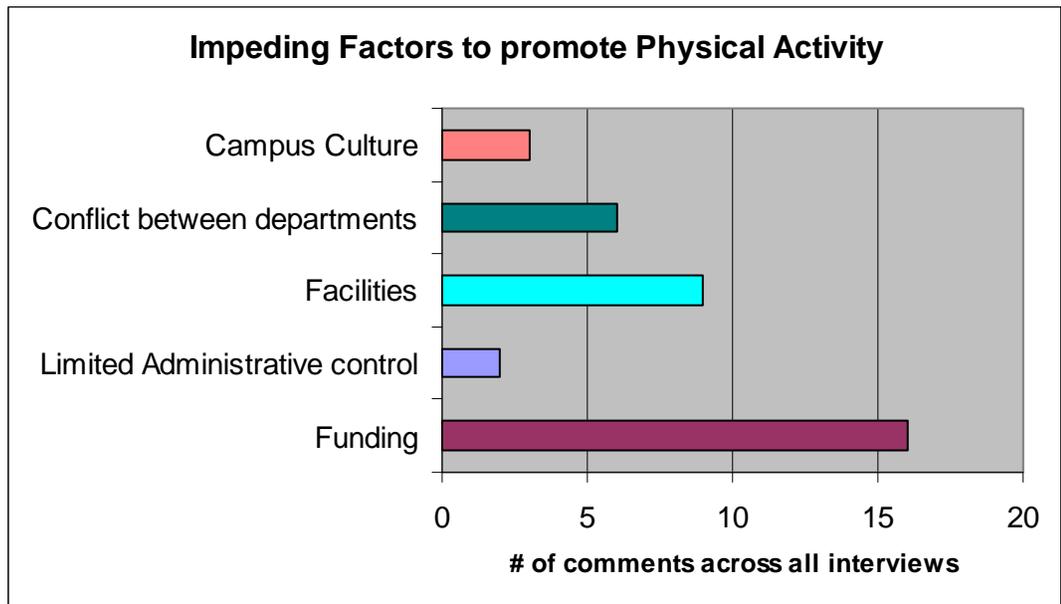


Figure 4. Barriers of Student Physical Activity Promotion



EPILOGUE

It is evident that many American college students do not meet the physical activity recommendations as prescribed by the American College of Sports Medicine and the American Heart Association. Yet, the literature review presented in this dissertation uncovered a dearth of published literature regarding physical activity promotion practices on college campuses. In conjunction with this literature review, results of the qualitative study support the need for additional research to establish university physical activity promotion best practice.

As highlighted in this dissertation, there are scientifically established characteristics that have the potential to influence physical activity behaviors of college students; however research in this area for the college student population is relatively new. Therefore, it is recommended that further research regarding determinants of physical activity among college student populations be conducted. Specifically, scientists and practitioners alike would benefit from research that attempts to confirm the strength of prediction individual level characteristics, environmental factors and policy have on physical activity behaviors of college students. Practitioners could then attempt to target these characteristics to promote behavioral change efficiently and effectively.

Ultimately, it is recommended that future physical activity promotion conducted on American college campuses employ strategies directed by the Social Ecological Model for Health Promotion's framework. Directed by the SEMHP framework, college

and university health promotion practitioners and scientists could work collaboratively to influence each factor that may potentially influence physical activity behaviors of college students. This collaborative relationship would also initiate the development of research to assess the effects of institutional/environmental, community and policy factors on physical activity behaviors of college students.

Future Work

The qualitative study presented in this dissertation may be the first to take an in-depth view of multiple factors related to physical activity promotion on a college campus. It is the intent that this study will be the first of many others potentially leading to the development of a model describing how physical activity promotion on a college campus is best accomplished. Furthermore, results from this dissertation will support the development of a survey instrument and improved interview protocol that will direct a mixed methods approach to assess physical activity promotion practice on a college campus. The replication of qualitative methods presented in this dissertation in combination with the implementation of a quantitative survey instrument could potentially lead to a more comprehensive understanding of physical activity promotion on American college campuses. Ultimately, research in this area would lead to prospective studies that assess the relationship between types, method and dose of physical activity promotion and physical activity outcomes of college students. In addition, data collected during future studies will enable the use of statistical procedures to test the mechanisms under which various determinants have on physical activity behaviors of college students (mediation). Cumulatively, studies of this sort will

hopefully provide those tasked with university physical activity promotion with the same type of evidence and support that James Sallis and Neville Owen have contributed to physical activity behavior and promotion for non-university populations.

APPENDIX A: ORAL CONSENT FORM VERBIAGE

THIS IS THE INFORMATION THAT WILL BE READ TO THE PARTICIPANT OVER THE VIA PHONE PRIOR TO PARTICIPATING IN THE INTERVIEW. THOSE WHO PARTICIPATE IN SEMI-STRUCTURED INTERVIEWS WILL RECEIVE THIS FORM VIA EMAIL.

**THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO
CONSENT TO ACT AS A HUMAN PARTICIPANT**

Project Title: *Promoting Physical Activity on North Carolina College and University Campuses*
Project Directors: Jeff Milroy (MPH), DrP.H(c) David Wyrick (PhD)

DESCRIPTION AND EXPLANATION OF PROCEDURES:

The primary aim of this study is to physical activity promotion and policy development on North Carolina college and university campuses. The results of this study will provide a comprehensive picture of the physical activity programs, policies and promotion strategies that are currently being implemented and support state wide initiatives regarding physical activity promotion on college campuses in the future. To accomplish this goal, 15 institutions located in North Carolina will be recruited to participate. From this, approximately 45 North Carolina college administrators will be recruited to participate in a 45 minute semi-structured interview regarding physical activity promotion, policy, and program development/implementation.

Please note that you may choose not to participate in this study, and your refusal to participate will in **NO WAY** affect you or your current position at your institution. By consenting to participate you agree to partake in a 45 minute semi-structured interview. For your records, a copy of the consent form will be sent to electronically. You are asked to keep a copy for your records.

For the protection of your identity, all master lists (i.e., contact information) related to this research will be kept on password protected computers located at the University of North Carolina Greensboro. Master lists and related data will be kept for 3 years following study closure. This interview will be digitally recorded and later transcribed. All transcribed data will also be kept on password protected computers for 3 years following study closure. 3 years following study closure, all electronic computer files and transcribed data will be removed and deleted permanently. Because your voice will be potentially identifiable by anyone who hears the tape, your confidentiality for things you say on the tape cannot be guaranteed although the researcher will try to limit access to the tape as described below.

RISKS AND DISCOMFORTS:

The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants. As noted above, your voice may potentially be recognized; however no other individual, other than the principle investigator Dr. David Wyrick and graduate student Jeffrey J. Milroy will have access to the digital recordings.

POTENTIAL BENEFITS:

For your participation you will receive \$50.00 for participating in the interview. Once the interview has commenced, you have earned the \$50.00 incentive. Even if the interview is stopped midway, you will still receive the incentive as promised. This incentive will be sent to a mailing address of your choice. The University of North Carolina at Greensboro Institutional Review Board, which ensures that research involving people follows federal regulations, has approved the research and this consent form.

Questions regarding your rights as a participant in this project can be answered by calling Mr. Eric Allen at (336) 256-1482. Questions regarding the research itself will be answered by Jeff Milroy by calling 336-256-8686. Any new information that develops during the project will be provided to you if the information might affect your willingness to continue participation in the project.

By answering “YES” when asked if the interview may proceed, you are agreeing to participate in the project as described above by Jeff Milroy.

APPENDIX B: INTERVIEW PROTOCOL

Key Personnel

1. What is your current title?
2. Is it stated in your job description, either within human resources or your own department, that you have a charge to engage in physical activity promotion efforts on your campus?
 - i. If not, why do you think this is?
 - ii. If so, why is it important that physical activity promotion is part of your role at your campus?
3. Please name any or all other individuals on your campus whose job role it is to promote physical activity.
4. Who gave these individuals the responsibility of promoting student physical activity?
5. If different from or in addition to those noted above, please name any other individuals on campus whose role it is to promote student physical activity.
6. Do you feel that collaboration with other individuals/departments on campus is important?

Physical Activity promotion Activities implemented on Campus

7. Please describe any or all physical activity promotion programs/campaigns implemented on your campus in the past year with the sole purpose of promoting physical activity among students.
 - i. Do any of these programs/campaigns target specific individual characteristics related to increased physical activity?
 - Prompts will include self-efficacy, perception of physical activity outcomes, attitudes regarding physical activity, etc.
8. Please describe any or all policies that were implemented in the past year with the sole purpose of promoting physical activity among students?
 - i. These may include mandatory wellness/health classes for students with a physical activity component, or a mandatory physical activity requirement (swim test, run test etc).....
9. Please describe all environmental changes made on campus in the past year with the sole purpose of increasing physical activity among students.
10. Contrary to programs that were implemented in the past year with the sole purpose of promoting physical activity among students, name any or all programs, policies and or environmental changes that may have indirectly influenced physical activity.
11. Please describe all physical activity promotion programs/campaigns that specifically target individual students (e.g., media campaigns)
 - i. This may include poster campaigns, email campaigns, articles or campaigns seen a campus newspaper or magazine etc.
12. Please describe all physical activity promotion programs that specifically target subpopulations/groups or social networks of students.

- i. This might include targeting specific ethnicities on your campus or programming specifically for females.
 - ii. This may also include fraternities, sororities, clubs and or groups.
- 13. Is there current documentation of physical activity information (e.g., importance of physical activity during the college years) that goes out to all students?

Factors influencing the implementation of physical activity promotion activities on campus

- 14. If anything, what factors have supported your efforts to promote student physical activity on campus?
 - i. Prompts include additional funding in the past year (grant funds), support from specific individuals on campus whom carry a strong influence over campus matters, efforts from specific student groups etc.
- 15. If anything, what factors have impeded your efforts to promote student physical activity on campus?
 - i. Prompts include funding, institutional support, human resources etc
- 16. Are there specific community factors that promote or prevent physical activity among students at your institution (e.g., safety of campus or surrounding community etc)?
- 17. In general, would you say that promoting physical activity is viewed by your institution as a primary or secondary responsibility?
 - i. If not, why do you believe this is so? What takes precedence over promoting physical activity on your campus?
 - ii. If so, how does your institution's view on physical activity promotion among students influence the efforts made by you and your department/office? Or, why do you think your institution has made it a primary responsibility?

APPENDIX C:
**CHART CONTAINING REVIEW OF PHYSICAL
ACTIVITY PROMOTION LITERATURE**

Study	Author(s)	Desired outcomes	Theory	Participants
Project GRAD; Graduate Ready for Activity Daily	Sallis et al., 1999	Desired Outcomes <ul style="list-style-type: none"> ▪ Increase in Physical activity ▪ Influence psychosocial mediators 	SCT & TTM	338 undergraduate seniors (185 men; 153 women)
Project GRAD; Graduate Ready for Activity Daily	Calfas et al., 2000 <ul style="list-style-type: none"> ▪ Report of 1 and 2 year follow up data 	Desired Outcomes: <ul style="list-style-type: none"> ▪ Increase in physical activity through transition out of school ▪ Influence psychosocial mediators 	SCT & TTM	338 undergraduate seniors (185 men; 153 women)
Project TEAM; Teaching Exercise/Activity Maintenance	Buckworth, 2001	Desired Outcomes: <ul style="list-style-type: none"> ▪ Increase the proportion of students who continued to exercise after the completion of an academic conditioning physical activity class. 	SCT & TTM	College conditioning activity classes
Program to improve exercise self-efficacy	D'Alonzo et al., 2004	Desired outcomes: <ul style="list-style-type: none"> ▪ Increase in exercise self- efficacy, perceived benefits ▪ Improved cardiorespiratory fitness ▪ Increased muscle strength ▪ Increased flexibility ▪ Increased activity level ▪ Decrease in perceived barriers ▪ Decrease in percentage body fat. 	SCT	44 undergraduate women
Academic incentives & student participation in and effectiveness	DeVahl et al., 2005	Desired Outcomes: <ul style="list-style-type: none"> ▪ Decrease body fat percentage ▪ Increased adherence to voluntary exercise program 	TTM	210 physical therapy college students
Signage to increase stair usage on a college campus	Ford et al., 2008	Desired Outcomes: <ul style="list-style-type: none"> ▪ Increase stair use relative to elevator use. 	HBM	students, faculty, staff, and any visitors accessing a college campus building
Holistic wellness and health behaviors among	Gieck & Olsen, 2007	Desired Outcomes: <ul style="list-style-type: none"> ▪ Increase knowledge regarding principles of 	MHW	41 college students

college students		<p>holistic wellness</p> <ul style="list-style-type: none"> ▪ Increase self-efficacy to employ principles of holistic wellness ▪ Decrease body fat %, body mass and body mass index ▪ Increase physical activity (exercise and resistance training) 		
Brief Time Perspective intervention and physical activity among college students	Hall & Fong, 2005	<p>Desired outcomes:</p> <ul style="list-style-type: none"> ▪ help participants become more aware of long-term implications of current behaviors ▪ Goal setting 	No theory Identified	18 college students; 94% female
<i>Double Report</i>		<p>Study #2 Same as study #1 but greater number of participants.</p>	No Theory Identified	81 college students; 95% female
Pedometer Intervention to promote walking among college students	Jackson & Howton, 2008	<p>Desired Outcomes:</p> <ul style="list-style-type: none"> ▪ Increase number of steps taken by students over the course of the study 	No Theory Identified	326 college students
Effectiveness of a Point based physical activity log intervention among colleges students	Largo-Wight et al., 2008	<p>Intervention group was complete physical activity logs (PAL) every weekday for 10 weeks.</p> <p>Desired outcomes</p> <ul style="list-style-type: none"> ▪ Increase in total lifestyle physical activity 	No theory identified	136 college students
Web-based physical activity intervention for college-aged women	Ornes & Ransdell, 2007	<p>Desired outcome</p> <ul style="list-style-type: none"> ▪ Increase walking 	SCT	112 college women
Email based physical activity promotion	Parrot et al., 2008	<p>Desired outcome</p> <ul style="list-style-type: none"> ▪ Increase exercise behavior ▪ Influence attitudes ▪ Influence intentions ▪ Influence perceived behavioral control 	TPB	170 college students
Healthy PAC-CATS	Newton, 2006	<p>Desired Outcomes:</p> <ul style="list-style-type: none"> ▪ Increase physical activity ▪ Improve eating habits ▪ Improve stress management 	No theory identified	Classroom 138 Option 1 = 63 Option 2 = 75

Web assisted Instruction and physical activity promotion	Suminski & Petosa, 2006	Desired outcomes <ul style="list-style-type: none"> ▪ Improved self regulation skills ▪ Increased Social support from friends and family ▪ Increased perceived confidence to overcome barriers to exercise. ▪ Increased knowledge regarding physical activity and fitness 	SCT	423 college students
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