

Evaluation of Taylor Place Fit's Motivational Signage  
and Mural Painting to Determine the Influence on Stair Use

by

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## ABSTRACT

Encouraging stair use may increase physical activity among college students. The overall goals of this study were to quantitatively and qualitatively evaluate a stair use initiative, which included a mural painting contest in a residential hall. The number of individuals exiting the stairs were counted and interview data were obtained regarding the visibility of the signs and murals and whether the signs or murals influenced stair use. Focus groups and interviews were conducted with the community assistants (CAs) and staff members involved with the project to obtain qualitative data on their perceptions and opinions of the mural painting event. It was hypothesized that the average number of individuals per half hour who used the stairs would significantly increase from baseline to post-test. To examine changes over time in individuals exiting the stairs, a quasi-experimental design was used with one baseline measurement and multiple posttests (n=5). Stair use was determined by counting individuals exiting the stairwells. Time differences in exiting stair use were examined with repeated measures analysis of variance (ANOVA). Descriptive statistics and t-tests were used to analyze interview data. Qualitative data were analyzed using a thematic analysis approach. There was a significant time effect on stair use ( $F=7.512$ ,  $p=0.000$ ) and a significant interaction between staircase and time ( $F=7.518$ ,  $p=0.000$ ). There was no significant interaction of gender over time ( $F=.037$ ,  $p=0.997$ ). A repeated measures ANOVA was conducted on each staircase individually and showed that significant time differences were only found in the Southwest staircase. Based on exit interviews (n=28), most students saw the

directional signs (61%) and murals (89.3%). However, neither the signs (71.4%) nor the murals (82.1%) were perceived as influential on stair use. Data from the focus groups and interviews revealed that the mural painting contest did not occur as intended, because the contest piece did not take place. In conclusion, solely having residents of a residential hall paint murals in stairwells was insufficient for increasing stair use. A mural painting contest may be a viable approach if properly planned and implemented.

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## Chapter 1

### **Introduction**

When young adults leave for college, there are often disruptions in health habits, including physical activity (Butler, Black, Blue, & Gretebeck, 2004).

Young adulthood is a unique period of time during which individuals are developing important health habits (Arnett, 2000). During the transition from high school to college, eating and exercise habits may change due to new environments and other pressures related to college (Strong, Parks, Anderson, Winett, & Davy, 2008). Interventions aimed at the college-age group are primarily beneficial for the individuals who are establishing health habits; however, some individuals in this age group are starting families, and the benefits of healthy eating may be passed down to future generations (Richards, Kattlemann, & Ren, 2006).

During the transition period from adolescence to young adulthood, there is a decline in physical activity (Malina, 1996). In studies with first year college students, students have reported that they exercise less than they did in high school (Nelson, Gortmaker, Subramanian, & Wechsler, 2007; Wengreen & Moncur, 2009). College students report that if they are busy, they might not participate in planned exercise (Strong et al., 2008). There may be short and long term health consequences associated with this decline in physical activity. It has been shown that weight gain during the first year of college has also been associated with decreases in physical activity (Vella-Zarb & Elgar, 2009).

An alternative strategy for promoting physical activity in the college population is to promote lifestyle changes such as taking the stairs instead of the

elevator or parking further away. The United States Department of Health and Human Services' (USDHHS) campaign for small steps provides easy and simple ideas that individuals can do to improve health habits (USDHHS, 2009). For example, Tip #67 states, "take stairs instead of the escalator." The Guide to Community Preventive Services recommends point of decision prompts (PODP) including those promoting stair use as a strategy to increase physical activity (Guide to Community Preventive Services, 2005).

Promoting stair use is a cheap and simple way to promote physical activity (Dolan et al., 2006). Stair climbing can be an effective way to burn calories (Teh & Aziz, 2002). Stair climbing has been shown to be an effective cardiovascular exercise for health benefits in previously sedentary women. Obtained health benefits including increased cardiorespiratory fitness and improved blood lipid levels occurred after a short stair-climbing intervention (Boreham et al., 2005).

It has been suggested that the use of simple signs to prompt people to use the stairs is an effective strategy for increasing stair use by adults in a variety of settings. Previous researchers have studied the effects of motivational signs and banners at decision-making points where individuals could choose either escalators or stairs (Andersen, Bauman, Franckowiak, Reilley, & Marshall, 2008; Andersen, Franckowiak, Snyder, Bartlett, & Fontaine, 1998; Andersen et al., 2006; Blamey, Mutrie, & Aitchison, 1995; Boen, Maurissen, & Opdenacker, 2010; Brownell, Stunkard, & Albaum, 1980; Coleman & Gonzalez, 2001; Eves & Masters, 2006; Eves, Webb, & Mutrie, 2006; Iversen, Handel, Jensen, Frederiksen, & Heitmann, 2007; Kerr, Eves, & Carroll, 2000, 2001a, 2001c,

2001d, 2001e,; Muller-Riemenschneider, Nocon, Reinhold, & Willich, 2010; Olander, Eves, & Puig-Ribera, 2008; Webb & Cheng, 2008; Webb & Eves, 2005, 2007a, 2007b, 2007c). Other studies have focused on PODPs or other methods to increase stair use in buildings where individuals can choose either elevators or the stairs to ascend the building (Auweele, Boen, Schapendonk, & Dornez, 2005; Boutelle, Jeffrey, Murray, & Schmitz, 2001; Bungum, Meacham, & Truax, 2007; Coleman & Gonzalez, 2001; Cooley, Foley, & Magnussen, 2008; Ford & Torok, 2008; Grimstvedt et al., 2010; Kerr, Eves, & Carroll, 2001a; Kerr, Yore, Ham, & Dietz, 2004; Marshall, Bauman, Patch, Wilson, & Chen, 2002; Meyer et al., 2010; Titze, Martin, Seiler, & Marti, 2001).

Two studies have evaluated the effects of artwork in the stairwells (Boutelle et al., 2001; Kerr et al., 2004). Although motivational signs did not have effects on increasing stair use, adding framed artwork and music in the stairwells did have a significant increase in stair use (Boutelle et al., 2001). In the Centers for Disease Control and Prevention (CDC) worksite facility, researchers found that changing the environment of a stairwell, specifically adding motivational signs and music, was sufficient to increase stair use among the employees at the building (Kerr et al., 2004). The environmental changes were completed in incremental steps, including carpeting and painting the stairwell, then adding artwork, then adding signs, and the final addition included piping music into the stairwells with a speaker system (Kerr et al., 2004). Only one study planned a stair use promotion study and allowed the users of the stairs to choose the incentives that they perceived as motivational to use stairs more often (Titze et al.,

2001). In a Swiss study of four office buildings, office employees were given the chance to choose types of incentives that they perceived as influential to increase their stair use (Titze et al., 2001). For example, one building chose fruit, and another building chose a game (Titze et al., 2001).

However, to date, there are no studies that have examined the influence of adding artwork, specifically mural paintings in the stairwells, by the individuals who reside or work in the building and use the stairs on a regular basis.

Additionally, to date, there are no published studies on promoting stair use in a university residential hall. There have been studies on college settings that have examined strategies for promoting stair use on the college campus ((Bungum et al., 2007; Coleman & Gonzalez, 2001; Ford & Torok, 2008; Grimstvedt et al., 2010; Russell et al., 1999; Russell & Hutchinson, 2000), but none have specifically tried to increase stair use by students who are living in a residential hall on a university campus.

The purpose of this study was to examine if a mural painting contest within the stairwells of a residential hall at a large urban university influenced the residents' use of stairs when exiting the building. This study also included a process evaluation of the mural painting contest to assess its feasibility and implementation during the fall semester. Only descending stair use was measured, because the students were unable to access the stairs from the first floor. The study addressed five specific aims:

- 1) Was there an increase from baseline to post-test in the number of individuals who used the stairs before and after a mural painting?

- 2) Did students exiting the stairs perceive that the signs promoting stair use influenced their stair use?
- 3) Did students exiting the stairs perceive that the murals influenced their stair use?
- 4) What were the community assistants' (CAs') and staffs' perceptions of the mural painting contest and its effects on stair use?
- 5) How did the CAs influence residents to use the stairs?

The hypothesis for the first specific aim was: The average number of individuals per half hour who use the stairs will significantly increase from baseline to post test.

### **Definitions**

Community assistants (CAs): The CAs were responsible for facilitating educational programming for their assigned floors and the residential hall community, assisting in the operation and management of the residence hall facility via specific daily and weekly duties, assisting residents and staff with effective management of crisis situations, and encouraging the learning, involvement, and growth of the residents. CAs are sophomore and above students who are selected based upon an application consisting of essays, letters of recommendation from faculty and/or staff, a minimum grade point average, clearance from a university judicial background check, and an individual and group interview process. CAs complete an intensive training prior to the start of the academic year and are provided with a stipend, room, and a partial meal plan as compensation.

DigiBoards: Digital devices that are hung near the elevators in the residential hall and provide residents with updated information, including community events and also featured stair promotion messages. These act as the modern day bulletin boards and are more sustainable.

Directional signs: Signs or posters that have specific information as to where to find the stairs, or what is located beyond the stairwell, such as academic buildings, eateries, and social environments.

First Year Residential Experience (FYRE): These are floors that are designated for students of all majors in their first year of college.

Motivational signage: Signs or posters that contain messages to promote stair use.

Mural painting event: An event organized by the residential community leaders including the community assistants, faculty advisors, and residential hall staff for students to paint a designated area in an assigned stairwell to promote stair use.

Point-of-decision prompts (PODPs): Motivational signs that are located either at or near stairwells, or near the entry of an escalator or elevator that encourage individuals to use the stairs. PODPs are designed with messages to provide information on health or benefits related to stair use or contain a deterrent message (Soler et al., 2010).

Residential community student leaders (RCSLs): The RCSL works to bridge the gap between campus life and academic support in the residence halls through programming, mentoring, and outreach for first year students living in residential communities grouped by their college or major. The RCSL role models success



strategies, assists students in navigating and making academic and social connections within the university environment, and provides an intentional focus on supporting first year students in their transitions to their respective academic programs. RCSLs are sophomore-level and above students that are hired through an application and interview process with the college associated with each residential community. RCSLs reside in Taylor Place on the floor housing their respective residential community and they complete training with the CAs prior to the academic year. RCSLs work closely with the CAs to meet the needs of their students and to develop community within their assigned floor. RCSLs' compensation includes a room and in some instances a small stipend.

Taylor Place (TP) Fit: The overall initiative that was created among student health services, the residential hall staff, and Campus Recreation that included both a pedometer challenge and the mural painting contest. The pedometer challenge was a competition that included a TP Fit Olympics and other activities to promote activity among the residents.

## Chapter 2

### Review of Literature

#### Transition From High School to College

College students are in a transitional period of their lives. Arnett (2000) has described the years from adolescence to young adulthood (ages 18 to 25) as “emerging adulthood.” During this time period, individuals have often completed secondary school and have moved away from their parent’s home for the first time. Independent decision-making and the establishment of habits and patterns for adulthood are critical development aspects of emerging adulthood (Arnett, 2000). A successful transition from high school to college may help form the foundation for future stages. Many values of health that affect adult health behaviors may be formed during these years (Lenz, 2001). There is evidence to show that health behaviors, including physical activity and healthy dietary behaviors decrease during the college years (Wengreen & Moncur, 2009). It is also plausible that establishing a routine of protective health behaviors, such as healthy diet and exercise habits, during these years may carry over into adulthood (Silliman, Rodas, & Neyman, 2004). Studies have shown that during the period from late adolescence to early adulthood, there is typically a decline in physical activity (Malina, 1996). Reasons for this decline in physical activity include the pressure on college students to perform well academically and a decline in participation in sports or exercise (Strong et al., 2008).

## **Current Physical Activity Habits of College Students**

While the actual physical activity level of college students varies from one study to the next, the majority of studies indicate that college students are not meeting the recommended levels of physical activity, although there are opportunities for physical activity on college campuses through recreation centers and intramural sports (Crombie, Illich, Dutton, Panton, & Abood, 2009; Keating, Guan, Pinero, & Bridges, 2005). According to the National College Health Assessment (American College Health Association [NCHA]), in the spring of 2010, only 48.7% of college students nationwide met the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) (2007) guidelines for physical activity (Haskell et al., 2007). These guidelines recommend moderate-intensity aerobic exercise for at least 30 minutes on five or more days per week or vigorous-intensity aerobic exercise for three or more days per week, or a combination of the two. Self-report data indicated that the majority of college students participated in physical activity less often than they did in high school (Han et al., 2008; Nelson, Kocos, Lytle, & Perry, 2007; Wengreen & Moncur, 2009). Based on self-report minutes of activity per week, students reported that weekly minutes of moderate, vigorous, and moderate-vigorous physical activity significantly decreased from the summer between high school and college (Han et al., 2008). During the first semester of college, there were also significant declines in physical activity compared to the activity during high school (Han et al., 2008). Using self-reported physical activity data, researchers have estimated that 22% to 61% of college students meet physical activity

guidelines (Bray & Born, 2004; Bray & Kwan, 2006; Buckworth & Nigg, 2004). However, based on accelerometer data, only 22% of college students have met the recommended combination of moderate and vigorous physical activity based on the 2008 Physical Activity Guidelines for Americans (Raynor & Jankowiak, 2010). The 2008 Physical Activity Guidelines for Americans are very similar to the ACSM recommendations, except they recommend 30 minutes of moderate exercise most days of the week (USDHHS, 2008). Similar guidelines by Healthy Campus 2010 provided specific objectives relating to physical activity and college students (American College Health Association, 2000). One objective was “to increase the proportion of college students who engage in physical activity at least 3 days per week at moderate intensity for at least 30 minutes, or vigorous physical activity for 20 minutes or more minutes” (American College Health Association, 2000).

### **Physical Activity and Weight Gain in College**

Several determinants are associated with weight gain in young women, including physical activity and the transition to college (Wane, van Uffelen, & Brown, 2010). The first year of college after high school is considered a critical period during which individuals may gain weight (Anderson, Shapiro, & Lundgren, 2003; Lloyd-Richardson, Bailey, Fava, Wing, & The Tobacco Etiology Research Network, 2009; Wengreen & Moncur, 2009). The weight gain ranges from 1.5 to 5.2 kg in one semester to 1.6 to 11.4 kg in the entire first academic year (Anderson et al., 2003; Lloyd-Richardson et al., 2009; Wengreen & Moncur, 2009). From freshman to senior year, it has been shown that females gain an

average of 1.7 kg (SD = 4.5 kg), while males gain an average of 4.2 kg (SD = 6.4 kg); both gains were statistically significant ( $p < .001$ ) (Racette, Deusinger, Strube, Highstein & Deusinger, 2008). Data collected on physical activity in this study found that the only change in exercise behavior was an increase in stretching exercises ( $p = 0.013$ ). Of the students surveyed, 25% of the seniors were not engaging in regular exercise (Racette et al., 2008).

Weight gain during the first year of college has been associated with decreases in physical activity (Vella-Zarb & Elgar, 2009). College students reported that if they were busy, they might not participate in planned exercise (Strong et al., 2008). Additionally, students may spend more time in sedentary activities, such as watching television, spending time on the computer along, or with, school-related activities such as studying or attending class (Strong et al., 2008). In a study of first-year college students, individuals who had gained more than 5% of their baseline weight reported less physical activity than those who gained less than 5% or no weight at all (Wengreen & Moncur, 2009). In a qualitative analysis, college students indicated that while they were concerned about unhealthy weight gain, there were various factors that prevented them from participating in physical activity (Nelson et al., 2009). College students listed several barriers to physical activity, including negative experiences at the recreation center, lack of time, lack of motivation, and lack of social support for physical activity (Nelson et al., 2009). In another survey-based study, time was perceived as a major factor related to a decline in exercise; college students rated

“exercising takes up too much of my time” as a top barrier (Grubbs & Carter, 2002).

### **Small Steps to Health**

Health promotion efforts need to focus on ways for college students to incorporate physical activity into their lives in order to prevent a decline in physical activity during the college years. Adding extra activity, such as using the stairs, may be a simple, small step for college students to adopt during their transition into young adulthood. Using stairs may help individuals accumulate the recommended amounts of physical activity throughout the day (Titze et al., 2001). The USDHHS recommends taking the stairs instead of the elevator as part of their campaign for small steps to improve health habits (USDHHS, 2009). The CDC’s *Guide to Community Preventive Services* recommended PODPs for increasing stair use as a health promotion intervention to increase physical activity (Guide to Community Preventive Services, 2005). The Task Force on the Community Preventive Services suggests tailoring the PODP in order to increase its effectiveness for increasing stair use. The CDC also has a stair-based initiative called StairWELL to Better Health that provides employers and work places with information to promote stair use at worksites (StairWELL, 2010). One of the suggested strategies in this initiative is to improve aesthetics of stairwells (StairWELL, 2010).

### **Stairs and Health Benefits**

Promoting stair use is a cheap and simple way to promote physical activity (Dolan et al., 2006). Stair climbing can be an effective way to burn calories (Teh

& Aziz, 2002). A 70-kilogram person would use 0.15 kilocalorie (kcal) per step when climbing stairs and 0.05 kcal per step when descending stairs (Bassett et al., 1997). Men who self-reported less than 20 flights of stairs per week had a higher risk of premature death than those who climbed more (Paffenbarger, Hyde, Wing, & Hsieh, 1986). Stair climbing also provides cardiovascular health benefits, including improved cardiorespiratory fitness and blood lipid levels (Boreham et al., 2005). In another study, improvements in fitness, weight, fat mass, diastolic blood pressure, and fitness levels occurred after an intervention promoting stair climbing (Meyer et al., 2010). Additionally, after an intervention for increasing stair use in 30 untrained males, there were significant decreases in body fat (Fardy & Ilmarinen, 1975). Stair climbing and walking have also been shown to positively impact bone mineral density (BMD) for the whole body and trochanter site (Coupland et al., 1999).

### **Stair Use Studies**

The literature strongly suggests the health benefits of using the stairs (Boreham et al., 2005; Coupland et al., 1999; Fardy & Ilmarinen, 1975; Meyer et al., 2010; Paffenbarger et al., 1986). However, there is less known about which intervention strategies work best for increasing stair use. Building aesthetics, location of stairs, setting, the types of prompts, the messages provided, and the target population may all be important characteristics to consider in reviewing the effectiveness of interventions. To date, interventions to promote stair use have studied a wide variety of approaches. They have estimated how the characteristics of a building (e.g. distance between the stairs and the elevators) and its stairs can

have an effect on stair use (Zimring, Joseph, Nicoll, & Tsepas, 2005). They have examined the effectiveness of simple PODPs, posters, and stair banners as well as how the different types of messages that resonate with people and improve stair use (Anderson et al., 2006; Eves et al., 2006; Webb & Eves, 2007b). They have examined the placement of PODPs as well as how the type of setting influences that effectiveness (Coleman & Gonzalez, 2001; Olander et al., 2008). Other studies tried to improve the aesthetics of the staircases, including paintings and music (Kerr et al., 2004; Boutelle et al., 2001). Role modeling has also been examined as a strategy for increasing stair use (Adams et al., 2006). Many studies researching the effects of signage on stair use have been conducted at transportation centers including train stations, subway stations, transit centers, and airports (Adams et al., 2006; Andersen et al., 2006; Blamey et al., 1995; Brownell et al., 1980; Coleman & Gonzalez, 2001; Eves & Masters, 2006; Iversen et al., 2007; Kerr et al., 2001c; Muller-Riemenschneider et al., 2010; Olander et al., 2008). Several have been conducted at shopping centers or shopping malls (Andersen et al., 1998; Boen et al., 2010; Brownell et al., 1980; Eves et al., 2006; Kerr et al., 2001b, 2001d, 2001e; Webb & Cheng, 2010; Webb & Eves, 2005, 2007a, 2007b). Other studies have been completed at worksites, office buildings (Auweele et al., 2005; Boutelle et al., 2001; Coleman & Gonzalez, 2001; Kerr et al., 2001a; Kerr et al., 2004; Titze et al., 2001), and one was completed at a conference center (Andersen et al., 2008). Some stair promotion studies were conducted in healthcare facilities (Marshall et al., 2002; Meyer et al., 2010). Other studies have been conducted at universities (Bungum et al., 2007; Coleman &



Gonzalez, 2001; Ford & Torok, 2008; Grimstvedt et al., 2010; Russell, Dxewaltowski, & Ryan, 1999; Russell & Hutchinson, 2000).

It is important to consider both the setting where the intervention has occurred and the intervention strategies used when examining the effectiveness of interventions to promote stair use. The type of setting and the types of individuals who are using the stairs within the setting may impact the intervention outcomes. In other words, not all intervention strategies may work as effectively across intervention settings and populations.

### **Transportation Centers**

As previously mentioned, researchers have conducted interventions in various transportation centers including train stations (Blamey et al., 1995; Eves et al., 2006; Iversen et al., 2007; Muller-Riemenschneider et al., 2010; Olander et al., 2008), transit centers for walking commuters (Eves & Masters, 2006), and airports (Adams et al., 2006; Coleman & Gonzalez, 2001; Russell & Hutchinson, 2000). Strategies used in these settings have included role-modeling and verbal prompts, PODPs, stair banners, and posters. Not all efforts have been successful.

***Train stations.*** The use of motivational signs, PODPs, and banners has been thoroughly studied in train stations. In an underground train station in Scotland, motivational signage placed near the adjacent 15-step staircases and escalators was associated with a significant increase in stair usage from 8% at baseline to 15% to 17% when the intervention signs were present (Blamey et al., 1995). In three underground stations in Berlin, Germany, researchers placed posters near the bottom of stairwells where individuals could choose between

taking the stairs or the escalator (Muller-Riemenschneider et al., 2010). Stair use increased significantly after the posters were placed and remained higher than before posters were up, even after posters were removed (Muller-Riemenschneider et al., 2010). Similarly, in two train stations in Denmark, stair use increased after a poster that encouraged stair use was placed near the stairs (Iversen et al., 2007).

Another study was conducted in a variety of settings (e.g. bus station, shopping center, and train station), and combined the results from all of all the settings (Brownell et al., 1980). The study's results indicated that there were significant increases in stair use in a train station once signs were placed. The stair use changed during the first phase from 5.3% to 13.7%. After signs were removed, stair use declined to 7.1% but increased again to 15.0% when the signs were displayed again (Brownell et al., 1980). In two Danish train stations, researchers found that there were significant increases in stair use when posters were present. At one station, stair use increased from 12% at baseline to 16% during the intervention ( $p < 0.001$ ) and from 23% to 31% at the second station (Brownell et al., 1980).

Andersen et al. (2006) also indicated that culturally sensitive signs are appropriate to increase stair use. Andersen et al. (2006) displayed a poster in which an African American female was taking the stairs and found that when the poster was displayed, the percentage of people using the stairs significantly increased from baseline (15.8%) to when the sign was present (21.5%) among people of all races. Specifically among African Americans, there was an increase

from 10.3 to 16.4%. Stair use increased significantly during the first phase of the intervention when the sign was introduced and remained significantly increased after the sign was removed (Andersen et al., 2006). At 3 weeks after intervention, the stair use declined, but was increased again when the sign was displayed again. Both Caucasian and African-American commuters increased their stair use (Anderson et al., 2006).

In contrast to the results of the studies already discussed, not all data from stair use studies in transportation centers have been positive. Although Muller-Riemenschneider et al. (2010) found that women significantly increased their stair use when PODPs were present in a train station, there were no significant differences with men's stair use (2010). One study compared two different types of messages on posters, which revealed significant increases in stair use (Kerr et al., 2001c). One poster that stated, "stay healthy, use the stairs," was connected to an increase from 38.1% to 41.9% in stair use while another poster that stated, "stay healthy, save time, use the stairs" affected a 45.7% increase (Kerr et al., 2001c). A slightly different approach was used in a train station in London (Olander et al., 2008). Stair-rise banners similar to the banners used in a previous study (Kerr et al., 2001c) were placed on the stairs in a train station. Stair-rise banners are placed directly on the stairs so that they are visible while looking at the staircase, instead of near the stairs like a poster. In this study, compared to baseline stair use of 40.6%, there were no significant increases in stair use during the weeks when only the stair-rise banners were present —stair use increased only to 40.9% and was not statistically significant (Olander et al., 2008). Conversely,

when posters were displayed near the entry of the stairs and escalators, there were significant increases (44.3%) in stair use (Olander et al., 2008).

***Travelator.*** Another study in Hong Kong indicated that posters were not effective in stair use (Eves & Masters, 2006). Baseline stair use was very low at 0.36% and was not significantly different and even decreased slightly during the intervention to 0.30%. Individuals could choose to walk up stairs or take a travelator up (an escalator without steps). Researchers indicated that more of the Asian population chose to walk up the travelator during the intervention than non-Asians. Although not the same as climbing stairs, it was an increase in physical activity (Eves & Masters, 2006).

***Airports.*** Two PODP studies used signs in airports (Coleman & Gonzalez, 2001; Russell & Hutchinson, 2000), while another study researched the effects of natural and confederate models with verbal prompts on stair use (Adams et al., 2006). A natural model was any other person on the staircase, while a confederate model was an individual from the research team who would ascend then descend the staircase (Adams et al., 2006). Coleman and Gonzalez (2001) studied effects of stair use when PODPs were displayed in a variety of settings and found that when signs were present in the airport, the levels of stair use significantly increased. Russell and Hutchinson (2000) found stair use increased from 8% to 15% when a health promotion sign was present, and stair use increased to 14% when a sign that stated, “please limit escalator use to staff and those unable to use the stairs” was displayed near the escalator. One study did not use PODPs, signs, or artwork, but rather examined if modeling the

behavior of other individuals would have effects on stair use (Adams et al., 2006). At an international airport with two ascending and one descending escalator with a staircase in between, researchers used several types of models and verbal prompts to examine stair use. During one phase, the confederate models would add verbal prompts, including speaking loudly to each other and stating phrases such as “let’s take the stairs” while pointing to the stairs. Results indicated that any type of modeling was positively associated with stair use ( $p < 0.001$ ). The researchers suggested that modeling might be a beneficial way to promote and sustain stair use (Adams et al., 2006).

Airports are also a type of transportation setting in which individuals may be in a rush to find their gates or to meet family members or friends, so perhaps stair use is increased due to a need for quickness, not for health reasons. However, unlike train stations, some individuals may not use airports on a daily basis as they would with train stations.

Although there were statistically significant increases in stair use in most studies discussed, the increases still indicated that less than one-half, or one-third of the individuals on average, were using the stairs. However, the setting must be taken into consideration. When commuters are rushing to get onto a train or off of a train, they may choose stairs or the escalator, based on which would be the quickest route. If there are too many individuals on either escalators or the stairs, they may choose the mode of transportation that has fewer individuals in an effort to get to their destination quickly. In addition, individuals who use the train stations on a regular basis are likely to be there most days of the week while

traveling to and from work or school, whereas other settings such as shopping malls may have a different type of population with fewer regulars.

### **Office Buildings**

Other efforts have focused on worksite interventions including office buildings, banks, and conference centers (Andersen et al., 2008; Auweele et al., 2005; Coleman & Gonzalez, 2001; Cooley et al., 2008 Kerr et al., 2001a; Titze et al., 2001). At a national ACSM annual meeting, stair use increased significantly after a motivational sign that showcased a photograph of a health professional using the stairs was displayed between the stairs and escalator (Anderson et al., 2008). Stair use increased from 22.0% on day 1 to 29.3% on day 2 and then to 26.8% on day 3. However, this represented less than one-third of the conference attendees, who were primarily educated health professionals. In a five-story public sector building that included PODPs that focused on decreasing risk of heart disease and stair-risers affixed directly on the stairs, researchers found that individuals coded as overweight had greater increases in stair use (+5.4%; odds ratio = 1.33) than those considered normal weight (+2.5%; odds ratio = 1.12) (Eves et al., 2006). Similarly, researchers found in a two phase intervention that included signs and a follow-up email from a medical doctor, both strategies were effective in increasing employee stair use in a five-story worksite building (Auweele et al., 2005). The first phase of the intervention included placing motivational signs promoting health and taking the stairs near the elevators and all stairwells (Auweele et al., 2005). The signs remained displayed during the second phase of the intervention, which included the worksite's physician sending an

email reminding the employees of the sign and description of the health benefits that can be obtained from regular stair use. Stair use was 69% at baseline and significantly increased after the first intervention to 77% ( $\chi^2 = 12.97$ ;  $p < 0.01$ ). After the second intervention that included presence of signs and the email message, stair use increased to 85% ( $\chi^2 = 15.58$ ;  $p < 0.01$ ).

In a four-story Tasmanian office building, an intervention using both positive and negative signage had no significant results on increasing stair use when individuals had the choice of an elevator or the stairs (Cooley et al., 2008). Compared to baseline, when the positive message sign was hung at a point of decision near elevators, stair use actually decreased, but the decrease was not statistically significant. When the signage with a negative message was posted, there were no significant differences between stair use at baseline or during that period of time (Cooley et al., 2008).

Another study that took place in office buildings used a different approach to increase stair use among the individuals who worked there: the study allowed the employees to choose incentives that would motivate them to use the stairs more often (Titze et al., 2001). In four Swiss federal buildings, researchers distributed health and physical activity information to the employees who worked in the buildings and provided potential incentives to use stairs to determine if these strategies would effectively increase stair use (Titze et al., 2001). Each office building's employees chose specific action plans and incentives as part of the intervention, based on their specific needs and wants, including fruit, games, and a symbolic elevator closure for a day. During the four-month intervention

period, stair use increased for all office buildings. However, it should be noted that two of the office buildings were fairly new and had brightly lit stairwells, and the new buildings had very high baseline stair use compared to the older buildings (Titze et al., 2001).

In another worksite study, posters placed near the elevator and adjacent to the stairwells were used as a stair promotion effort (Kerr et al., 2001a). The study found that there were no significant effects on stair ascent (Kerr et al., 2001a). However, stair descent increased significantly in both office buildings. Questionnaires were administered to determine if employees could recall poster messages and what they thought about the posters and messages. In addition, participants were asked to report stair-climbing habits (Kerr et al., 2001a). Overall, employees reported that the posters were a good idea, with 71% positive feedback for the first site and 73% for the second site. However, both worksites' employees also reported that the messages made them feel negative, and participants specifically reported feelings of guilt and laziness (Kerr et al., 2001a). Results from the questionnaire indicated that barriers to stair usage included the floors in which employees work, the time, and load, which included bags and briefcases. Employees that worked on the lower floors reported using stairs more often than those on higher floors (Kerr et al., 2001a).

Another proposed environmental strategy to increase stair use is to add artwork and music so that the stairwells are more appealing to the users (Boutelle et al., 2001; Kerr et al., 2004). This strategy has been primarily tested in office buildings. Adding artwork and music within the stairwells in addition to



directional and motivational signs had a significant effect on increasing stair usage in a university office building (Boutelle et al., 2001). Similar effects were seen after several intervention phases were completed at the CDC building (Kerr et al., 2004). Both studies measured stair use at incremental periods, such as after specific signs or paint were added. There were four phases implemented in the CDC building: addition of carpet and paint to the stairwells, inclusion of framed artwork, implementation of motivational signs, and introduction of music. Proximity sensors measured frequency of stair usage. Each phase was measured separately, with significant increases after motivational signs were placed, and increases again after music was added (Kerr et al., 2004). There were no significant increases after only painting the stairwells and carpet were added, and there was a significant decline between the first three months of when signs were present and the last period of the intervention. Authors suggested that perhaps individuals had a “curiosity factor” where individuals eventually became accustomed to viewing the signs, and they no longer were effective (Kerr et al., 2004).

Research conducted on stair use in office buildings has had mixed results. Although stair use increased with a poster present during a national exercise science meeting, the results indicated that less than one-third of the individuals were choosing to use the stairs (Andersen et al., 2008). Other studies conducted in office buildings used other factors to promote stair use with positive results. Such factors included an email from a medical doctor during the time posters were displayed (Auweele et al., 2005) and allowing employees to choose their

incentives for stair use (Titze et al., 2001). Yet, some data indicated that not all stair use studies in office buildings had significant results on stair use, although Kerr et al. (2001a) and Cooley et al. (2008) found positive results with stair descent. Perhaps other factors should be used in combination with motivational signs, because studies conducted by Auweele et al. (2005) and Titze et al. (2001) indicated that other strategies were associated with increased stair use.

Office building stairwells are often used by the same individuals on a day-to-day basis, and additional research should be conducted to determine types of messages and incentives that motivate office employees to use stairs. One type of measurement has not been measured in any studies: intra-floor stair travel. This would also be an additional important factor in determining if individuals have increased stair use. Even if individuals are not exiting or entering the stairwells at certain points, perhaps their stair use mostly consisted of using stairwells between floors.

### **Hospitals or Healthcare Facilities**

The results of studies in hospitals or healthcare facilities have been mixed. One stair promotion intervention was successful in a hospital setting (Meyer et al., 2010). Participants were instructed to use stairs instead of elevators and wore badges indicating their participation in the study (Meyer et al., 2010). Research staff collected numerous data on the participants in this study including blood lipids, physical activity habits, dietary habits, weight, aerobic capacity, waist circumference, and physical activity measured by accelerometers, along with self-reported stair use per day (Meyer et al., 2010). Not only did individuals report an

increased amount of stair use, they also had significant positive health outcomes (Meyer et al., 2010). Yet, Marshall et al. (2002) found that there were no significant increases among community individuals and healthcare facility employees during an intervention that utilized motivational signs in a hospital building. The intervention also included footprint stickers in the hallways leading to the stairs and posters that displayed photographs of people taking the stairs (Marshall et al., 2002). There were no significant increases in stair use, then stair use actually decreased when the signs were reintroduced after a control period with no signs present (Marshall et al., 2002). Motion sensor devices (MSDs) recorded most of the data, with one hour per day of observational data. MSD are less likely to influence behavior, but they have flaws. If two individuals walk by the MSD, it counts just one person (Marshall et al., 2002). Marshall et al. (2002) also obtained data regarding visibility of signs and footprints; the majority of individuals (90%) who were surveyed had seen the intervention prompts, yet there were still insignificant results.

The two studies conducted in the hospitals differ in the type of intervention and the way in which stair use was measured. Perhaps the individuals who were instructed to wear badges identifying them as participants in a stair use study felt obligated to use stairs more often (Meyer et al., 2010), and they also were aware of various health measures that would be collected at time points throughout the study. In one study, signs and foot print stickers were the motivational prompt designed to increase stair use (Marshall et al., 2002), while in the later study, employees were told to use stairs instead of elevators wore

badges indicating participation and also had health outcomes measured (Meyer et al., 2010).

### **Shopping Centers**

There have been several successful interventions using motivational signs for increasing stair use in shopping centers (Brownell et al., 1980; Kerr et al., 2001b, 2001d, 2001e; Webb & Eves, 2006, 2007c). Banners with specific messages that were placed on the actual stairs have produced even greater results in this type of setting, with a 127% to 179% increase in stair usage (Kerr et al., 2001b, 2001d, 2001e; Webb & Eves, 2005). There were significant increases in stair use in a shopping mall setting when colorful banners with messages were placed on every other stair on a staircase adjacent to escalators (Kerr et al., 2001b). The increase was maintained over the 3 months following the intervention (Kerr et al., 2001e). A similar study that compared a poster versus banners with multiple health messages found that the banners were more effective at promoting stair use (Kerr et al., 2001b). A poster that was effective in a previous study was displayed for a total of 4 weeks at a point near the escalator and stair entrance (Kerr et al., 2001a). Stair use increased from 2.4% to 4.0% with the poster. Stair use increased even more to 6.7% when banners that contained multiple health-promoting messages were placed on alternate stair-risers for the last two weeks of the intervention (Kerr et al., 2001b). A study conducted by Webb and Evans (2007c) also indicated that banners were more effective than posters. Results from a banner-based intervention study comparing a generalization site and intervention site indicated that stair use ascension

increased after placement of banners displayed on the stairs (Webb & Eves, 2007c). During the study's 13-week intervention, banners displaying three different messages were placed on the stairs, and there were significant increases in stair use. Stair use increased to 14.6% compared to 5.3% at baseline (Webb & Eves, 2007c).

Two of the studies based on stair use in shopping centers also obtained qualitative data regarding the messages used on the signs, the visibility of signs, and the reasons why individuals take stairs or escalators (Kerr et al., 2000; Kerr et al., 2001d). Based on interviews with shoppers in the area regarding viewing of the banners and posters, 78% of individuals reported seeing the banners, whereas only 37% reported seeing the posters (Kerr et al., 2001d).

In a series of interviews at a shopping mall site that used poster prompts to increase stair usage, Kerr et al. (2000) found that the main reason for stair use was to improve health (41.4%). Escalator users reported that they used the escalator due to ease of use (30.3%) and due to laziness (24.2%). A similar study in a town square was conducted to determine which messages would be perceived as the most motivating to promote stair use (Webb & Eves, 2007b). Research staff provided interviewees with general description and consequences of stair use; for instance, a general description would be "stair climbing provides daily exercise," and a consequence would be "stair climbing keeps you fit" (Webb & Eves, 2007b). Research staff asked interviewees to rate the messages based on a 1 to 5 scale, and some interviewees were told the messages were true, and a comparison group was not told anything. Individuals assigned higher motivation ratings to the

specific consequence messages than the general descriptions, and assigned even higher motivation ratings if they were told the messages were true (Webb & Eves, 2007b).

Most shopping center stair use studies have found significant positive results after posters were displayed, and some studies determined that banners were more effective than posters (Kerr et al., 2001b, 2001d; Webb & Eves, 2007c). Interview data indicated that more shoppers recalled seeing the banners versus the posters (Kerr et al., 2000). It may be difficult to compare stair use studies in shopping centers to other settings, since individuals in shopping centers might not be using the stairs on a day-to-day basis. On the other hand, individuals at train stations and office buildings may have the choice of stairs or escalators or stairs or elevators on an everyday basis. Therefore, stair promotion strategies may have differing impacts on those individuals who have decided to shop on a particular day rather than those who use office buildings or train stations every day.

### **University Buildings**

Several studies have researched the effects of signage on stair use at college campuses (Bungum et al., 2007; Coleman & Gonzalez, 2001; Ford & Torok, 2008; Grimstvedt et al., 2010; Russell et al., 1999; Russell & Hutchinson, 2000). In one study, after motivational signs were placed in the college settings, stair use increased significantly and continued to remain elevated after signs were removed (Bungum et al., 2007). At baseline, 22.8% of individuals took the stairs; when signs were present, 38.4% took the stairs; two weeks after the signs were

taken down, 30.8% of individuals took the stairs (Bungum et al., 2007). The percentage of individuals who took the stairs was significantly different between baseline and the second data collection ( $\chi^2 = 39.31, p < 0.01$ ). Results from another campus-based study where measurement was taken during baseline (Phase I), when signs were displayed (Phase II), and after signs were removed (Phase III) indicated that after motivational signs were displayed, stair use increased significantly compared to baseline: from 23.6% to 28.0% (Ford & Torok, 2008). When signs were removed, stair use remained significantly elevated compared to baseline, with 28.6% of individuals taking the stairs (Ford & Torok, 2008).

Only one study researched the effects of both motivational and directional signs in a building in which individuals could use stairs or the elevator (Grimstvedt et al., 2010). The signs included both a directional message and a motivational message along with a picture including the university mascot climbing up the stairs. Before the study commenced, focus group participants made up of individuals who regularly took the stairs in this building helped to determine which messages would be used to promote stair use (Grimstvedt et al., 2010). The focus group participants chose the motivational message “walking up the stairs burns almost five times as many calories as riding an elevator” to display in the elevator lobby area (Grimstvedt et al., 2010). The focus group participants had reported that lack of awareness of the location of stairwells may limit stair use, and they suggested that having directional signs to hidden stairwells would assist in increasing their stair use (Grimstvedt et al., 2010). Stair

use significantly increased from baseline to intervention week and remained elevated two weeks after the intervention when all signs were removed (Grimstvedt et al., 2010).

Two studies examined the effects of signs in university libraries (Coleman & Gonzalez 2001; Russell et al., 1999). Significant increases in stair use occurred when signs were present at a university library location (Russell et al., 1999). During the intervention phase of one study, there were overall significant increases in stair use. The use of stairs increased from 39.7% during baseline to 41.9% during the intervention phase ( $\chi^2 = 4.28, p < 0.05$ ) (Russell et al., 1999). In contrast, another study that examined sign use in a library did not see increases in the stair use of both genders. After an individual-based health promotion sign (with one figure ascending stairs), chi square analyses indicated that when the sign was present, there was a significant association with a decrease in men's stair use and no significant changes in women's stair use (Coleman & Gonzalez, 2001). When the family-based health promotion sign was displayed, a significant association was found; however, the results differed among males and females. Stair use among men decreased ( $\chi^2 = 38.55, p < 0.001$ ) and increased among women ( $\chi^2 = 83.64, p < 0.001$ ) (Coleman & Gonzalez, 2001).

### **Measurement**

Stair use promotion studies have used observational data, and others have used motion sensor devices that count individuals in the stairwells (Boutelle et al., 2001; Kerr et al., 2004; Marshall et al., 2002). However, with sensor devices, there is no way to determine ascent versus descent, gender, and other variables,



and MSDs record two individuals passing the device as only one person (Marshall et al., 2002).

### **Summaries and Conclusions**

Only one study focused on using other individuals as role models (Adams et al., 2006), and only one study allowed the stair users to choose incentives to help motivate them to use the stairs (Titze et al., 2001). Only two previously published studies are similar to the current mural painting study in that they have used artwork to promote stair use among the building inhabitants (Boutelle et al., 2001; Kerr et al., 2004). The artwork in these studies was not chosen by the users of the building, but by the researchers. Only one study measured specific health outcomes before, during, and after a stair promotion intervention (Meyer et al., 2010).

Several researchers have shown PODPs to be an effective strategy for increasing stair use in numerous settings including transportation stations (Andersen et al., 2006; Blamey et al., 1995; Brownell et al., 1980; Coleman & Gonzalez, 2001; Eves & Masters, 2006; Iversen et al., 2007; Kerr et al., 2001c), shopping malls or centers (Brownell et al., 1980; Kerr et al., 2001b, 2001d, 2001e; Webb & Eves, 2006, 2007c), worksites (Andersen et al., 2008; Auweele et al., 2005; Kerr et al., 2001a), and university settings (Bungum et al., 2007; Coleman & Gonzalez, 2001; Ford & Torok, 2008; Grimstvedt et al., 2010; Russell et al., 1999; Russell & Hutchinson, 2000). Yet, other studies have found that PODPs did not have any effect on stair use, including in hospitals (Marshall et al., 2002), university library settings (Coleman & Gonzalez, 2001), and a train station

(Olander et al., 2008). Potential reasons for the discrepant findings include the environment or setting of the intervention and the types of individuals who use the stairs within these settings. The individuals who use the stairs on a daily basis at train stations, office buildings, or university buildings may respond differently to PODP interventions, compared to shopping centers where shoppers may shop during specific seasons or sporadically. The type of strategy used in the intervention may also make a difference. Some studies found that banners placed on the actual stairs were more effective in promoting stair use than posters in shopping centers (Kerr et al., 2001b, 2001d, 2001e; Webb & Eves, 2007c), yet a similar study using banners in a train station had no significant results (Olander et al., 2008). Data indicate that other strategies to promote stair use including motivational signs plus an email from the worksite physician promoting stair use (Auweele et al., 2001), extra incentives to take the stairs (Titze et al., 2001), or modeling stair use (Adams et al., 2006) may be beneficial for increasing stair use. There were few studies that used multiple approaches for promoting stair use, including studies that implemented the stair promotion in two phases, such as utilizing banners and signs separately (Kerr et al., 2001b; Olander et al., 2008). Only one study used the authority of a medical doctor as an additional booster to a stair signage study (Auweele et al., 2005). In the hospital setting, an intervention where research staff instructed participants to use stairs instead of elevators had positive results with increased stair use (Meyer et al., 2010) compared to another intervention where only signs and messages were used in the hospital with no significant increases in stair use (Marshall et al., 2002). Perhaps individuals need

additional verbal reminders as motivation to use stairs more often. Only one study combined both a stair use promotion intervention along with collecting health measures on the participants (Meyer et al., 2010).

### **Gaps in Literature**

Despite the array of studies on the impact of signage on stair use, to date, no published studies have examined the influence that the addition of artwork created by the regular users of the stairs has on stair use. Few studies have obtained data on reasons for stair use or if intervention prompts were visible (Kerr 2001a; Marshall et al., 2002), and few studies have used focus groups for examining details relating to the stair use promotion intervention (Grimstvedt et al., 2010). These data are important in tailoring interventions and providing beneficial information for future studies in the same setting. This mural painting study that took place in a residential hall was consistent with The Task Force on the Community Guide to Preventive Services, which suggested that stair usage studies tailor interventions to specific populations (Guide to Community Preventive Services, 2005). Additionally, StairWELL's guide to promoting stair use suggested adding artwork to stairs to make them more aesthetically pleasing to the users (StairWELL, 2010). No published studies, to date, have examined stair use at a residential hall.

This study addressed the gaps in literature by conducting a study within a residential hall including artwork that was developed by the individuals who use the stairs. Data were collected from individuals exiting stairs to examine visibility of signs and murals. Focus groups and interviews were conducted with

the CAs and staff members regarding the stair promotion intervention to obtain information on the mural painting contest and training relating to the initiative.

## Chapter 3

### Methods

#### Participants and Recruitment

All students (N = 1,084) residing in a residential hall of an urban college were eligible and recruited to participate in the mural painting contest. The majority of the residential hall residents were female (n = 768) and most were first-year students (n = 690). The residential hall was divided into floors specific to residential colleges or groupings of specific majors (e.g., journalism, nursing, liberal arts and sciences, nutrition, etc.). There were a few floors—the First Year Residential Experience (FYRE)—that were not major-specific. Each designated floor had a CA who was in charge of the floor. The CA had to be at least a sophomore at the university and was selected to be in this position by the residential staff. All CAs attended weekly staff meetings, perform specific duties and maintain communication between the residential hall staff and their assigned floor residents. In addition to the CAs, there are residential community student leaders (RCSLs) and FYRE student leaders who lived on designated floors. The CAs, RCSLs, FYRE student leaders and residential hall staff were responsible for recruiting the residents to participate in the mural contest. All students who resided in the residential hall and residential hall staff were eligible to be counted while exiting the stairs. The majority of study participants were students who resided in the residential hall although residential hall staff members were also counted. It is unlikely that friends and/or family members of the residents were included as participants. Residents are required to register guests and check them

in and out each day through the lobby area. All staircases lead directly outside, so it is unlikely individuals other than residents or staff had taken the stairs. Any student who exited the stairs was eligible to be asked to participate in a quick survey regarding their stair use and opinions about the mural painting contest. Every 10th individual coming down from the stairs was asked to answer a few questions regarding stair use, their recall of the prompts for increasing stair use and the mural paintings. CAs and the residential hall staff involved in oversight of the stair-painting contest were all invited to participate in either an interview or focus group after completion of the stair painting activity. The CAs were recruited for focus groups during two separate staff meetings. Key residential hall staff members (n = 2) were invited to attend an interview via e-mail.

### **Overview of the Mural Painting**

As part of new programming designed to improve the health, wellness and physical activity levels of students living in a residential hall on an urban college campus, a mural painting contest to improve the aesthetics of the staircases (n = 4) in the residential hall was implemented. All residents living in the residential hall were supposed to be invited to participate in both the mural painting and voting portion of the contest. Participating residents formed teams based on the floor in which they resided. Each team that participated painted a mural on a designated space within one of the staircases. Each team was provided with acrylic paint and was allowed to paint any image agreed upon by the team members, within reason. The CAs, RCSLs, FYRE leaders, and faculty advisors to the designated floors were in charge of ensuring that students did not paint

obscurities or inappropriate images. In addition, the CAs were provided with training on promoting stair use and were responsible for encouraging stair use by the residents residing on their respective floors. The CAs were expected to model the behavior of using the stairs, verbally encourage their residents to use the stairs, and recruit their residents to participate in the mural painting contest. After completion of the murals, the original intention of the mural painting contest was to have each resident of the residential hall vote on their favorite mural in order to increase stair usage. The voting was originally scheduled for the week directly after the mural painting activity. An award was to be given to the floor whose mural had the most votes. However, the contest portion did not actually occur.

In addition to the mural painting activity, directional signs to prompt stair use were taped on the doors exiting to the stairwells prior to the move-in date for the residential hall. These signs informed the students about what university buildings, restaurants, and other places of business are located beyond each stairwell. The signs were relatively small: 8.5 by 11-inches laminated signs. Motivational messages designed to encourage stair use were also placed on the DigiBoards throughout the residential hall. The DigiBoards rotated a variety of messages throughout the day, including events throughout the residential facility, the university, and the downtown community. An example of what was displayed to promote stair use during the fall semester was “Take the Stairs.” The DigiBoards are located near the elevator area on each floor, and one is located on the first floor near the televisions in the dining area.

## **Data Collection**

Due to security requirements of the residential hall, the stair use data collected only included number of residents exiting the building using the stairs. In order to ascend the stairwells, the residents were required to take an elevator to the second floor, exit the elevator and then transfer to the stairs. The stairwells could not be entered from the ground floor. Access to the residential hall beyond the first floor required a valid identification card. This configuration precluded the ability to collect data on ascending and between-floor stair use.

A quasi-experimental design with one pre-test and multiple post-tests was used to evaluate exiting stair use pre-and post-mural painting contest. A baseline measure (week 0) of exiting stair use was collected prior to mural painting contest. An assessment of exiting stair use was conducted immediately following the intervention (week 1) and again during weeks 2, 4, and 6. Multiple post-contest assessments were done to examine when the effects of the stair-painting contest subsided.

In order to capture the most pedestrian flow, data were collected during the busiest times for elevator use and pedestrian traffic flow as designated by residential hall staff (see Table 1). There were four staircases that exit from the residential hall. Two were used more frequently due to their proximity to university classrooms and facilities. Data were collected on the two busiest stairwells that include the Southwest and Northwest staircases. On Monday, Wednesday, and Friday mornings, data were collected for 115-minute periods. On Tuesday and Thursday mornings, data were collected for 75 minutes. Afternoon



data were only collected on Mondays and Wednesdays and the observation period each day was 75 minutes (see Table 1). These data collection timeframes were consistently used during all assessment weeks.

Table 1.

*Description of Locations and Times for Observation of Stair Use*

Day	Staircases Measured	Time	Minute Total
Monday	Southwest, Northwest	9:40-11:35 a.m.	115
Monday	Southwest, Northwest	2:00-3:15 p.m.	75
Tuesday	Southwest, Northwest	10:30-11:45 a.m.	75
Wednesday	Southwest, Northwest	9:40-11:35 a.m.	115
Wednesday	Southwest, Northwest	2:00-3:15 p.m.	75
Thursday	Southwest, Northwest	10:30-11:45 a.m.	75
Friday	Southwest, Northwest	9:40-11:35 a.m.	115

To qualitatively examine the influence of the directional signage and the mural paintings on stair use, every 10th individual coming down from the stairs was asked to answer a few questions regarding stair usage and their recall of the prompts for increasing stair use and the mural paintings. The interviews were conducted during at least two of the observation periods each week (excluding baseline). Additionally, CAs from all 24 floors of the residential hall were invited to participate in focus groups and interviews to address the contributions CAs made to the contest. Staff members directly involved with the stair use initiative were invited to participate in an interview. The moderator’s guide and interview guide can be found in Appendix B, C, and D.

## **Process Evaluation**

CA and staff perceptions of the mural painting activity, and other topics related to the stair use promotion initiative were qualitatively obtained. Two focus groups (n = 7; 71% female), three CA interviews (n = 3; 100% female), and a staff interview with two members present (n = 2; 100% male) were conducted. Three CA interviews were conducted, because the CAs interested in participating in the focus groups could not attend the two scheduled focus groups due to schedule constraints. The two staff members were identified as the staff responsible for planning and promoting the stair use initiative. The CAs were asked about their perceptions and frequency of training for this project, specifically how much the stair use promotion was encouraged, the types of encouragement they were asked to use to encourage stair use, and methods of encouragement that the CAs actually implemented to promote stair use. The CAs were also asked about their perceptions of the mural painting contest, the participation and responses from residents, considerations for future similar initiatives, and CA perceptions on barriers to stair use. The staff members were asked similar questions including reasons for the implementation failure of the mural painting contest.

Upon arrival to a focus group or interview, a verbal script was read to the participants to provide information regarding the study, what was expected, and information pertaining to the focus group or interview. All participants signed an informed consent for the focus group or interview. Participants were asked to use pseudonyms during the focus groups and interviews to protect their identity. All

participants were encouraged to respond to each question. Participation in the focus groups and interviews was voluntary. Participants could decline to answer any question that they were uncomfortable answering, or they could choose to leave the interview if they became too uncomfortable. The CAs were asked questions about the training they received for the mural painting contest and what their roles were in encouraging the residents' stair use. The staff members were asked questions about implementation of the mural painting contest and the type of training the staff provided to the CA staff. The moderator's guide for the focus groups and interviews can be found in Appendix B and C.

All focus groups and interviews were audio taped and transcribed verbatim. A trained note-taker took notes during focus group sessions. Transcripts were verified for accuracy and entered into N-VIVO software for facilitation of data analyses. A thematic analysis approach was used to analyze the data based on participant response to the question.

### **Study Participants**

*Inclusion criteria.* All individuals who exited the stairwells during the times of observation were included. Individuals who participated in the survey about stair use had to be residents of the residential hall, at least 18 years of age and willing to speak to the interviewer for three to five minutes. The focus groups and individual interviews included only community assistants (CAs) who were at least 18 years old and who signed an informed consent. The staff interviews included the two staff in Taylor Place who were originally part of the programming for the stair promotion initiative.

***Exclusion criteria.*** Individuals who did not exit via the stairwells were not counted during the observation times. For the staircase interviews, research staff asked every 10th person a short set of questions. Individuals under the age of 18 were unable to participate in the questions. If the individual declined the interview, research staff asked the next person who exited the stairs. If the 10th person who exited the stairwells was a staff member, he or she was not asked for an interview. If an individual was on his or her phone, was using headphones, or was running or jogging, the individual was not asked for an interview. For the CA focus group and interview participants, any individuals who were not CAs were excluded from this portion of the research. For the staff interviews, staff that were not directly involved with the stair use initiatives were not recruited for the interviews.

### **Dependent Variables**

The primary outcome for this study was the average number of individuals per half hour exiting the stairwell before and after the mural painting activity. Stair use was measured at baseline (week 0), during the two weeks (week 1 and week 2) following the intervention, then again three weeks after the intervention (week 4) and a fifth time six weeks (week 6) after the intervention.

### **Independent Variables**

The primary independent variable was the mural painting activity within the stairwells of the residential hall. While there were motivational and directional signs to prompt stair use posted in the residential hall, these could not be considered independent variables for the analyses, because they were in place

prior to the students moving into the residential hall. Their independent effects on stair use could not be determined in this study.

### **Variables**

All individuals exiting the stairwells were counted, and the person's gender was recorded. The stairwell, the day, date, and time period in which the observation occurred were also recorded on a standardized tally sheet.

### **Reliability Testing of Observations**

All individuals who assisted with observations completed inter-observer reliability training to ensure consistency and accuracy among research staff. During the training session, the observers were taught to observe a specific stairwell and to tally and record the gender of the individuals exiting the stairs. Each research staff member had a 30-minute training session to ensure observer consistency in measurement of stair use. Each observer was required to count individuals exiting stairs and record the gender prior to observing for the actual research purposes. The average inter-rater reliability was 98%.

### **Dropouts**

During the observational portion of the study, there were not any dropouts because individuals were counted as they exited the stairwells. However, there were a large proportion of individuals who declined participation in the brief interview during their exit from the staircase. During the focus groups, individuals were told that they could leave if necessary.

The individuals who chose to participate in the brief three to five minute interview regarding reasons for stair use could enter into a drawing to win a

\$10.00 gift certificate for a restaurant within a 1-mile radius of the residential hall. Individuals who participated in the focus group or interview received a \$15 gift card.

### **Data Management**

*Exit stair use.* The stair use data was recorded on tally sheets while observing. Each sheet contained collected information on the date, time interval, specific stairwell, and the number of males and females exiting the stairs. The tally sheets for the observations were given to the co-investigator after each segment of observations (see Appendix E). The research staff entered the data into an Excel spreadsheet, including the number of individuals and gender of individuals. These were recorded by staircase, gender, day, date, and the amount of minutes spent observing the stairwells.

### **Data Analyses**

*Stair use.* All data analyses were performed in PASW Statistics 18 (Chicago, IL). Descriptive statistics for the primary outcome (the mean number of individuals exiting the staircase per half hour) were calculated for each week of data collection. Repeated measures analysis of variance (ANOVA) with two within-subject effects (gender and staircase) were used to determine if there were differences in the average number of individuals per half hour who exited the stairwells over time. Interactions between staircase and time and between gender and time were examined to see if the effects of the intervention were modified by staircase or gender. Sphericity was examined using Mauchly's Test of Sphericity. If assumptions of sphericity were not violated, significance on the repeated

measures ANOVA was evaluated with sphericity assumed. If sphericity was not assumed, the Greenhouse-Geisser statistic was used. Post-hoc group-wise comparisons of means were done when the overall repeated measures ANOVA results were significant.

Descriptive statistics were also calculated for the data obtained from the exit stair interviews. Frequency distributions (percentages for yes or no) for self-reported observation of seeing the signs and murals were calculated along with perceived influence of the murals and directional signs. Also, self-reported weekly stair use was calculated and averaged. Frequencies of self-reported stair use were stratified by gender and floor level of residence. Independent t-tests were also used to examine mean differences in self-reported stair use between individuals who reported that the signs or mural paintings influenced their stair use and those who indicated the signs and paintings were not motivational. Additionally, the association between floor level of residence (high or low) and average self-reported stair use was examined through independent t-tests.

For the qualitative analyses, a thematic analysis approach was used. Focus group and interview transcripts were transcribed verbatim and verified. N-VIVO (Version 8) software was used to facilitate data analysis of the focus group and interview data. After the transcripts were coded for themes, the transcripts were consensus coded. Major themes were then identified.

### **Limitations**

This was an observational study that occurred throughout the fall semester. The individuals observed exiting the stairwell may or may not be the

same people who used the stairwells at a different time point. There was no way to detect if specific individuals began to use the stairwells more often than others. Due to restrictions on access to the building, the number of individuals using the stairwells may have been underestimated, since individuals using the inter-floor stairwells could not be counted. Except for those who agreed to speak to the research staff about reasons for stair use, there were no ways to know from which floors the individuals exited.

Due to the way that the residential hall is built, residents cannot access the stairwells from the first floor. Instead, they must take an elevator to the second floor and then continue on the elevator or exit and then take stairs from there. For security reasons, it was not possible to observe and count individuals who were ascending the stairwells between floors. Research staff members were not allowed to observe individuals in the stairwells, between floors, or to view the videos from the security cameras. Research staff members were also unable to obtain data on elevator use to corroborate these findings.

Since the mural paintings were painted onto the actual walls in the stairwells versus hanging up signs or banners, there was no way to determine what would occur if the mural paintings were removed. Other university events may have caused an increase in pedestrian traffic that was not predicted prior to data collection. For example, there were ASU pep rallies on Thursdays during the fall semester that may have caused an increase in the number of students leaving the residential hall. Certain classes or other events may have been canceled at any time point that may have caused a decrease in pedestrian traffic. Weather



potentially could have been a factor in students using the stairs. With the focus groups and interview portion, not all CAs were interested in participating in the portion of the study.

## Chapter 4

### Results

Overall, 13.7% of hall residents ( $n = 148$ ) participated in the mural painting activity. Twenty of the 24 residential hall floors (83.3%) painted murals in their designated stairwell location. Eighteen of the floors painted the mural on the designated date while two floors completed their paintings at another time due to scheduling conflicts. For a variety of reasons to be addressed later, the contest piece was not actually implemented. Students were not provided the opportunity to vote on their favorite painting, and no prizes were awarded. Results reflect the effects of residents painting murals in the stairs and subsequent stair use only.

Over the six weeks of observations, a total of 2,883 individuals were observed exiting the Southwest and Northwest stairwells (female:  $n=1955$ ; 68%, male:  $n=928$ , 32%). The majority of individuals (74%) used the Southwest staircase (2,143 of 2,883). The Southwest staircase was observed for a total of 52.5 hours, while the Northwest staircase was observed for 49.3 hours.

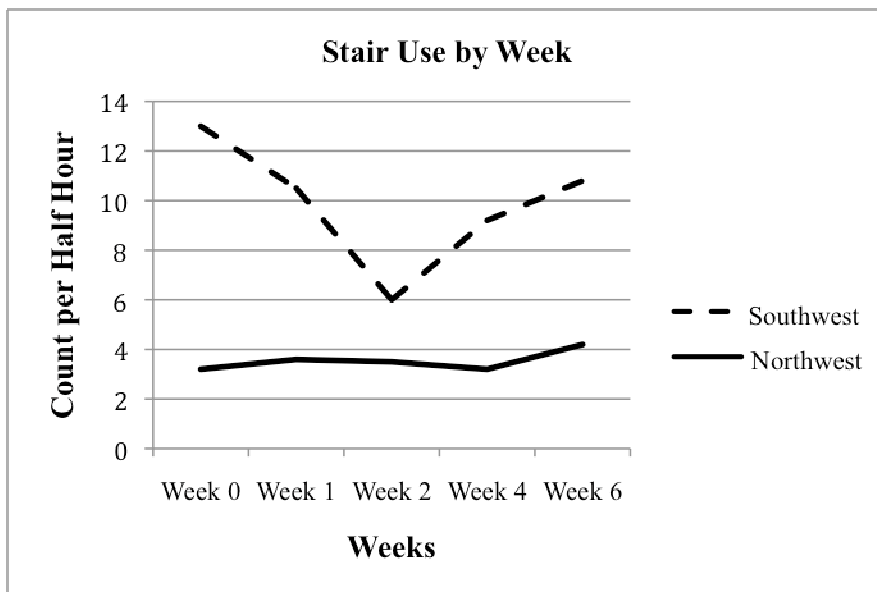
To examine specific aim 1, two-factor repeated measures analyses of variance (ANOVA) were completed to see if there were significant differences in the average number of students per half hour who used the stairs over time. There was a significant time effect on stair use ( $F=7.512$ ,  $p=0.000$ ) and a significant interaction between staircase and time ( $F=7.518$ ,  $p=0.000$ ) (see Table 2). There was no significant interaction of gender over time ( $F=.037$ ,  $p=0.997$ ). A repeated measures ANOVA was conducted on each staircase individually. Stair use did not change over time in the Northwest staircase (Figure 1). Significant time

differences were only found in the Southwest staircase. The post-hoc pair wise comparisons of means indicated that there was a significant decline between baseline and Week 2 and between baseline and Week 4 (see Figure 1). There was also a significant increase in stair use between Weeks 2 and Week 6.

Table 2

*Results from Repeated Measures ANOVA by Intervention Outcome Effects*

Factors	F	p value
Time	7.512	0.00
Time * Staircase	7.518	0.00
Time * Gender	0.037	0.997
Time * Gender * Staircase	1.446	0.229



**Figure 1.** Stair use in Taylor Place, according to staircase used, over the time of the study.

### Interview Data

To answer Specific Aims 2 and 3, brief interviews with individuals exiting from the stairwells were conducted. These were conducted during every week that

stair usage observations were completed after the intervention. Specific Aim 2 was: Did students exiting the stairs perceive that the signs promoting stair use influenced their stair use? On at least two days of the weeks after the intervention, interviews were conducted with individuals exiting the stairs. This included the four weeks after the mural painting occurred. Research staff asked every 10th person exiting a specific stairwell asking if he or she had time to conduct a brief interview. A total of 219 individuals were asked to participate in a brief survey regarding the promotional strategies to increase stair use in the residential hall, and only 28 individuals agreed (13% response rate). This represents 6% of the individuals exiting the stairs on the combined days and hours of times spent interviewing individuals. During the times of the interview sessions, there were a total of 466 individuals exiting the stairs. There were some interview sessions in which all individuals who were asked to complete an interview refused to participate. It should be noted staff members asked the first person out of the stairs and continued to ask for interviews until a person agreed to participate in an interview and 18 years of age or older, with the exception of individuals talking on their cellular phones, listening to music with headphones, or jogging away from the stairwell. After the interview with an individual, research staff members waited to ask the next 10th person exiting the stairs for an interview. Additionally, some individuals exiting the stairs took longer than others to answer questions or had additional questions about the study that staff members would answer. Of the individuals interviewed, 61.0% reported that they had seen signs relating to the directional signs encouraging stair use in the residential hall

(Table 3). Only 28.6% of the individuals who indicated they had seen the signs said that the signs positively influenced their stair use. The sign the participants recalled seeing most often was a “TP Fit” sign. Specific Aim 3 was: Did students exiting the stairs perceive that the murals influenced stair use? The majority of survey respondents (89.3%) indicated that they had seen the murals. However, only 17% reported that the murals influenced their stair use. The most commonly recalled mural themes reported were the “TP Fit” and the “Jersey Floor” designs.

Table 3

*Interview Data From Individuals Exiting Stairs, Data Presented as N (%) or*

*Means (With Standard Deviations in Parentheses)*

Variable	N (%) or Mean (SD)
<b>Gender</b>	
Male	7 (25.0%)
Female	21 (75.0%)
<b>Frequency of Stair Usage Per Week</b>	
Male	11.3 (8.7)
Female	11.7 (8.6)
<b>Have you seen any of the signs in Taylor Place relating to stair use?</b>	
Yes	17 (61.0%)
No	11 (39.0%)
<b>Did any of the signs influence you to use the stairs?</b>	
Yes	8 (28.6%)
No	20 (71.4%)
<b>Have you seen any of the murals in Taylor Place in the stairwells?</b>	
Yes	25 (89.3%)
No	3 (10.7%)
<b>Did any of the murals influence your decision to use the stairs?</b>	
Yes	5 (17.9%)
No	23 (82.1%)

*Note.* This represents the number (n = 28) of individuals who agreed to participate in interviews.

There were no differences by floor level in the proportion of individuals who reported that the signs or murals influenced stair use (see Table 4). It should be noted though that the majority of interview respondents (75.0%) lived on floors 2-4.

Table 4

*Independent T-Tests Comparing Mean Stair Use Per Week by Students on Lower Floors and Upper Floors and by Response (With Standard Deviations in Parentheses)*

Variable	Mean Stair Use Per Week	T-value	p-value
Floor of Residency		0.38	0.70
Lower Floors (Floors 2-4)	12.0 (9.3)		
Upper Floors (Floors 5-14)	10.6 (6.1)		
Have you seen any of the signs in Taylor Place relating to stair use?		0.71	0.49
Yes	12.4 (10.1)		
No	10.4 (5.1)		
Did any of the signs influence you to use the stairs?		0.64	0.52
Yes	13.3 (8.7)		
No	11.0 (8.5)		
Have you seen any of the murals in Taylor Place in the stairwells?		0.63	0.53
Yes	12.0 (8.7)		
No	8.7 (5.5)		
Did any of the murals influence your decision to use the stairs?		1.30	0.20
Yes	16.0 (8.3)		
No	10.7 (8.3)		

*Note.* This represents the number (n = 28) of individuals who agreed to participate in interviews.

Independent t-tests found no significant differences in self-reported stair use per week between individuals who resided on the lower floors ( $M = 12.0$ ,  $SD = 9.3$ ) and those who lived on the upper floors ( $M = 10.6$ ,  $SD = 6.1$ ) (Table 4). Additionally, there were no significant differences in average weekly self-reported stair use between individuals who reported that they had seen the signs compared to those who did not see the signs. Similar results were found with the mural data. No significant differences were found in average weekly self-reported stair use between individuals who reported that signs or murals were perceived as motivation to use the stairs (Table 4).

### **Process Evaluation**

To address specific aims 4 and 5, interviews and focus groups were conducted with the CAs and residential hall staff. Specific aim 4 was: What were the community assistants (CAs') and staffs' perceptions of the mural painting contest and its effects on stair use? Specific aim 5 was: How did the CAs influence residents to use the stairs? Interviews and focus groups were conducted with 41.7% ( $n = 10$ ) of the CAs and the two residential hall staff involved with oversight of the mural painting. Of the 24 CAs that work for Taylor Place, 16 expressed interest in participating. Of the 16 who indicated interest in participating, only 10 responded to invitations to attend the focus groups. There were two focus groups ( $N = 7$  CAs) and three interviews conducted with three CAs who were unable to attend the focus group times. All participants in the interviews and focus groups received an incentive of a gift card to participate in the 60 to 90-minute session.

Focus groups and interviews were conducted with a total of 10 CAs and two staff members (33.3% male 66.7% female). Information about the overall stair use initiative was obtained in an effort to understand why there was no increase in stair use post intervention.

*Training of the CAs for the stair use initiative.* The majority of the training efforts were focused on strategies for promoting stair use (e.g. role-modeling, signage, etc.). Little training was provided on how to get residents involved in the mural painting activity. There appeared to be a discrepancy between the content the staff members perceived as delivered during training and the content perceived as received by the CAs. The staff perceived their training mechanisms as “formal” and indicated that the training occurred during the CAs’ before-school orientation. According to the staff, a specific section of the training was dedicated to the initiative. The staff indicated that the students were given information on ways to encourage stair use. The staff also followed up on the stair use initiative during the weekly CA meetings. One staff member described the training as follows, “We had a section about it during the training, and specifically there was a time that we had split the first years and returners up. I remember talking to the returners first about it, and then we all got back together. We talked about the programming for the hall.” The same staff member also stated, “Well, we originally started having those conversations during fall training. We talked about the goal of the program, one: to encourage students to use the stairwells, but also to include campus pride, building pride. They really jumped on board with it, and they provided feedback.”



When asked about weekly CA meetings, a staff member stated, “That was a weekly agenda item, some of the feedback.” In contrast, the CAs had a variety of perceptions about the dose and the quality of the training with some describing it as “informal,” and others indicated they did not receive training at all. In two interviews and in one focus group, CAs used the word “informal” to describe the training for the stair use initiative. One CA described the training as follows “it was never really a big deal.” Similarly, during an interview, a CA said, “it was really informal training that I recall anyhow...” There was also a lack of consistency in terms of how often CAs recalled hearing about encouraging stair use or had training regarding stair use. In one interview, a CA said that she did not receive any training but rather, the CAs in meetings would bring up the topic. She said, “They haven’t really said anything. Every once in a while, a CA will bring it up, but especially the people on the upper floors...” A CA in a focus group indicated that there were many other agenda items at meetings; she stated, “I know at the beginning there, there were so many initiatives that started off...” The same CA also reported that there was a Game Day Initiative when asked about the current frequency of stair promotion training. She said, “I think that has decreased with the Game Day Initiative, because they’ve been putting so much emphasis on that. We’re having a coordinator switch right now, so there’s definitely been just a lot of hustle and bustle.” Another CA reported that there were other agenda items that were taking precedent. He said, “especially during the fire drills; we’ve had two or three meetings where that’s been a huge focus....”

*Instructions given to CAs to encourage stair use.* Staff members said that they had told the CAs certain things to encourage stair use. One staff member said, “the fact of the role modeling behaviors...hey you know what? It’s easy for you to just go use the elevator, but it’s just as easy for you to go to the stairs. Make sure you do that at high traffic times.” Although CAs considered the training as “informal,” CAs were able to recall specific strategies for encouraging stair use that the staff members had told them to do to encourage residents to use the stairs. Of those who recalled what the staff identified were making signs, and telling residents to use stairs, especially during high traffic time, and during move-in. Additionally, some CAs reported that the staff provided them with signs to use. A CA who was interviewed said, “In training, they recognized there was a problem with elevator use. They really encouraged us and the residents to use the stairs. They constantly said ‘TP Fit’ – to get people to push us to use the stairs and burn some calories...” During an interview one CA said, “I don’t remember any literal phrases, the general concepts, again, to really try to implement it into the students’ lifestyles. It is healthier and saves a lot of congestion.” A CA in a focus group said, “we had training on which ways to, for instance on moving day, which ways to gear the line in order to be more efficient. We were trained to tell all of our residents and also post them on our floors to make sure that you’re not pressing every single number for the people who are on the upper floors and things like that. Every floor is connected by a mini staircase, so we were trained to do every other as opposed to every one.” A CA in the same focus group followed up from the previous statement with, “she hit on most things. We were

also trained and encouraged to basically tell residents places that stairs would lead to in a quicker time.” Another CA in a different focus group said, “I guess in our training to be a CA, they just hammered us with ‘make sure you educate your students to take the stairs.’ They’re allowed to take the stairs.”

***Actual implementation of stair use promotion.*** There were varying reports of what the CAs actually did to encourage stair use among their residents. Some CAs used verbal reminders. A CA in a focus group stated that she would remind students while in the lounge. A CA in an interview said that she used floor meetings as a way to present the message. She said, “in our floor meetings, again, those first ones especially. They’re the most opportunity, what you say holds value, reminding them. ... It’ll save you a lot of time, and if you’re tired of waiting, just take the stairs...” However, one CA did not speak to their residents that often about using stairs. A CA on one of the upper floors said, “I have monthly floor meetings. I would tell them maybe twice to use the stairs. It’s like a joke, “TP Fit – take the stairs.” I didn’t push it as much, since we’re so high up.”

***Role-modeling.*** To ascertain whether or not the CAs and staff members were actually modeling stair use, they were asked about their personal stair use. Stair use ranged from two times per week to three to 10 times per day. In one interview and two focus groups, a total of three CAs reported taking the stairs three times per day. The staff members and one CA reported taking the stairs between two to three times per day. One staff member said, “...I’m up there two to three time a day, right now, following up with students....” The other staff member who had transferred to another position within the university recalled to

his previous work in the residential hall and said, “I’d say, what, at least two times a day...” A CA in a focus group stated, “I use it daily, probably twice a day...” Another CA in the same focus group said, “I say probably three, depending on what day it is.” Two CAs said they took the stairs twice per week; one CA in an interview said she took them every time she left the building. She said, “pretty much every time I leave the building. There are rare cases that I don’t” when asked about how often she took the stairs. It was rare that CAs did not use stair frequently, but for example, one of the CAs in a focus group who lives on one of the upper floors used the stairs less often. He said, “Just to give a better frame, at most, twice weekly. At most.”

Staff members indicated that they had discussed role modeling with the CAs. One staff member said, “one of the major messages we were, the fact of the role modeling behaviors....” Additionally a staff member stated, “Yeah we talked about role modeling. The CA training lasted two weeks. The second week of training was CAs and RCSLs; we talked about expectations, being a role model, being in the fishbowl.” When asked about ways to encourage resident stair use, the other staff member brought up role-modeling again, one big influence is if they see other people doing it, they’ll do it.” Two CAs of a focus group and in interview reported that they specifically used role modeling. One CA said, “So I always make sure I set the example. And whenever they’re hanging out in the lounge, I make sure I walk past them and take the stairs.” Another CA in an interview said, “Yeah the leading by example is the best way to encourage, again,

for me, trying to do it as much as often, but really, the majority do take the stairs most of the time.”

***Take the stairs with me.*** In addition to role modeling, staff indicated that they told the CAs to ask residents to take the stairs with them. In two focus groups and in two interviews, CAs indicated that they asked residents to take the stairs with them. One CA stated, “...or if somebody is talking to me, I’ll just say ‘hey why don’t we just take the stairs?’” Another CA in an interview said, “and a lot of individual CAs definitely do that with the residents, say ‘hey just come with me down here.’” The staff members indicated that they perceived the CAs as doing their jobs with verbally encouraging students to use the stairs. One staff member said, “...The CAs have a lot better sense of who’s in the community and have personal relationships with them. They’ll call them out on it, but they will have a serious tone to it. ‘Yeah I was just in a hurry.’”

***White boards and signs.*** The staff did not discuss CAs making signs or the use of white boards, but many of the CAs indicated that they created their own signs or wrote stair promotion messages on their white boards. One CA said, “I wrote, ‘it only takes two minutes to go down, two minutes to get up’ and then when I noticed more and more of them take the elevator, I wrote ‘remember the stairs, it’s faster.’” Three CAs reported that they had created their own signs for their floors. One CA in an interview stated she received signs with footprints on them. A CA in an interview said, “a lot of us created our own fliers, different things like that. I found a graphic, with a skeleton next to an elevator, then some body builders and TP Fit, those types of things. We did a lot of that. They were

mostly our own, self-generated posters.” In a focus group, a CA mentioned TP Fit as a popular theme for posters; she said, “I know some of the CAs made posters on their door saying ‘TP Fit.’” A CA in a focus group said, “I guess some of the CAs made some fliers. I made a little TP Fit flier with a little muscular guy that just said “take the stairs, it’s better for you.” I posted it on my door...”

However, although CAs recalled being encouraged to create signs, the same CA who created the TP Fit flier with a muscular guy said “we’re considered a green campus, and we’re not actually supposed to, it’s not encouraged to have paper fliers. In fact, a lot of the times, we get told to them down if they’re not approved. So when we first put them up, we’re afraid they were going to get torn down.”

**Health.** The health benefits of stair use were mentioned in two interviews and two focus groups as important motivators to use the stairs, with a common theme relating to weight gain. For example, in an interview, a CA stated, “I’ll tell them that, “just take the stairs down, you’re still burning calories; the more calories you burn, it helps avoid the freshman 15.” Another CA in an interview recalled during some of the floor meetings, she discussed using the stairs with her residents; she said “it’ll save you a lot of time, and if you’re tired of waiting, just take the stairs...it’s just healthier anyway.” A CA in a focus group discussion stated, “I have a lot of girls on my floor, and they’re all worried about going home for break, because they need to fit into their old winter clothes. And I said, ‘you don’t want to gain the freshman 15. If you already have, take the stairs, let’s go.’” Others described how stair use impacted their personal health. One CA said she

personally took stairs to avoid weight gain, and another CA said she took stairs, since they were just part of her lifestyle.

***Mural painting event.*** The CAs were asked to describe the participation of the residents in the mural painting, which was one of the strategies to promote stair use. Of the 10 CAs who participated in either focus groups or interviews, six CAs reported that their floors painted the mural on the designated date during the fourth week of school. Two CAs reported that their floors painted their murals at a later date, and two CAs said that their floor residents did not paint a mural at all. Among the CAs who reported having residents participate in the painting, there was a large range in the number of residents described as participating in the mural contest. One CA reported that only two residents helped her, and two CAs reported that they had 15 to 20 residents, and the highest number reported was 25 residents. Resident participation meant that they either attended the mural painting or collaborated on a design.

Most floors painted on the designated date during the fall semester. However, several did not paint on the designated date for a variety of reasons. One CA in an interview said that they painted a week later, and a CA in a focus group said that her floor painted two weeks after the original date. The CA who reported painting a week later said that there was an exam that many of her residents had to take the next day after of the original date, so they opted to move the date to the following week. The CA who said her floor painted two weeks after the designated date said that her floor did not seem enthused about the painting at first but after they saw the other paintings, they decided they wanted to

complete their floor's painting. She stated, "Two weeks later, I just sent out a mass email and a mass text saying 'hey come join me as I paint it,' and I actually had a great turn out of people that I wasn't expecting, which I thought was really cool." Of the CAs who did not have any paintings, they also provided reasons. A CA in an interview said, "my floor did not show up for the mural painting. That's how motivated we are. No one showed. I tried to reset dates. I let them choose a date, and they had no involvement in that. I barely could get them to come when we have free food." When this CA was asked about reasons why the students were resistant against a future date, she said, "I try to talk to them about it at every floor meeting. I thought about painting it myself, but stick figures are about all I could do. I still want them to paint something. I have no cooperation." A CA in a focus group said, "My floor is largely active floor outside of the residential hall. They are less artistically inclined, so to speak. They are more athletically inclined. They're much more sociable. They tend to go out in packs and they also tend to go out. So getting participation on that was an incredible struggle."

*Designs of mural paintings.* The majority of the designs for the murals were created by the residents on the floors, with the exception of one floor. The CA on one floor said that the faculty advisor drew a design to help the floor get started on their painting. The murals represented things that were important to residents, including either hobbies or illustrations that represented their majors. Two CAs in focus groups said that their floors painted designs that reflected what their residents did for fun, including one floor that played Monopoly and another floor that watched the television show "Jersey Shore." The CA that reported the



Monopoly board said, “My kids lived here, well half of them lived here last year, and a big thing on my floor was that they loved to play Monopoly.” The “Jersey Floor” theme was based on one floor that, as the CA described, “My floor bonded over “Jersey Shore.” So we called ourselves the Jersey Floor, so to match our tee-shirts that we have, we drew Jersey Floor...” The other designs reflected majors, such as a nursing floor that included flames and symbols from the medical field. Another CA with a variety of majors on her floor said that “we had an On-Air sign, a nursing symbol, and I don’t know what for criminal justice.” The floor that had the faculty advisor’s assistance had a muscular man on a beach to represent their exercise, nutrition, and health-related majors.

*CAs’ perceptions of residents’ responses to mural painting.* The CAs and staff were asked if they felt that their floor residents were interested or excited in the mural painting contest. Among the CAs who successfully implemented the painting, the majority reported their floor residents were enthusiastic about the activity. The word “fun” was used in describing their perceptions of the mural painting at least four times during interviews or focus groups. One CA said, “everybody really liked ours, so they were all passionate about it. They’re like ‘we should add this; we should add this,’ so it was fun.” Two CAs indicated that their floors had decided together on designs that represented what the floor enjoyed doing (Monopoly game board and “Jersey Floor” themes). Two CAs indicated that although their students were not art majors, they perceived it as a fun activity for some of their artistic students to have a chance to express themselves. One CA said, “there were people you would never expect to come out

of their rooms, which was cool, because I think it also really targeted the more introverted, artistic people, if you wanted to put a label on them.” However, other CAs did not have positive responses. One CA indicated that no one on her floor attended the mural painting activity. The students originally said they would come but did not attend; she said that they were not interested in a future mural painting. Another CA whose floor did not paint indicated that he had other programs at night and that his floor was highly social and it was difficult to get them involved with floor-based activities. Several of the CAs suggested that the painting should occur again, or that it would be ideal to have it as a tradition each year. It should also be noted that there were four floors where the painting did not occur. We spoke with the CAs who represented two of the floors, and they reported that their residents were not interested or too busy to participate in the painting. Additionally, only 13.7% of all the residents participated in the mural painting activity. These data only reflect what the CAs and staff perceived from the students who participated; there was no way to know the perception of the residents who did not participate.

***Problems encountered with implementing the mural painting contest.***

The original stair promotion intervention was to include a mural painting contest. The students were to paint the murals on a specific date, and then they were supposed to be able to vote on which mural was their favorite during the week immediately following. This contest did not happen for several reasons. The two main reasons that were found were that it likely did not occur due to inadequate planning and due to challenges associated with providing a prize to the floor with

the winning mural painting. The staff members described that it was initially going to be a contest, but they did not end up making a specific plan for implementing the voting and prize piece. Related to this, it was not consistently communicated to the CAs that painting the murals was supposed to be part of a contest. There were some CAs who were unaware of the contest. Some CAs were aware of the contest but said they did not know much about it; one CA indicated that she had heard about it one time but then it was never discussed again. Part of the reason the contest piece was not actually planned or implemented was due to restrictions on the types of awards that can be provided to students according to university policy. According to the staff members, the paperwork and possibility of impacting a student's financial aid makes it difficult to provide contest winners awards. One staff member stated, "We have to have them fill out paperwork done, because if it's an award is over \$20, then the student has to fill out paperwork, because it could have an impact on the financial aid." Additionally, the staff members also indicated that they were trying to move away from incentivizing participation in activities. One staff member stated, "One just because the paperwork aspect of it, but the fact it can have an effect on financial aid."

*Perceived influences on stair use.* Both the CAs and the staff were asked to describe how the suggested stair promotion strategies influenced residents' stair use. Factors that were perceived as positively influencing stair use included the mural paintings and directional signs. By far the most commonly used reason for using the stairs had nothing to do with suggested strategies for the stair use. The biggest influence on stair use was the amount of time waiting for elevators. Some

of the CAs and the staff indicated that they thought the mural painting was effective for students to use the stairs more often. One CA stated, “I think when we did the mural paintings, that was a huge increase, it spiked, I believe, because people wanted to see what their friends did...”

***Directional signs.*** Most CAs reported that they had directional signs on their respective floors; however, two CAs said that they did not get any of these types of signs. One CA reported that hanging these types of signs was difficult with the tape provided. The CAs indicated that these types of signs were helpful for residents to understand what direction in the building they were and where they could go if they exited from the specific stairwells, but few indicated that they helped with increasing stair use. The staff members reported that the directional signs were created based on feedback from the CAs regarding how they could increase stair use among residents, during the summer meetings prior to school starting.

***Elevator wait time.*** There were numerous mentions of the long waits for the elevators and how taking the stairs takes much less time. One CA who uses the stairs on a regular basis said, “I take the stairs; it’s so much faster overall, rather than waiting on the elevator.”

***DigiBoards.*** The CAs were asked about the DigiBoards and if they thought they were effective in promoting stair use among the residents. The staff members said that the DigiBoards had motivational messages for students to use the stairs more often. The CAs indicated that the DigiBoards were inconveniently

located. Also, some CAs indicated that no one looked at the DigiBoards in the hallways.

***Barriers to stair use.*** When asked about why students do not use the stairs, the CAs and staff had several reasons. A major theme that was brought up numerous times was “lazy” or “laziness.” The CAs also mentioned that lifestyle plays a part in an individuals’ choice to take the elevator or take the stairs. Some CAs and staff said that if students are hurried then they might not take the stairs. Several CAs and the staff indicated that since many of the majors who live in this residential hall are journalism students, there are a higher number of students who dress professionally on a regular basis. There were two mentions of equipment as a barrier to stair use in a CA interview and by the staff. Residents who are journalism majors might have to check out an expensive camera and tripod.

Several CAs and the staff discussed the alarms that are on the most commonly used door as a possible barrier to stair use. According to the CAs, the students have complained that the alarms are very loud. The staff members said that the alarms used to sound every time the door opened but now are only on during the building’s night and weekend hours. CAs indicated that living on a higher floor, such as 10 or 14 might serve as a barrier to stair use. Several environmental barriers were identified. Cleanliness of the stairs was another theme indicated as to why students might not use the stairs.

***Suggested strategies for increasing stair use.*** When asked what additional strategies CAs could be used to promote stair use, several themes emerged. CAs suggested additional signage, signage relating to calories burned, additional

paintings, creating a residential hall tradition, a contest, and incentives. The CAs indicated that having additional signs would potentially encourage residents to use stairs more often than the elevator. In one focus group, CAs discussed that the signs could be changed out or have different colors and fonts. In another focus group, CAs indicated that having information on amount of calories burned on the signage might be beneficial to residents. The CAs indicated that having another mural painting activity would help increase stair use. The theme of having a tradition in the residential hall of taking the stairs was mentioned several times in a focus group. CAs in the interviews indicated that having incentives or awards may influence the students to take stairs more often, and one focus group discussed that having a contest such as originally planned may influence residents to use the stairs more often.

## **Conclusion**

Based on the focus groups and interviews, we have found that there were inconsistencies in how the CAs perceived the stair use promotion in their CA training and its importance and the frequency of the information provided by the staff members. The majority of CAs tended to perceive the mural painting as a beneficial and fun activity for their residents, although two of the CAs interviewed did not have the same type of feedback. The CAs indicated that specific tools influenced students to take the stairs instead of the elevators, especially the elevator wait time that some CAs reported as long as 15 to 20 minutes. Barriers to stair use were identified including lifestyle, students who are “lazy,” professional dress, and the alarms at the bottom of the stairwell. The CAs and staff considered

ideas for future stair use promotional campaigns including having additional signage, mural painting every year or every semester, incentives for using the stairs, and stair use becoming a tradition within the residential hall.

## Chapter 5

### Discussion

This study tested a novel approach for increasing stair use in the college age population: having residents of a residential hall paint murals in the staircases. The data collected indicated that painting murals within staircases was insufficient to increase stair use in this population. There was a significant but transient decline in stair use in one stairwell and no change in the other. Although there was no increase in stair use over time, this type of intervention should not be ruled out as a potential strategy for motivating students to take the stairs more often. The study was originally intended to be implemented as a contest where the floor with the mural selected as the “best mural” by the students would win an award. It was originally hypothesized that the contest would enhance participation and encourage stair use, since people would have to use the stairs to observe the paintings.

There are a few potential reasons why the mural paintings alone may not have worked. First, during the two weeks prior to the murals being painted, there were motivational and directional signs aimed at increasing stair use posted. A second potential explanation for these findings is that Week 0 was the second full week of the semester, and students may have been exiting the building more often, providing a higher count during that week. Some students may have been figuring out schedules and attending classes more frequently during the beginning of the semester. Both of the aforementioned situations could have resulted in a higher than usual stair use, and the findings could be regression towards the mean.



There was a fire drill 30 minutes before one of the observation periods, but this occurred during Week 1 measurement periods and would not account for the observed decline in stair use. This drill may have been a deterrent to stair use during that time period, since the residential hall staff allowed students to ascend the stairs after the fire drill at the same time when the observation period had begun. Usually students are not allowed to ascend the stairs, and perhaps the large number of individuals climbing the stairs could have deterred others from going down the stairs.

Another explanation may be that students had stopped returning to the building as often during the semester. During the staff interviews, there was mention that students do not always return to the building as often as during the beginning of the year and therefore, would not descend the stairs as often either. There were also university-led pep rallies during the observation periods, once per week on Thursdays every week post intervention. This may have influenced students to use the stairs to exit the building. There was a slight increase in stair use in the Northwest staircase over time, although not significant. Perhaps individuals who were not originally familiar with this stairwell used it more often after the mural painting.

The findings from this study are inconsistent with other research that used artwork in the stairwells as interventions to promote stair use (Boutelle et al., 2001; Kerr et al., 2004). In Boutelle et al.'s study (2001), there were several phases in which they tested the effect of motivational signs compared to artwork and music. Motivational signs were placed near the decision point at the bottom

of the stairs and near the elevator bank (Boutelle et al., 2001). There were no significant differences with the signs alone (Boutelle et al., 2001). When artwork and music were added to the stairwells, there were significant increases from baseline ( $p < .01$ ) (Boutelle et al., 2001). The artwork was changed weekly, and the compact disc was changed daily (Boutelle et al., 2001). Kerr and colleagues (2004) found that with the varying changes throughout their study, motivational signs were the one type of intervention that yielded increases in stair use.

Although there were slight increases when artwork and music were added, there were no significant increases (Kerr et al., 2004). The findings in the present study also differed from other studies done on university settings. Stair use studies at other universities yielded positive results (Ford & Torok, 2008; Grimstvedt et al., 2010). When motivational signs were placed at a point of decision area near the elevators, there were increases in stair use (Ford & Torok, 2008). There were also significant increases in stair use in another university setting when both motivational and directional signs were in place (Grimstvedt et al., 2010). Other differences in similar studies may impact comparisons in results. Boutelle et al. (2001) measured individuals using stairs as well as the amount of elevator use (Boutelle et al., 2001; Kerr et al., 2004). In addition, the aforementioned studies were able to capture the individuals ascending stairs. In the present study, only descending stair use was captured due to the layout of the building and security issues. It is plausible that stair use was underestimated and that the murals could have positively influenced inter-floor stair use habits.

## **Reasons for Insignificant Results**

There are several reasons that results were insignificant. The murals were painted inside the stairwells, not near the elevator banks. DigiBoards that were near the elevator rotated through messages including stair promotion messages, but other messages were displayed including community events. Although there were directional signs on the exit doors, there were no signs near the elevators to encourage individuals to use the stairs, unless the CA for the specific floor had made his or her own signs. However, based on the process evaluation, the placement of fliers or signs by CAs was inconsistent. Also, the contest piece of the mural painting contest was canceled. Perhaps if this contest did occur, students would have more of an incentive to participate in the mural painting and to use the stairs. The staff members in this particular residential hall had numerous other competing projects and programs that take up significant portions of their time, so the mural painting contest was not a top priority. There was no dedicated employee for this project alone to market the painting activity or to promote it.

## **Interview Data**

Based on the interviews conducted with residents as they were descending from the stairwells, the majority of the residents reported seeing the murals (89.3%); however, fewer reported viewing the signs (61%). Nearly 30% of individuals said signs motivated them to use the stairs, and 17% indicated that the murals motivated them to take the stairs. These findings are consistent with other researchers who conducted interviews with individuals during a stair promotion

intervention (Kerr et al., 2000; Marshall et al., 2002; Webb & Eves, 2005). In a shopping center where banners were affixed to stairs, 79% of individuals interviewed saw the prompts for promoting stair use (Webb & Eves, 2005). In another stair promotion study in a shopping center, interviewers asked individuals to report their stage of change for exercise and if they saw the posters near escalators and stairs (Kerr et al., 2000). Of those interviewed, 8.6% who were in the pre-contemplation group reported seeing the posters, while 40.1% in other stages of changes reported seeing the posters (Kerr et al., 2000). In a stair promotion study utilizing signs and footprints affixed to the floor that had no significant increases in stair use, 38% of individuals interviewed recalled seeing signs, and 30% saw the foot prints on the floors, 18% reported seeing both intervention strategies (Marshall et al., 2002).

In a study where stair and escalator users were interviewed about their reasons for stair use, individuals who had used the stairs were more likely to believe in the physical benefits of stair use and the benefit of saving time; additionally, stair users more so than escalator users indicated personal reasons such as preference or habit (Kerr et al., 2001c). Those who reported living on the lower floors (floors 2-4) reported a slightly higher use of stairs, although not statistically significant. Similarly, in a worksite study using signage, employees on lower floors reported higher levels of habitual stair use compared to those who lived on higher floors ( $F(8,58) = 8.45, p < .0001$ ) (Kerr et al., 2001a).

### **Stair Use Promotion by the CAs**

Based on the process evaluation, many of the CAs had discussed using the

stairs with their students, but some did not. The staff and CAs indicated that they did have adequate education on encouraging stair use, but there were other initiatives of importance. There were inconsistent reports from the CAs regarding the amount of education received on the stair use promotion strategies. Some of the CAs had reported it as a weekly or monthly agenda item, and others had reported it less often. Focus group data also indicated that there were inconsistencies in how often or how stair use promotion was implemented.

### **Elevator Wait Time**

The CAs and staff indicated that the wait time for elevators was long, and that taking the stairs was a faster option. Eves and Webb (2006) suggested that in buildings where the choice of ascent or descent includes either the elevator or stairs, some individuals may not use stairs for health reasons but rather due to the long wait time with the elevator. Escalators are often adjacent to staircases, making the choice slightly different than elevators. Some stairwells are not visible from the elevator banks, so individuals may choose not to take stairs due to this reason (Eves & Webb, 2006).

Several CAs and the staff members indicated that some individuals who are dressed professionally seem to take the stairs less often. In addition, they indicated that other barriers included carrying equipment and lifestyle. In contrast, Adams et al. (2006) found that individuals who were dressed in what was considered “formal dress” attire used stairs more often; however, that particular study was completed at an international airport.

## **Strengths**

To date, there are no published studies examining mural paintings in stairwells of residential halls for promoting stair use nor are there any other studies conducted relating to the stair use among residents in a university residential hall. The study was a real-world application of a stair promotion intervention with collaborative efforts among Campus Recreation, the Residential Hall Association, Student Services, and the research staff. Measurements were taken for four weeks post-intervention to examine if there were any increases or decreases over time instead of just one measurement post-intervention. Brief interviews were conducted with residents who were exiting from the stairwells, which provided important data on sign and mural visibility and the perception of signs and murals motivating to stair use. Additionally, qualitative data were collected from the staff members directly involved with the initiative that provide additional important information as to why the original mural painting contest did not occur.

## **Limitations**

The numbers of individuals exiting the stairs has been underestimated, based on the method of measurement. There was no way to measure the stair use between floors inside the building. Also, there is likely human error to consider. Research staff did not use the automated counters as other studies (Cooley et al., 2008; Kerr et al., 2004; Titze et al., 2001), nor was there access to video camera footage. Additionally, this study did not have a control stair well. There were no other residential halls at this particular campus, and comparing a campus among

the same university would not be appropriate, since each campus is in a different city with a unique environment. There were also no elevator use data, since research staff were not allowed to count individuals inside the residential hall building. Besides the individuals that agreed to an interview, there was no way to measure the number of stairwells the individuals had descended. The research staff were not allowed to view security video footage or to be placed inside the residential hall to collect these data. Although all data collectors attempted to be inconspicuous, the way in which the stairwells are located, the data collectors were visible and may have influenced individuals' stair use. There were very few choices of locations in where data collectors could observe stair use. Research staff measured the stair usage during specific times based on the residential hall staff's suggestion. However, there may have been other times in which stair use should have measured to capture the majority of students exiting from the residential hall. With the exit interviews, only 13% of the individuals approached agreed to participate in an interview. Individuals who agreed to participate in an interview were offered a chance to receive an award based on a drawing, but not every person was able to receive an incentive. This could have deterred individuals from participating in interviews. Additionally, many individuals exiting from the residential hall were leaving to attend class and may not have wanted to arrive late.

### **Future Studies**

If this project were to be completed again in the future, a devoted employee should oversee the implementation and design of the project to ensure

the CAs and faculty advisors get the students engaged and promote awareness of the mural painting activity. Part of the planning phase should include specific dates and ways in which CAs and staff could implement not only the mural painting contest, but the voting component at the end, so that students could vote on their favorite murals. Additionally, the planning phase should include choosing appropriate awards for the floor with the most popular mural.

In a future study similar to the one conducted, another suggested strategy is to provide a theory-based framework in the planning and evaluation of the intervention. Other physical activity interventions in the college population have been successful with theory-based interventions (Ince, 2008; Wadsworth & Hallam, 2010). The Social Cognitive Theory's constructs are related to the interaction of the person's characteristics, the behavior, and the environment in which the person lives (Bandura, 1986; Glanz, Rimer, & Lewis, 2002). This theory could be appropriate in planning a stair promotion intervention, since the environment includes both the social and physical environment. In a residential hall, both of these are influences on an individual's behavior. The Social Cognitive Theory also includes observational learning, such as having role models for the specific behavior; this too would be appropriate, since the CAs were considered role models as part of the stair use behavior (Bandura, 1986; Glanz et al., 2002). A successful stair promotion at a university setting obtained focus group data prior to creating the messages for motivational signs based on what the target population perceived as motivational for them to use stairs more often (Grimstvedt et al., 2010). Perhaps another strategy would be to not only



obtain these data but also better understand the individuals in the building based on their stages of change, based on the Transtheoretical Model (TTM) (DiClemente & Prochaska, 1982; Glanz et al., 2002). The TTM's constructs include stages of change: precontemplation, contemplation, preparation, action, and maintenance that can be applied to physical activity (DiClemente & Prochaska, 1982; Glanz et al., 2002). Individuals may perceive stair promotion messages differently based on their current stage of change. The TTM's other constructs include decisional balance in which an individual has to consider benefits of changing behavior (DiClemente & Prochaska, 1982; Glanz et al., 2002). For a stair promotion intervention to be successful, taking into consideration appropriate messaging that is tailored directly to a population based on what they perceive as the benefits and costs of changing may allow researchers to determine what promotion strategies are most successful. Another theory that could be used to plan a stair use promotion study is the Health Belief Model (Glanz et al., 2002; Rosenstock, 1974). The HBM constructs include perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Glanz et al., 2002; Rosenstock, 1974). A stair promotion study could be planned using these constructs especially with the cues to action including motivational messages that are reminder systems for individuals to use stairs more often. Researchers could also obtain what the perceived barriers are to stair use to better understand the target population and ways to motivate individuals to use stairs with these barriers in consideration.

The CAs and staff members have numerous other priorities on the weekly

staff meeting agenda, so some CAs may not have taken it as seriously as others. If there were documents and emails provided to the CAs, perhaps the messages would have been taken more seriously. Providing incentives for students to engage in a mural painting contest to promote stair usage possibly will increase participation and furthermore, increase stair use. The CAs and staff reported that students enjoy receiving incentives.

### **Specific Messages**

The process evaluation results indicated that perhaps students would be more motivated to use the stairs with additional signage or with more specific messages relating to health. Perhaps having messages specifically tailored to this population based on their input (Grimstvedt et al., 2010), or having the students choose their own incentives for using stairs more often (Titze et al., 2001) would have yielded positive results. Providing written messages via email may be beneficial to the college population (Ford & Torok, 2008). Stair use increased in a two-phase intervention that included motivational signs and a follow-up email from the worksite physician that emphasized importance of stair use and a reminder of the sign (Auweele et al., 2001).

### **Conclusion**

Although the current study had no significant results, there were several factors that can be considered for future studies. This promotion strategy should not be ruled out as a public health promotion for encouraging stair use. While the evaluation of this study suggests that only painting murals within the stairwells is not a sufficient dose to cause significant increases in stair use among this

population, it was still positively perceived by the students and the staff. The process evaluation with the CAs and staff indicated that the majority of the CAs had promoted stair use, but there were inconsistencies in the frequency and implementation of promotion strategies. An insufficient dose of training may explain the variety of promotional strategies.

Key lessons learned from this project were that coordination and communication are key ingredients for successful implementation of a project like this and the timing of the mural painting event could have impacted the participation levels. If a project such as this is to be directed by student leaders, more attention should be paid to the content, quantity, and frequency of training required to effectively implement the project. Timing might have impacted study results. Stair use may have been higher than usual during the first week of observation data, because it was only the second full week of school. Related, first-year students likely had numerous competing demands during the first few weeks of school and were potentially less likely to participate in community events at the start of a school year. Another suggested strategy would be to complete this type of intervention in phases similar to other studies (Boutelle et al., 2001; Kerr et al., 2004) that implemented both signs and artwork but examined each phase separately. Since there were signs in place prior to the intervention, there was no way to determine if these alone had an impact in increasing stair use. This type of study could potentially be implemented again successfully if proper planning took place. Additional research needs to be conducted within residential facilities, such as a university residential hall to

better understand how this environment and its unique characteristics may impact physical activity intervention results. Another unique aspect of this type of intervention includes the involvement of the student staff, the CAs and RCSLs. Residential hall settings should be the focus for future stair promotion studies.

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APPENDIX A

STAIR USAGE QUESTIONS FOR EXIT INTERVIEWS

Male \_\_\_\_\_

Female \_\_\_\_\_

### Stair Usage Questions

Hello, do you have about 5 minutes to answer a few questions regarding stair use and Taylor Place?

Yes    No

If yes, then continue onto the survey. If no, say thank you.

Thank you for agreeing to participate; are you 18 years old or above?

If yes, continue

If no, tell the individual that due to IRB, we can only ask participants questions if they are 18 or older.

If you are interested, please read this information letter agreeing to discuss stair use for about 5 minutes.

(Provide information letter to individual)

1. How often do you use the stairs per week in Taylor Place?  
\_\_\_\_\_ times per week

2. Have you seen any of the signs in Taylor Place relating to stair use?  
\_\_\_\_\_Yes    \_\_\_\_\_No

\*if yes, continue to #3; if no, continue to #4

3. Did any of the signs influence your decision to use the stairs?  
\_\_\_\_\_Yes    \_\_\_\_\_No

\*if yes, continue to #4; if no, continue to #5

4. If so, which ones? Can you tell me a little bit about the signs that you had seen?

\_\_\_\_\_  
\_\_\_\_\_

5. Have you seen any of the murals in Taylor Place in the stairwells?  
\_\_\_\_\_Yes    \_\_\_\_\_No

\*if yes, continue to #6; if no, continue to #8

6. Did any of the murals influence your decision to use the stairs?

\_\_\_\_\_Yes    \_\_\_\_\_No

\*if yes, continue to #7; if no, continue to #8

7. If so, which ones? Can you tell me a little bit about the murals that you had seen?

\_\_\_\_\_

8. What floor of Taylor Place do you live on?

Floor \_\_\_\_\_

Refused \_\_\_\_\_

Thank you for participating. If you are interested in a chance to win a prize of a gift card at a restaurant near the residential hall, please write down your name, phone number, and email address.

APPENDIX B

MODERATOR'S GUIDE FOR STAIR USAGE STUDY AT TAYLOR PLACE



## Moderator's Guide for Stair Usage Study at Taylor Place

Prior to starting, participants should sign informed consent for focus group participation.

### **Introduction**

Welcome to the focus groups regarding stair usage and the mural painting contest at Taylor Place. We are glad you chose to participate in the focus group. For your participation, you will receive a \$15 gift card.

### **Settings**

Please feel free to excuse yourself for the restrooms that are located down the hall. Also if you feel uncomfortable at any time and do not wish to continue to participate, you may leave at any time.

### **How the Focus Group will Work**

A focus group is a guided discussion, but due to recording purposes, only one person can speak at a time. Please feel free to share your opinion on topics discussed. There are no "right" or "wrong" answers. Others may have different opinions, but please feel that you can discuss what you really think. We are interested in everyone's ideas and opinions.

### **Focus Group Guidelines**

There are several things to remember when participating in the focus group. First, this is a recorded discussion so it is important to remember that one person only speaks at a time. Otherwise, it is hard to transcribe the audiotapes.

You want to say something say, "This is Chloe. I like apples better than oranges, since they are easier to pack in my lunch."

Third, everyone's opinions are important. Please do not judge what others have to say, and please try not to interrupt others. There are sheets of paper in front of you with pens, so if you want to say something but are afraid you may forget, jot down your ideas so that you can remember when the other person is done speaking.

Fourth, if you have any idea or thought that is from another participant in the group, please share. What you say does not have to be solely from the questions that we are asking.

### **Confidentiality**

Today we are using first names only, but when the transcription occurs, all names will be taken out. Also we are asking you to not speak to others about the discussion that occurs in this room with the focus group.

### **Questions**

Does anyone have questions for us? Is it OK that we start the recording now?

**\*\*Start recording now.**

1. What types of education or training did you receive to increase stair use to avoid congestion in the elevator area?

*Prompts: In the CA training, was there emphasis on using the stairs to go down to the first floor?*

2. How often did you as a CA hear that you should encourage your residents on your floor to use the stairs? And what specifically were you told?

*Probe: For example, was this only discussed at before-school meetings, or at every weekly meeting?*

3. As a CA, what are you doing to encourage your residents on your floor to use the stairs more often?

*Probes: What are you telling your residents? What happens if the residents use the elevator all the time instead of the stairs to go down to other floors?*

4. What types of responses are you receiving from your residents in the effort to increase stair usage?

*Prompts: Have you noticed residents using the stairs more often? Is there any negative feedback at this point?*

5. What do you think of using the directional signs on the exit doors to help with stair usage? Do you think this encouraged the residents on your floor to use the stairs more often?

*Probe: Do you think it's an appropriate method? Do you think it's effective? Why do you think the directional signs were/were not effective? What could have made the signs stand out more?*

6. How many residents on your floor each participated in the mural painting contest? Were residents interested/excited in this community activity?

7. What types of designs / paintings were suggested for your floors and what did you end up painting?

8. Do you feel this activity and the paintings have helped encouraged students to use the stairs more often?

*Probe: Do you think the voting period had a higher amount of traffic compared to the weeks after this?*

9. What other sorts of signs, encouragement, or ideas do you have that would encourage students to use the stairs?
10. In the training sessions at the beginning of the year with the residential hall staff, they instructed the CAs to create their own motivational signs.
  - a. What types of signs did you create?
  - b. What did the signs say?
  - c. Do you feel these were effective on your specific floor?
11. What do you think prevents you or other residents to use the stairs to leave the building?
12. Do you think having mural painting contests in the future is a good idea? Do you think residents will continue to participate?
13. Is there anything I have missed that you would like to discuss related to this topic?

APPENDIX C

MODERATOR'S GUIDE FOR CA INTERVIEWS

Signage and Mural Painting to Determine the Influence on Stair Usage  
**Moderator's Guide for CA Interviews**

Prior to starting, participants should sign informed consent for the interview.

**Introduction**

Thank you for participating in an interview regarding the stair usage study. For your participation, you will receive a \$15 gift card.

**Settings**

Please feel free to excuse yourself for the restrooms that are located down the hall. Also if you feel uncomfortable at any time, please let me know, and we will end the interview.

**How the Interview**

The interview will be based on a list of questions. Please feel free to share your opinion on topics discussed. There are no “right” or “wrong” answers.

**Confidentiality**

Today we are using pseudonyms only- please use a fictitious name or a pen name of your liking today. Please be consistent though and only use one name. For example my name is Shannon but I am going to use the name Sunshine today. Also we are asking you to not speak to others about the discussion that occurs during the interview.

**Questions**

Do you have any questions for me? Is it OK that we start the recording now?

**\*\*Start recording now.**

1. What types of education or training did you receive to increase stair use to avoid congestion in the elevator area?

*Prompts: In the CA training, was there emphasis on using the stairs to go down to the first floor?*

2. How often did you as a CA hear that you should encourage your residents on your floor to use the stairs? And what specifically were you told?

*Probe: For example, was this only discussed at before-school meetings, or at every weekly meeting?*

3. As a CA, what are you doing to encourage your residents on your floor to use the stairs more often?

*Probes: What are you telling your residents? What happens if the residents use the elevator all the time instead of the stairs to go down to other floors?*

*Personally how often do you use the stairs? Do you ever encourage your residents to walk down the stairs with you?*

4. What types of responses are you receiving from your residents in the effort to increase stair usage?

*Prompts: Have you noticed residents using the stairs more often? Is there any negative feedback at this point?*

5. What do you think of using the directional signs on the exit doors to help with stair usage? Do you think this encouraged the residents on your floor to use the stairs more often?

*Probe: Do you think it's an appropriate method? Do you think it's effective? Why do you think the directional signs were/were not effective? What could have made the signs stand out more?*

6. How many residents on your floor each participated in the mural painting? Were residents interested/excited in this community activity?
7. What types of designs / paintings were suggested for your floors and what did you end up painting?
8. Do you feel this activity and the paintings have helped encouraged students to use the stairs more often?
9. What other sorts of signs, encouragement, or ideas do you have that would encourage students to use the stairs?
10. In the training sessions at the beginning of the year with the residential hall staff, they instructed the CAs to create their own motivational signs.
  - a. What types of signs did you create?
  - b. What did the signs say?
  - c. Do you feel these were effective on your specific floor?
11. What do you think prevents you or other residents to use the stairs to leave the building?
12. Do you think having mural painting contests in the future is a good idea? Do you think residents will continue to participate?
13. Is there anything I have missed that you would like to discuss related to this topic?

APPENDIX D

MODERATOR'S GUIDE FOR STAFF INTERVIEWS

Signage and Mural Painting to Determine the Influence on Stair Usage  
**Moderator's Guide for Staff Interviews**

Prior to starting, participants should sign informed consent for interview participation.

**Introduction**

Thank you for participating in an interview regarding the stair usage study. For your participation, you will receive a \$15 gift card.

**Settings**

Please feel free to excuse yourself for the restrooms that are located down the hall. Also if you feel uncomfortable at any time, please let me know, and we will end the interview.

**How the Interview Will Work**

The interview will be based on a list of questions. Please feel free to share your opinion on topics discussed. There are no "right" or "wrong" answers.

**Confidentiality**

Today we are using pseudonyms only- please use a fictitious name or a pen name of your liking today. Please be consistent though and only use one name. For example my name is Shannon but I am going to use the name Sunshine today. Also we are asking you to not speak to others about the discussion that occurs within this interview.

**Questions**

Do you have any questions for me? Is it OK that I will type out the answers as we go along?

1. What types of education or training did you give to the CAs to tell them to encourage their residents to use the stairs?

*Prompts: Was the type of training mostly verbal, or were there documents emailed or given to the CAs?*

2. How often did you give information/training to the CAs regarding the stair usage?

*Prompts: Did you discuss the stairs / mural painting at every meeting prior to school starting? What about weekly meetings?*

3. How often do you use the stairs yourself?
4. What types of responses are you receiving from the CAs and the residents in the effort to increase stair usage?



5. Have you noticed a decrease in elevator congestion? Were there any noticeable patterns throughout the semester?
6. What types of responses have you received from the CAs regarding participation on their respective floors?
7. What do you think of using the directional signs on the exit doors to help with stair usage? Do you think this encouraged the residents on your floor to use the stairs more often?

*Probe: Do you think it's an appropriate method? Do you think it's effective? Why do you think the directional signs were/were not effective? What could have made the signs stand out more?*

8. How many residents on each floor participated in the mural painting? Were residents interested/excited in this community activity?
9. We understand that the mural painting contest did not occur, due to the different timing of the paintings. Do you mind describing how this decision was made? Do you think there will be future painting contests?
10. Was the mural painting contest activity assigned to a committee of student employees, such as the CAs, or who was in charge of the contest piece?
11. Some of the floors decided to paint their mural paintings on different days. Can you provide some details on this? What were some of the reasons that floors participated on other dates besides the original September 9<sup>th</sup> date?
12. Do you feel the mural painting activity has helped encouraged students to use the stairs more often?
13. What other sorts of signs, encouragement, or ideas do you think would have encouraged students to use the stairs?
14. For future planning. What types of programs or activities do you have planned to promote stair usage?
15. Will there be future mural painting activities and/or contests?
16. What do you think prevents you or other residents to use the stairs to leave the building?
17. Is there anything I have missed that you would like to discuss related to this topic?

APPENDIX E

TALLY SHEET FOR STAIRWELL STUDY

Tally Sheet for Stairwell Study

Staircase: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Observer: \_\_\_\_\_

Please place a check or tally mark for each individual exiting the stairwell and corresponding gender.

<u>Male</u>	<u>Female</u>	<u>Unknown</u>

APPENDIX F

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

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Office of Research Integrity and Assurance

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**To:** Cheryl Der Ananian

**From:** *for* Mark Roosa, Chair  
*ost* Soc Beh IRB

**Date:** 08/20/2010

**Committee Action:** Exemption Granted

**IRB Action Date:** 08/20/2010

**IRB Protocol #:** 1008005417

**Study Title:** Evaluation of Taylor Place Fit's Motivational Signage and Mural Painting to Determine the Influence of Stair Usage

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR IPart 46.101(b)(2).

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.