Graduate Student Use of Campus Green Spaces and the Impact on Their Perceptions of Quality of Life

A.L. McFarland¹, T.M. Waliczek^{2,4}, and J.M. Zajicek³

ADDITIONAL INDEX WORDS. university satisfaction, green-use, happiness

SUMMARY. Students' perception of their overall academic experience and the campus environment is related to academic accomplishment, and research has found that the designed environment of the university can influence the degree of stress students may feel. Past research found that undergraduate student use of campus green spaces and perceptions of quality of life were related to each other. The main objective of this study was to investigate the relationship between graduate student use of campus green spaces and their perceptions of quality of life at a university in Texas. A total of 347 of 3279 ($\approx 10\%$) of the graduate student body received e-mails with information regarding the incentive for participation and instructions on accessing an on-line survey. The survey included questions that related to student use of campus green spaces, overall quality of life statements, an instrument to measure the quality of life of university students, and demographic questions. A total of 79 (22.8% response rate) graduate student questionnaires were collected and analyzed to compare perceptions of quality of life of university students and the level of individual usage of campus green spaces. Descriptive statistics determined that, unlike undergraduates who were primarily "high users" of campus green spaces, graduate students were about equally split between being "low," "medium," and "high users" of campus green spaces. However, graduate students still ranked their quality of life highly. Finally, this study found that, unlike undergraduates, graduate students did not have a statistically significant relationship between green-user scores and perception of quality of life scores. It may be that graduate students have less time to spend in outdoor spaces, yet still meet their quality of life needs through other means such as academic achievements.

Many universities are currently concerned with improving the research capacity of their institutions and learning about graduate student preferences and the factors that influence graduate educational experiences, positive and negative, in an attempt to maximize the positive influences while minimizing the negative ones (Dorn and Papalewis, 1997; Golde, 1998; Kallio, 1995; Texas State University, 2007). In 2005, there were almost 2.2 million graduate students enrolled in American universities (National Center for Education Statistics, 2007). However, it is estimated that among doctoral students, the incidence of attrition is between 40% and 50% (Dorn and Papalewis, 1997; Golde, 2005). A Canadian study found that graduate

students had significantly higher stress levels, more thoughts of quitting their studies, and more mental health problems than did medical students (Toews et al., 1997). Research has found that almost 50% of graduate students report experiencing stress-related problems affecting their academic performance and more frequent mental distress when compared with the national adult population (Hyun et al., 2006). Keys and Fernandes (1993) found that factors other than curriculum positively contributed to learning in students. These factors also contributed to student life, and student happiness must be considered in relation to many other environmental factors in addition to curriculum (Hendershott et al., 1991).

Research has reported that undergraduate students felt more positively in stressed situations when

viewing plants or other views of nature (Ulrich, 1979, 1981). Additional research found that undergraduate student use of campus green spaces and perceptions of quality of life were positively related to each other (McFarland et al., 2008). Furthermore, Kaplan and Kaplan (1989) reported that individuals who had access to natural settings were happier with their home, job, and life in general. Similar positive results have been found with different types of natural settings, including those with vegetation, water, or nearby mountains (Heerwagen, 1990; Moore, 1981; Ulrich, 1981; White and Heerwagen, 1998). Thus, one might suggest that university priorities should include creating an attractive and relaxing campus environment to help students mitigate stress and to help improve academic achievement (Griffith, 1994).

Kaplan (1992) defined nature to include "one plant or many plants, and also the place created by them. It includes a street tree as well as trees in an atrium. We also include in this concept nearby fields, woods and land that have not yet been turned to development." People can interact with plants and nature actively or passively. Kaplan explained that research has found such effects to be global, and not bound by culture, ethnicity, age, place of residence, or occupation (Kaplan, 1992). Research suggested that active interactions with nature, such as directly growing plants, were related to improved psychological and physiological health in children and adults (Cammack et al., 2002; Kaplan, 1973; Lewis, 1978; Waliczek et al., 2005). These benefits included increased self-esteem and reduced stress levels. Alternatively, passive interactions are those that are visual and more observational in character (Lewis, 1994), and these interactions have been found to improve life satisfaction (Zampini, 1994). For example, Ulrich (1984) found that patients in hospitals with window views of natural areas result in lower incidence of reported illness. Lewis (1994) explained that both types of interactions with natural areas have had positive mental and

¹Graduate Assistant, Department of Horticultural Sciences, Texas A&M University, College Station, TX 77843-2133

²Associate Professor, Department of Agriculture, Texas State University, San Marcos, TX 78666

³Professor, Department of Horticultural Sciences, Texas A&M University, College Station, TX 77843-2133

⁴Corresponding author. E-mail: tc10@txstate.edu.

Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.4047	acre(s)	ha	2.4711

physical effects on individuals. However, most colleges and universities do not enhance the physical environment with the intention of enhancing learning and comfort of students (Sturner, 1972).

The main objective of this study was to investigate the relationship between graduate student use of campus green spaces and their perceptions of quality of life at a university in Texas.

Materials and methods

SAMPLE. The sample used in this study was a random selection of graduate students at Texas State University-San Marcos. Texas State University-San Marcos consists of a main campus of over 450 acres, with an additional outlying area of more than 5000 acres used for recreational and instructional purposes (Texas State University, n.d.). The main campus is situated on a hill that inhibits large expanses of green spaces. However, the spring-fed San Marcos River flows next to the main campus and includes several university and city park areas. The university is currently working on a master plan that is focused on removing parking areas and replacing them with green areas (Texas State University, n.d.). The university is also committed to the goal of “emphasizing doctoral program development” and increasing student retention (Texas State University, 2007).

A total of 347 of 3279 ($\approx 10\%$) of the graduate student body was randomly selected by a computer and received e-mails with information regarding the incentive for participation and instructions on accessing an on-line survey. According to Dillman (2007), sampling 351 people is sufficient for a population of 4000 people, and it is not necessary to oversample to improve the completed sample size. The survey included questions that related to student use of campus green spaces, overall quality of life statements, an instrument to measure the quality of life of university students, and demographic questions. A total of 79 (22.8% response rate) graduate student questionnaires were collected and analyzed to compare levels of quality of life of graduate students and the level of usage of campus green spaces.

Data were collected using the on-line survey distributed via e-mail

requesting participation in this study with the compensation of being entered into a drawing for a chance to win one of three prizes. This e-mail request simply stated that the survey was regarding the “campus environment” and “campus experiences” and did not mention green spaces or quality of life. Students accessed the survey from the link in the e-mail and then agreed to privacy and consent information and acknowledged that he/she understood that participation in the study was voluntary.

A second e-mail was sent out 1 week later to students who had not yet responded to remind them of the opportunity to participate in an attempt to raise the rate of response. Nonresponse error was not controlled. Due to nonresponse and self-selection of respondents, the sample may differ from the target population (Frankel, 1983). Due to time constraints in the campus Office of Institutional Research, whose resources were used to assist in the distribution of the survey, additional contacts to improve the response rate were not possible beyond the second e-mail.

DEMOGRAPHICS. The demographic section of the instrument was modeled after similar instruments (McFarland et al., 2008; Waliczek et al., 1996) and reviewed by other researchers for content validity. Demographic questions asked about gender, age, ethnic group, marital status, work status, and living situation. At the end of the demographic section of the instrument, there was a space for respondents to add open-ended comments regarding their experiences on-campus.

STUDENT USE OF CAMPUS GREEN SPACES INSTRUMENTATION. The “green-user” section of the questionnaire was developed for use in a similar study investigating undergraduate students’ use of campus green spaces (McFarland et al., 2008). This section asked participants to rate the frequency in which they participated in various activities (walking to and from class, exercising, participating in organized or intramural sports, socializing with friends, participating in club meetings, studying, eating, relaxing, and working) outdoors on-campus. These activities focused on simple passive interactions with nature because past research has indicated that passive interactions are

sufficient for stimulating positive benefits in people (Lewis, 1994; Ulrich, 1984; Zampini, 1994). Responses were on a Likert-type scale (Likert, 1967) ranging from 1 to 5. Lower scores indicated less frequent use of campus green spaces and higher scores indicated more frequent use for the specified activity. Also, one question asked generally, “How frequently do you spend time outdoors on-campus?” This question was scored on a four-point scale. Green-user scores ranged from 8 through 47. Higher green-user scores indicated more frequent use of campus green spaces and lower scores indicated less frequent use. Respondents were also asked to include any comments or suggestions regarding the campus environment. This section of the instrument was also reviewed by other researchers for content validity.

QUALITY OF LIFE OF UNIVERSITY STUDENTS’ INSTRUMENTATION. The instrument selected to measure quality of life of students was developed by Canadian researchers over the course of a series of studies (Clifton et al., 1996; Roberts and Clifton, 1992) and was used in a similar study investigating undergraduate perceptions of quality of life (McFarland et al., 2008). It consisted of two separate domains: an “affective domain” (Roberts and Clifton, 1992) and a “cognitive domain” (Clifton et al., 1996). The affective domain assessed how students felt about their educational experiences (Roberts and Clifton, 1992). The affective domain of quality of life of university students was measured using a series of 30 statements encompassing three dimensions (total positive affective, interaction with students, and interaction with professors). This section of the instrument asked students to rate their agreement with statements such as, “the things I learn are important to me,” “I feel restless,” and “I find it easy to get to know other people” (Roberts and Clifton, 1992). Scores on the affective domain ranged from 0 to 148. Scores on the three dimensions of the affective domain ranged from 0 to 80, 0 to 25, and 0 to 45, respectively. Higher scores on the affective domain indicated that the respondent felt more positively about their self-worth in the university.

The cognitive quality of life of university students measured the

degree to which students felt that they were experiencing sufficiently “demanding cognitive challenges” (Clifton et al., 1996). This domain was measured using a series of 17 statements. Each statement was preceded with: “At Texas State University, I have been challenged to...” and included statements such as, “demonstrate how theories are useful in real life,” “identify organizing principles in my courses,” and “remember an extensive number of new concepts” (Clifton et al., 1996). Scores on the cognitive domain ranged from 0 to 85. Higher scores on the cognitive domain indicated that the respondent felt more positively about the stimulation of their intelligence within the university.

The statements on the affective and cognitive domains were all rated on a five-point Likert-type scale, with responses of 1 indicating “strongly disagree” and responses of 5 indicating “strongly agree” (Likert, 1967). Except for four statements on the total affective dimension, the statements were positive in nature, and scoring was equivalent to the responses, where a response of 1 scored 1 point and a response of 5 scored 5 points. On the negative statements, responses were reverse coded so that responses of 1 scored 5 points and responses of 5 scored only 1 point. Nonresponse to any question resulted in 0 points for that question. The scores were summed for the affective and cognitive domains, resulting in an overall quality of life score for each university student. Scores on the overall quality of life of university students’ scale ranged from 0 to 231. Higher scores on the overall quality of life of university students’ scale indicated that students felt positively about their overall experience within the university.

OVERALL QUALITY OF LIFE. Two additional questions were asked about overall quality of life. These questions were “overall, how would you rank the quality of your life?” and “when all things in your life are considered, how do you feel today?” (McFarland et al., 2008; Waliczek et al., 1996), and were rated on a five-point Likert-type scale. On these questions, more positive responses scored more points. Therefore, the least positive response scored only 1 point, and the most positive response scored 5 points. This section

of the instrument was also reviewed by other researchers for content validity.

A Cronbach’s alpha reliability test reported the green-user and quality of life survey instrument to have high reliability ($\alpha = 0.91$) (Gall et al., 2006; McFarland et al., 2008).

DATA ANALYSIS. After the questionnaire was available for 2 weeks, data were automatically downloaded into an Excel™ file (Microsoft, Redmond, WA) and then analyzed using SPSS® (version 11.5; SPSS, Chicago). Statistical analysis included descriptive statistics, frequencies, correlations, and multivariate analysis of variance.

Results and discussion

Respondents were classified as “low,” “medium,” or “high users” of the green spaces based on their responses to the green-user scale. Individuals with 20 or fewer points (indicating that most responses scored 1–2 points) were ranked as “low users,” while individuals with 21 to 29 points (indicating that most responses scored 3 points) were “medium users,” and individuals with 30 or more points (indicating that most responses scored 4 or 5 points) were “high users.” Frequency statistics determined that there was an about equal distribution of graduate students who were classified in each of the three categories of green use (Table 1). Overall, the mean green-user score for graduate students was 25.4 (“medium users”).

More women responded to the questionnaire, with 55 respondents being female and 24 being male. Ethnically, the majority of respondents were Caucasian (64.6%), with the second most common ethnicity among responders being Hispanic (16.5%). This ethnic distribution was fairly representative of the overall ethnic breakdown of graduate students within the university, with

68.4% of the enrolled graduate students being Caucasian (2243) and 16.9% being Hispanic (554) (Texas State University, 2006). However, university enrollment reports do not report on gender distribution for comparison between the sample and the population (Texas State University, 2006). About one-third of respondents were between the ages of 21 and 25 years old (35.4%), one-third were between the ages of 26 and 30 years old (34.2%), and the remainder was older than 30 years old. Most respondents identified themselves as being married or partnered (46.8%), and were closely followed by single respondents (45.6%). Greater than one-third (38.0%) of respondents reported commuting between 30 min and 1 h to school. Finally, almost one-half (49.4%) of respondents reported working between 20 and 40 h per week, followed by another one-third (30.4%) reporting working more than 40 h weekly.

OVERALL QUALITY OF LIFE OF GRADUATE STUDENTS. The mean score to both overall quality of life questions (“overall, how would you rank the quality of your life?” and “when all things in your life are considered, how do you feel today?”) was greater than 4, indicating that most graduate students had positive perceptions of their overall quality of life. This positive perception held true for the quality of life of university students’ scale, where most students gave responses that were between “agree” and “strongly agree” about their overall affective and cognitive experiences in the university (overall mean score of 4.096). This indicated that graduate students felt positively about their self-worth (affective) and the degree to which they felt challenged and intellectually stimulated within the university (cognitive).

Table 1. Distribution of graduate students at Texas State University-San Marcos among green-user groups^a in the study of graduate student use of campus green spaces and the impact on their perceptions of quality of life.

Low use ^y		Medium use ^x		High use ^w		Total
Frequency (no.)	Frequency (%)	Frequency (no.)	Frequency (%)	Frequency (no.)	Frequency (%)	
28	35.4	24	30.4	27	34.1	79

^aScale included nine questions with scores ranging from 1 to 5, and one question with scores ranging from 1 to 4. Overall actual scores ranged from 8 to 47. This scale was designed to measure students’ passive use of outdoor areas on campus.

^yScored 20 or fewer points on the green-user scale.

^xScored 21 to 29 points on the green-user scale.

^wScored 30 or more points on the green-user scale.

QUALITY OF LIFE OF UNIVERSITY GRADUATE STUDENTS AND GREEN-USE COMPARISONS. A Pearson product-moment correlation was run to compare respondents' green-user groups, responses to the two overall quality of life statements, and to the university student quality of life scores. No statistically significant correlations were found between green-user groups and responses to either of the overall quality of life questions. The correlation between green-user groups and overall quality of life of university students' scores was also not statistically significant. No statistically significant correlations were found between green-user groups and the affective or cognitive domains, or any of the included dimensions, of student quality of life (Table 2). These findings indicated that within the overall sample of graduate students, those who used the campus green spaces more frequently did not rate their overall quality of life differently when compared with students who used the campus green spaces less frequently, nor did they rate their student quality of life differently.

DEMOGRAPHIC COMPARISONS. Most of the demographic information obtained did not warrant statistical comparisons due to the small sample within each demographic variable. However, there were enough men and women make gender comparisons.

GENDER. A Pearson's product-moment correlation was run comparing gender, green-user groups, and overall and student quality of life scores. This analysis indicated no statistically significant relationships between any of these variables of interest (Table 2). A two-way multivariate analysis of variance (MANOVA) also compared gender, green-user group, and quality of life measures to investigate any interactions. Neither statistically significant interactions nor simple main effects were found (Table 3). This indicated that no specific gender or green-user group, nor the various combinations of gender and green-user groups, rated their quality of life differently when compared with other gender and green-user group combination (for example, female low users of campus green spaces rated their quality of life similar to male high users of campus green spaces).

NONRESPONSE. Nonresponse error was handled in this study by

Table 2. Correlation matrix indicating the Pearson's product-moment correlation between green-user group, gender, overall quality of life, overall quality of life of university students, the affective domain of quality of life of university students (which included the total positive affective dimension, the interaction with students dimension, and the interaction with professors dimension), and the cognitive domain of quality of life of university students at Texas State University-San Marcos in the study of graduate student use of campus green spaces and the impact on their perceptions of quality of life.

Scale	Measurement	Green-user group ^z	Gender ^y
Overall quality of life ^x			
When all things in your life are considered, how do you feel today?	Pearson correlation	0.091	-0.172
	<i>P</i>	0.425	0.130
	<i>N</i>	79	79
Overall, how would you rank the quality of your life?	Pearson correlation	0.101	-0.109
	<i>P</i>	0.375	0.339
	<i>N</i>	79	79
Quality of life of university students ^w			
Overall quality of life of university students ^v	Pearson correlation	0.000	-0.119
	<i>P</i>	0.998	0.295
	<i>N</i>	79	79
	Pearson correlation	-0.014	-0.122
	<i>P</i>	0.905	0.285
	<i>N</i>	79	79
Total positive affective dimension ^u	Pearson correlation	0.000	-0.083
	<i>P</i>	0.997	0.467
	<i>N</i>	79	79
Interaction with students dimension ^t	Pearson correlation	-0.118	-0.104
	<i>P</i>	0.301	0.360
	<i>N</i>	79	79
Interaction with professors dimension ^s	Pearson correlation	0.034	-0.130
	<i>P</i>	0.768	0.253
	<i>N</i>	79	79
Cognitive domain ^r	Pearson correlation	0.015	-0.088
	<i>P</i>	0.898	0.440
	<i>N</i>	79	79
Green-user group	Pearson correlation	1	-0.109
	<i>P</i>		0.339
	<i>N</i>	79	79
Gender	Pearson correlation	-0.109	1
	<i>P</i>	0.339	
	<i>N</i>	79	79

^xIndividuals with 20 or fewer points (indicating that most responses were, on average, scored 1 or 2 points) were ranked as "low users" (coded as "1"), while individuals with 21 to 29 points (indicating that most responses were, on average, scored 3 points) were "medium users" (coded as "2"), and individuals with 30 or more points (indicating that most responses were, on average, scored 4 or 5 points) were "high users" (coded as "3"). This scale was designed to measure students' passive use of outdoor areas on campus.

^yGender was coded as "1" being male and "2" being female.

^wRoberts and Clifton, 1991.

^vThe affective domain assessed how students felt about their educational experiences and was measured using a series of 30 statements. Possible scores ranged from 0 to 148.

^uPossible scores ranged from 0 to 80.

^tPossible scores ranged from 0 to 25.

^sPossible scores ranged from 0 to 45.

^rThe cognitive domain assessed the degree to which students felt that they were experiencing cognitive challenges. It was measured using a series of 17 statements. Possible scores ranged from 0 to 85.

comparing early and late respondents (Lindner et al., 2001). According to Lindner et al. (2001), late responders are similar to nonresponders. Late responders were "defined operationally and arbitrarily as the later 50% of the respondents" (Lindner et al., 2001). After assigning the first 50%

of the respondents as early responders (coded as "1") and the last 50% of the respondents as late responders (coded as "2"), a multivariate analysis of variance test was completed to compare the mean scores of the two groups on the variables of interest including green-user score, the two

Table 3. Two-way multivariate analysis of variance test comparing male and female low-, medium-, and high-users of campus green spaces scores on overall quality of life, overall quality of life of university students, the affective domain of quality of life of university students (which included the total positive affective dimension, the interaction with students dimension, and the interaction with professors dimension), and the cognitive domain of quality of life of university students at Texas State University-San Marcos in the study of graduate student use of campus green spaces and the impact on their perceptions of quality of life.

Source	Dependent variable	df	Mean square	F	P
Green-user group ^z	When all things in your life are considered, how do you feel today?	2	0.258	0.344	0.710
	Overall, how would you rank the quality of your life?	2	0.258	0.344	0.710
	Overall quality of life of university students ^y	2	224.817	0.456	0.635
	Affective domain ^x	2	116.662	0.675	0.512
	Total positive affective dimension ^w	2	27.362	0.497	0.611
	Interaction with students dimension ^v	2	4.685	0.501	0.608
	Interaction with professors dimension ^u	2	24.970	0.964	0.386
	Cognitive domain ^t	2	17.609	0.123	0.885
Gender	When all things in your life are considered, how do you feel today?	1	1.877	2.499	0.118
	Overall, how would you rank the quality of your life?	1	0.961	1.500	0.225
	Overall quality of life of university students	1	771.085	1.566	0.215
	Affective domain	1	300.119	1.737	0.192
	Total positive affective dimension	1	48.773	0.886	0.350
	Interaction with students dimension	1	10.798	1.156	0.286
	Interaction with professors dimension	1	49.761	1.920	0.170
	Cognitive domain	1	109.087	0.760	0.386
Green-user group × gender	When all things in your life are considered, how do you feel today?	2	0.346	0.461	0.632
	Overall, how would you rank the quality of your life?	2	0.382	0.596	0.554
	Overall quality of life of university students	2	632.269	1.284	0.283
	Interaction with students dimension	2	3.300	0.353	0.704
	Interaction with professors dimension	2	32.770	1.265	0.288
	Cognitive domain	2	81.529	0.568	0.569

^zIndividuals with 20 or fewer points (indicating that most responses were, on average, scored 1 or 2 points) were ranked as “low users” (coded as “1”), while individuals with 21 to 29 points (indicating that most responses were, on average, scored 3 points) were “medium users” (coded as “2”), and individuals with 30 or more points (indicating that most responses were, on average, scored 4 or 5 points) were “high users” (coded as “3”). This scale was designed to measure students’ passive use of outdoor areas on campus.

^yRoberts and Clifton, 1991.

^xThe affective domain assessed how students felt about their educational experiences and was measured using a series of 30 statements. Possible scores ranged from 0 to 148.

^wPossible scores ranged from 0 to 80.

^vPossible scores ranged from 0 to 25.

^uPossible scores ranged from 0 to 45.

^tThe cognitive domain assessed the degree to which students felt that they were experiencing cognitive challenges. It was measured using a series of 17 statements. Possible scores ranged from 0 to 85.

quality of life statements (“When all things in your life are considered, how do you feel today?” and “Overall, how would you rank the quality of your life?”), and the overall quality of life of university students’ score.

Only one comparison revealed a statistically significant difference between early and late responders. For the statement “Overall, how would you rank the quality of your life,” late respondents had a statistically significantly higher mean score ($\alpha = 0.042$) of 4.44, whereas early respondents had a mean score of 4.08. For all other comparisons, there were no statistically significant differences between early and late responders (all

$\alpha > 0.258$). This indicated that if there was any nonresponse error in this study, nonrespondents were likely to resemble late responders on the question “Overall, how would you rank the quality of your life.” Because late responders responded more positively to this statement when compared with early responders, it is likely that nonresponders would also respond more positively to this statement. Because late responders did not differ from early responders on green-user scores, it is likely that the difference between early and late responders did not increase Type II error in this study. If anything, this difference increased within-group

(green-user group) variance on this measure of quality of life.

Conclusions

Although a previous study revealed a relationship between undergraduate student use of campus green spaces and quality of life (McFarland et al., 2008), this study did not find similar relationships between graduate student use of campus green spaces and perceptions of quality of life. No statistically significant Pearson’s product-moment correlations were found between green-user scores and overall quality of life statements and quality of life of university students. Additionally, a MANOVA comparison did not

reveal any differences between high, medium, or low green-user groups or gender with regard to any of the quality of life measures used.

While graduate students were unaffected in the same way as undergraduates from their use of campus green-spaces (McFarland et al., 2008), they still reported overall positive experiences within the university and in their own lives. Why might graduate students still report high perceptions of quality of life even though they reported lower use of campus green spaces?

Research has found multiple ways to achieve life satisfaction and increased quality of life. Graduate students may achieve their high perception of quality of life through some other means rather than green use. Myers and Diener (1995) reported that four traits are repeatedly found in studies that identify happy people: "self-esteem, a sense of personal control, optimism, and extraversion." Graduate students may have more of these traits due to their educational achievements. Furthermore, Csikszentmihalyi (1990) reported on "flow" as being a source of happiness. Flow is a state achieved through activities that provide sufficient challenge to not be boring, but are of an appropriate level to not stress or overwhelm the individual. Because undergraduates are often in basic courses, they may not be particularly interested in or knowledgeable about their coursework. However, graduate coursework is said to be about learning "specialized knowledge, skills, attitudes, values, norms, and interests of the profession" (Bragg, 1976). This specialization may help graduate students reach Csikszentmihalyi's flow (1990).

Other factors may additionally contribute to graduate students' sense of quality of life. Frequency statistics revealed that almost half of graduate students were married. People with intimate relationships have been found to be happier than individuals without these relationships (Burt, 1986; Myers and Diener, 1995). Graduate students may report higher perceptions of quality of life due to their relationships with a significant other.

While this study found that graduate students are, for the most part, happy, green-use may still be important for these students. This study did

not ask about green-use outside of the university setting. Because many of the respondents were commuters with work and families, they may not actually spend vast amounts of time on campus. In fact, several students specifically noted this in the open-ended response area. For example, one graduate student said, "If I were an undergrad (younger) and not a parent with two jobs, I would probably partake of the facilities much more." Another graduate student reported having visited campus only eight times in the current semester. More insight on the relationship between green-use and perceptions of quality of life for graduate students may be found by asking about green-use off campus.

Finally, it is interesting that the quality of life findings in this study do not support findings in previous studies that found that graduate students had significantly higher stress levels, more thoughts of quitting, more mental health problems when compared with medical students (Toews et al., 1997), and more frequent mental distress when compared with the national adult population (Hyun et al., 2006). High stress, thoughts of quitting, and mental health problems and distress would seem to indicate that graduate students are unhappy and dissatisfied with life or their studies. However, the current study found the opposite, in that graduate students were overall happy and had positive perceptions of their quality of life. One graduate student attributed her perceptions to being in a community in which she was comfortable. Another indicated the university had a "unique charm and small-town feel." A different graduate student expanded on the small-town feel stating, "it's a more personable place to live." One graduate student expressed feeling safe and welcomed on campus. Therefore, it may be that graduate students at this campus are different from graduate students in larger, more urban schools because of the small-town feel and positive community support of this particular university.

More studies are needed investigating graduate student happiness and how green-use and active and passive interactions with plants and nature can contribute to their feelings of life satisfaction. Studies conducted with graduate students at schools in

larger cities may be useful to get a broader perspective of graduate student experiences.

Conversely, studies conducted at schools with more or larger expanses of green spaces may provide more positive results. While previous research with undergraduates indicated the green space at this university positively impacted student quality of life and that it is important for campus planners to consider the relationship between the student experience and green spaces on campus (McFarland et al., 2008), it may be insufficient for different populations such as graduate students. Ulrich (1984) found statistically significant differences in patient recovery rates for individuals with views of walls when compared with individuals with views of nature. It may be that graduate students are more sensitive to the quantity and quality of green spaces than are undergraduates.

Furthermore, studies investigating off-campus green use by graduate students may provide more insight on how green use may benefit them specifically. Additionally, studies probing graduate students' attitudes about nature and their motivations for using campus green spaces could help campus planners more adequately provide facilities for this population. Finally, because this study focused on passive interactions with nature, a different direction for future engagement and research in this topic might be to investigate graduate students' active interactions with nature, or to explicitly inquire about time spent in the more natural areas of campus.

Literature cited

Bragg, A.K. 1976. The socialization process in higher education. ERIC Higher Educ. Res. Rpt. No. 7. Amer. Assn. Higher Educ., Washington, DC. (ERIC Document Reproduction No. A unique accession number assigned to each record in the database; also referred to as ERIC Document Number (ED Number) and ERIC Journal Number (EJ Number). ED132909).

Burt, R.S. 1986. Strangers, friends and happiness. General Social Survey Tech. Rpt. No. 72. Univ. Chicago, Natl. Opinion Res. Center, Chicago.

Cammack, C., T.M. Waliczek, and J.M. Zajicek. 2002. The Green Brigade: The effects of a community-based horticultural

- program on the self-development characteristics of juvenile offenders. *HortTechnology* 12:82–86.
- Clifton, R.A., E. Etchevery, S. Hasinoff, and L.W. Roberts. 1996. Measuring the cognitive domain of the quality of life of university students. *Soc. Indic. Res.* 38: 29–52.
- Csikszentmihalyi, M. 1990. *Flow: The psychology of optimal experience*. Harper and Row, New York.
- Dillman, D. 2007. *Mail and internet surveys: The tailored design method*. 2nd ed. Wiley, Hoboken, NJ.
- Dorn, S.M. and R. Papalewis. 1997. Improving doctoral student retention. *Annu. Mtg. Amer. Educ. Res. Assn.*, Chicago, 24–28 Mar. 1997.
- Frankel, M. 1983. Sampling theory, p. 21–67. In: P.H. Rossi, J.D. Wright, and A.B. Anderson (eds.) *Handbook of survey research*. Academic Press, San Diego, CA.
- Gall, M.D., W.R. Borg, and J.P. Gall. 2006. *Educational research: An introduction*. 8th ed. Allyn and Bacon, White Plains, NY.
- Golde, C.M. 1998. Beginning graduate school: Explaining first-year doctoral attrition. *New Dir. Higher Educ.* 101:55–64.
- Golde, C.M. 2005. The role of the department and discipline in doctoral student attrition: Lessons from four departments. *J. Higher Educ.* 76:669–700.
- Griffith, J.C. 1994. Open space preservation. *J. Higher Educ.* 65:645–669.
- Heerwagen, J.H. 1990. The psychological aspects of windows and window design. *Proc. Environ. Design Res. Assn.* 21:269–280.
- Hendershott, A., S. Wright, and D. Henderson. 1991. Quality of life correlates for university students. *Natl. Assn. Student Personnel Administrators J.* 30: 11–19.
- Hyun, J.K., B.C. Quinn, T. Madon, and S. Lustig. 2006. Graduate student mental health: Needs assessment and utilization of counseling services. *J. Coll. Student Dev.* 47:247–266.
- Kallio, R.E. 1995. Factors influencing the college choice decisions of graduate students. *Res. Higher Educ.* 36:109–124.
- Kaplan, R. 1973. Some psychological benefits of gardening. *Environ. Behav.* 5:145–162.
- Kaplan, R. 1992. The psychological benefits of nearby nature, p. 125–133. In: D. Relf (ed.) *The role of horticulture in human well-being and social development*. Timber Press, Portland, OR.
- Kaplan, R. and S. Kaplan. 1989. *The experience of nature: A psychological perspective*. Cambridge University Press, New York.
- Keys, W. and C. Fernandes. 1993. What do students think about school? A report for the national Commission on Education. *Natl. Foundation Educ. Res.*, Slough, UK.
- Lewis, C.A. 1978. Comment: Healing in the urban environment. *Amer. Psychological Assn. J.* 7:330–338.
- Lewis, C.A. 1994. The evolutionary importance of people-plant relationships, p. 239–254. In: J. Flagler and R. Poincelot (eds.) *People-plant relationships: Setting research priorities*. Haworth Press, Binghamton, NY.
- Likert, R. 1967. The method of constructing an attitude scale, p. 90–95. In: M. Fishbein (ed.) *Readings in attitude theory and measurement*. Wiley, New York.
- Lindner, J.R., T.H. Murphy, and G.E. Briers. 2001. Handling nonresponse in social science research. *J. Agr. Educ.* 42: 43–53.
- McFarland, A.L., T.M. Waliczek, and J.M. Zajicek. 2008. The relationship between student use of campus green spaces and perceptions of quality of life. *HortTechnology* 18:232–238.
- Moore, E.O. 1981. A prison environment's effects on health care service demands. *J. Environ. Syst.* 11:17–34.
- Myers, D.G. and E. Diener. 1995. Who is happy? *Psychol. Sci.* 6:10–19.
- National Center for Education Statistics. 2007. Total graduate fall enrollment in degree-granting institutions, by attendance status, sex of student, a control of institution: 1969–2005. 19 Feb. 2009. <http://nces.ed.gov/programs/digest/d08/tables/dt07_197.asp?referrer=report>.
- Roberts, L.W. and R.A. Clifton. 1991. Measuring the quality of university student life. Centre for Higher Education Research and Development, University of Manitoba, Winnipeg.
- Roberts, L.W. and R.A. Clifton. 1992. Measuring the affective quality of life of university students: The validation of an instrument. *Soc. Indic. Res.* 27:113–128.
- Sturmer, W.F. 1972. Environmental code: Creating a sense of place on the college campus. *J. Higher Educ.* 43:97–109.
- Texas State University. 2006. Fall 2006 final enrollment report. 31 Aug. 2007. <<http://www.emm.txstate.edu/marketing-resources/enrollment-reports/contentParagraph/00/document/200612+%7BFall+06%7D+Enrollment+Report+-+Final.ppt>>.
- Texas State University. 2007. 2004–2009 University plan: “Embracing change”: 2007 University plan progress. 11 Feb. 2009. <<http://gato-docs.its.txstate.edu/university-planing-and-assessment/2007-Division-College-Plan-Updates/2007-Plan-Update-for-Graduate-College/2007%20Plan%20Update%20for%20Graduate%20College.pdf>>.
- Texas State University. n.d. About Texas State. San Marcos, Tex. 31 Aug. 2007. <<http://www.txstate.edu/about/index.html>>.
- Toews, J.A., J.M. Lockyer, D.J.G. Dobson, E. Simpson, A.K.W. Brownell, F. Brenneis, K.M. MacPherson, and G.S. Cohen. 1997. Analysis of stress levels among medical students, residents, and graduate students at four Canadian schools of medicine. *Acad. Med.* 72:997–1002.
- Ulrich, R.S. 1979. Visual landscapes and psychological well-being. *Landscape Res.* 4:17–23.
- Ulrich, R.S. 1981. Natural versus urban scenes: Some psychophysiological effects. *Environ. Behav.* 13:523–556.
- Ulrich, R.S. 1984. View through a window may influence recovery from surgery. *Science* 224:420–421.
- Waliczek, T.M., J.M. Zajicek, and R.D. Lineberger. 2005. The influence of gardening activities on consumer perceptions of life satisfaction. *HortScience* 40:1360–1365.
- Waliczek, T.M., R.H. Mattson, and J.M. Zajicek. 1996. Benefits of community gardening on quality-of-life issues. *J. Environ. Hort.* 14:204–209.
- White, R. and J. Heerwagen. 1998. Nature and mental health: Biophilia and biophobia, p. 175–192. In: A. Lundberg (ed.) *Environment and mental health*. Lawrence Erlbaum, London.
- Zampini, J.W. 1994. Down to earth benefits of people-plant interactions in our community, p. 185–191. In: J. Flagler and R. Poincelot (eds.) *People-plant relationships: Setting research priorities*. Haworth Press, Binghamton, NY.