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**EVALUATION OF A
LEAVE NO TRACE PROGRAM
FOR CITY OF BOULDER OPEN SPACE & MOUNTAIN PARKS**

Submitted by:

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EXECUTIVE SUMMARY

1. Overall, visitors to City of Boulder Open Space appear to have a favorable level of LNT knowledge in terms of recognizing good LNT behavior. Out of six true-false LNT questions, the average number of correct responses was high in both the pre-test (5.32), and the post-test (5.46). *Consequently, education and outreach efforts should not be built on creating recognition of specific LNT behaviors; users already seem to know them.*
2. There were rarely any differences in LNT knowledge by activity type, age, frequency of visitation, or years or residence in Boulder County. *Consequently, there is no one group that would appear to be a better target of outreach than another.*
3. More than two-thirds of respondents had at least heard of the LNT program in the open space system. Those who lived in Boulder County longer were more likely to have heard of it; older visitors (65+) were less likely. Although older visitors were less likely to be aware of the program, they were no less likely to know the correct responses to the six LNT true-false questions.
4. Older visitors (65+) were slightly less likely than other users to “leave it as you found it” and “share the trail,” although put into perspective, there were still very likely to follow those behaviors overall.
5. Thirty-six percent of respondents indicated that they perceived their LNT behavior to be “somewhat” or “much” better following the LNT outreach effort. It is important to note that self-reports such as this survey are often affected by social desirability and an inclination to answer favorably.
6. Trailhead contacts were the overwhelming choice for receiving information.
7. Bikers self reported the greatest fidelity to trail with 89% reporting they always stay on trail, runners at 76%, dog walkers at 73% and hiking at 70%.
8. Compliance with specific LNT behaviors, including “picking up poop” and “keeping your dog under voice and sight control,” appears to be predicated by something stronger than knowledge. How long someone thinks about or how much one knows had almost no effect on their likelihood to comply with a specific LNT behavior. In other words, in this instance, processing or thinking about a behavior has minimal effect on whether or not they actually do that behavior. Consequently, further education and outreach efforts should focus not on building one’s depth of knowledge about the rationale for specific LNT behaviors. Instead, it might include raising awareness about potential consequences of non-compliance including increased enforcement or the social desirability of compliance. Further, heuristic approaches that trigger individual reaction may be a more cost-effective approach for future efforts.
9. A majority of respondents indicated that a primary motivation for following LNT behaviors was based on intrinsic motivations *to do the right thing*. However, the most cited statement that would influence one’s compliance with open space rules related to retaining dog-walking privileges, a very extrinsic rationale. There appears, then, to be a disconnect between what people say is their primary

motivation, and their reaction when given a scenario where privileges might be lost if they fail to comply. This is not unusual; third party consequences can create a variety of undesirable feelings and reactions (e.g., embarrassment) that are not necessarily at stake when one violates their ethics, unless that ethic is very core to their persona. Dog-walking ethics are probably not a central part of most people's personal code of ethics. Therefore, they can compromise those ethics with only mild sanctions (e.g., some level of dissonance), whereas a third party reprimand creates greater discomfort.

METHODS

City of Boulder staff and volunteers conducted the pre-treatment survey in September of 1999 at City of Boulder Open Space trailheads. Five trailhead access points were selected to ensure a large sample size and a sufficient sample of recreational activities. Every visitor was asked to fill out a survey. A total of 803 surveys were completed correctly. The refusal rate was less than 10%. A five month educational treatment of trailhead contacts, brochures, signs, local public access video spots and newspaper articles was conducted. The original 803 survey respondents were then mailed the post-treatment survey, a reminder and a second survey if they had not returned the first survey. This resulted in 388 valid surveys in the post survey sample, a 48% return rate.

Pre and post survey results were entered into a statistical software package (SPSS) for analysis. In addition to a variety of descriptive functions (e.g., frequencies, means, medians), the analysis included comparisons between groups (e.g., activity types, years of residence in Boulder County, gender) as well as pre/post comparisons for individuals. These comparisons included the following tests: paired sample t-tests, cross-tabs / chi-square analysis, analysis of variance, and multiple regression. In most instances, a p-value of .05 was used to determine statistical significance.

RESULTS

DESCRIPTIVE STATISTICS

Post Test #6 a-f.

On a scale of 1 to 5, 1 being "much more often", 3 being "no change" and 5 being "much less often," compared to several months ago when you filled out the pre-education survey, about how often do you do the following when visiting open space trails?

	<i>Mean</i>	Much more often	No change <i>Reported as a percent.</i>			Much less often
Keeping your dog under voice and sight control	2.54	15.8	10.4	72.3	1.0	.5
Picking up you dog's poop on and off trail	2.50	14.7	12.8	71.7	.5	.3
Picking up and putting your trash in a waste container	2.58	14.7	8.2	71.6	.3	.3
Leaving flowers, fossils and artifacts as you find it	2.44	13.4	8.2	74.0	.3	.5
Staying on designated trails	2.43	16.8	12.1	66.2	1.5	.3
Sharing the trail with other visitors	2.54	13.4	10.1	72.4	.3	.5

** Mean is reported on a scale of 1 (much more often) to 5 (much less often).*

Result:

In all instances, a clear and compelling majority of visitors indicated that their behavior had either no change or improved change. In addition, "no change" was the most commonly reported response for all behaviors. Further, questions to which there is a clearly more desirable response (e.g., "much more often") may influence respondents' answers due to social desirability. Based on results reported later in this report that indicate behavior change was not substantial, these results suggest that some degree of social desirability occurred. Only dog walkers are included in the first two questions with 185 responses.

Post Test #8

Which one outreach method do you think had the most effect in changing your behavior when visiting open space trails?

Outreach methods	Frequency	Percent
Trailhead contacts	238	61%
Information board	66	17%
Sign	52	13%
Channel eight	52	13%
Newspaper	35	9%
Word of mouth	36	9%
No other ways	30	8%
Other	28	7%
Received mail	25	6%

Result:

Consistent with other outdoor education survey results, personal contact appeared to have the greatest impact, with more than 61% of respondents citing that strategy as having the greatest effect. The remaining options failed to garner more than 17% of responses. Clearly, person-to-person contact is the most effective, according to the users.

Post Test #9

Why do you think this outreach method was more effective than others? (open-ended)

Outreach methods	Frequency	Percent
Personal	118	30.4%
Convenient	17	4.4%
Makes me think	16	4.1%
Answers questions	15	3.9%
Peer pressure	14	3.7%
other	38	9.8%

Result:

Taken in conjunction with the results of question #8 (listed above), clearly people respond to the personal interaction with a ranger more than other more passive methods.

Post Test #10

There are a number of reasons for practicing low impact recreation techniques. Of the following reasons, which one reason would be most likely to influence you to change your behavior?

Reason	Frequency	Percent
We have a responsibility to lessen our impact on the natural environment	114	29.4
It is the right thing to do	83	21.4
They protect the health of the land for future generations	58	14.9
They maintain the beauty of the natural area	41	10.6
By practicing low impact behaviors, fewer restrictions will be put in place	37	9.5
These practices reduce impacts on plants and wildlife	36	9.3
Other	5	1.3
They minimize land erosion	2	.5
They reduce impacts on other visitors	2	.5

Result:

Most respondents indicate an intrinsic motivation (e.g., it is the right thing to do) for practicing low impact techniques. This would indicate that one's ethics and sense of responsibility to nature provide the incentive, rather than extrinsic motivations such as possibility of sanctions (e.g., fines). Intrinsic motivation is derived from deeply held values and ethics, and these are very difficult constructs to influence within a singular education campaign.

Post Test #13

Have you heard of the voice and sight control regulation?

	Frequency	Percent
Yes	199	94.8
No	11	5.2

Result:

Clearly visitors are familiar with the voice and sight control regulation.

Post Test #15

Which of the following statements do you think would be likely to influence you to improve your dog management?

	Most likely				Least Likely
Dogs disturb others' enjoyment of open space	40.9	28.0	20.4	4.8	5.9
Dogs could hurt or scare others	41.8	31.0	15.8	6.0	5.4
Dogs could hurt or scare wildlife	47.1	32.3	16.4	1.6	2.6
Dogs could reflect negatively on me	18.2	17.7	28.7	12.7	22.7
Control keeps dogs safe from other dogs	38.9	24.9	21.1	9.2	5.9
Control keeps dogs safe from other animals such as skunks, porcupines or coyotes	40.9	24.7	18.8	7.5	8.1
Control keeps dogs safe from natural hazards such as the plague	28.4	23.5	23.5	8.7	15.8
You can get a ticket if your dog is not under voice and sight control	31.7	18.8	26.3	12.9	10.2
Not controlling my dog may lead to a loss in dog-walking privileges	52.4	16.6	15.5	7.5	8.0

Result:

Contrary to the results in # 10 that indicated an intrinsic motivation to practice LNT behaviors, the most compelling rationale for following dog management rules is to retain dog-walking privileges; more than 53% of the respondents – the highest of any statement – indicated that to be the most likely reason to improve their dog management. The second tier statements appear to stem from keeping dogs safe from other parts of the ecosystem (e.g., wildlife, other dogs), and insuring a quality experience for other users.

Post Test #16

Have you heard of the pick up poop regulation?

	Frequency	Percent
Yes	181	90.5
No	19	9.5

Result:

Clearly visitors are familiar with the pick-up poop regulation.

Post Test #19

When you don't pick up poop, what is the main reason?

Reason	Percent
No poop pick up bag available.	19.3
Dog has diarrhea	16.5
Poop too far from trail	14.4
No trash can nearby	12.6
Cant find poop in vegetation	11.3
Don't have extra bag	10.6
Don't want to carry full poop pick up bags.	10.1
Other	6.7
Dog poop is natural to the environment.	2.3
Not required to pick up	.8

Result:

The results indicate that 1) lack of bag, and 2) dog has diarrhea, as the most often-cited reasons for failing to pick up poop.

STATISTICAL ANALYSIS RESULTS

I. USER PROFILES

Visits to open space

How often do you visit open space?	Pre-test results ¹		Post-test results ¹	
	<u>frequencies</u>	<u>Valid percent</u>	<u>frequencies</u>	<u>Valid percent</u>
3 times/week	329	41%	172	44%
1-2 times/week	225	28%	114	29%
1-3 times/month	124	15%	60	16%
Less than 1/month	85	11%	37	10%
First visit	37	5%	5	1%

¹numbers may not equal 100% due to rounding errors and missing data

Chi-square test of significance indicated no significant differences in pre and post-test data

Conclusion:

On a basis of open space visitation, the profile of respondents in the pre-test did not differ significantly from the profile of respondents on the post-test. In terms of making subsequent pre and post-test comparisons, this result is favorable.

Years of residence in Boulder County

How many years have you lived within Boulder County?	Pre-test Results ¹		Post-test results ¹	
	<u>frequencies</u>	<u>Valid percent</u>	<u>frequencies</u>	<u>Valid percent</u>
Less than one yr.	99	12%	42	11%
2-5 years	185	23%	88	23%
6-10 years	125	16%	64	17%
11+ years	228	29%	131	34%
Don't live in B. Co	163	20%	61	16%

¹numbers may not equal 100% due to rounding errors and missing data

Chi-square test of significance indicated no significant differences in pre and post-test data

Conclusion:

On a basis of years of residence in Boulder County, the profile of respondents in the pre-test did not differ significantly from the profile of respondents on the post-test. In terms of making subsequent pre and post-test comparisons, this result is favorable.

Age

Age range	Pre-test Results ¹		Post-test results ¹	
	<u>frequencies</u>	<u>Valid percent</u>	<u>frequencies</u>	<u>Valid percent</u>
Under 24	87	11%	23	6%
25-34	277	35%	117	30%
35-44	154	19%	130	34%
45-54	154	19%	87	23%
55-64	40	5%	7	2%
65 or older				

¹numbers may not equal 100% due to rounding errors and missing data

Chi-square test of significance indicated no significant differences in pre and post-test data

Conclusion:

On a basis of age, the profile of respondents in the pre-test did not differ significantly from the profile of respondents on the post-test. In terms of making subsequent pre and post-test comparisons, this result is favorable.

Gender

What is your gender?	Pre-test Results ¹		Post-test results ¹	
	<u>frequencies</u>	<u>Valid percent</u>	<u>frequencies</u>	<u>Valid percent</u>
Male	342	43%	151	39%
Female	454	57%	235	61%

¹numbers may not equal 100% due to rounding errors and missing data

Chi-square test of significance indicated no significant differences in pre and post-test data

Conclusion:

On a basis of gender, the profile of respondents in the pre-test did not differ significantly from the profile of respondents on the post-test. In terms of making subsequent pre and post-test comparisons, this result is favorable.

II. LEAVE NO TRACE KNOWLEDGE

Note: paired t-tests are not possible on individual LNT questions with *nominal*-level responses (e.g. true/false). Therefore, data were combined to give each respondent a numeric score (1-6) indicating how many LNT questions were answered correctly (an LNT "IQ"). This allowed for the data to be set at an *interval/ratio* level, and therefore can be manipulated more by statistical analyses. A paired t-test was computed using this new IQ variable. The following is a summary of this data:

Please indicate whether you think each of the following statements is true or false by circling the appropriate response.

Survey Item	Pre-test Results ¹		Post-test results ¹	
	<u>True</u>	<u>False</u>	<u>True</u>	<u>False</u>
1a. orange peels take several years to decompose	79%	20%	83%	17%
1b. tossing dog poop off the trail hurts native plants...	86%	12%	90%	10%
1c. collecting leaves or flowers is OK ... in moderation	10%	91%	3%	97%
1d. when a trail is muddy walking on grass ... is OK	6%	94%	5%	95%
1e. Trails and trail activity (-) effect birds at 100 yards	81%	19%	81%	19%
1f. Walking off trail increases the (-) effect on ...wildlife	99%	1%	98%	2%

¹numbers may not equal 100% due to rounding errors and missing data

Chi-square test of significance indicated no significant differences in pre and post-test data

Conclusion:

The statistical test of significance (chi-square) indicated that there was no demonstrated difference in percent of people who answered any one of the above six LNT items correctly in the pre and post tests. Despite small differences in the pre and post tests on some items (e.g. 86% vs. 90% in the pre/post tests for #1-b), the differences between pre and post tests can only be attributed to random error.

LNT IQ FREQUENCIES:

<u># answered correctly out of 6</u>	<u>Pre-test Frequencies</u>	<u>Post-test frequencies</u>
1	1	0
2	4	1
3	10	13
4	45	26
5	112	107
6	199	220
Mean Score	5.32	5.46

Paired Samples T-Test

	<u>N</u>	<u>df</u>	<u>Significance (2-tailed)</u>
Pre-test IQ – Post-test IQ	351	350	0.006

Conclusion: The increase in averages from 5.32 to 5.46 is considered statistically significant, meaning a true increase in LNT knowledge appears to have occurred. However, the difference (.014) represents an approximate 2% gain overall. From both a practical and management implication perspective, the increase in knowledge is relatively weak.

III. RESEARCH QUESTIONS AND HYPOTHESES TESTED

Question: Did pre and post Leave No Trace IQ differ by **activity type**?

Results of one way analysis of variance comparing pre and post LNT IQ scores by **activity type**.

	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Significance</u>
Pre IQ					
Between groups	6.632	5	1.326	1.659	.144
Within groups	291.837	365	.800		
Total	298.469	370			
Post IQ					
Between groups	4.852	5	.970	1.537	.178
Within groups	227.965	361	.631		
Total	232.817	366			

Result: There were no significant differences observed by open space activity type regarding Leave No Trace knowledge levels. Walkers, bicyclists, hikers, runners, horseback riders all appeared to share the same level of knowledge about the six LNT principles listed previously, in both the pre-test and the post-tests.

Question: Did pre and post Leave No Trace IQ differ by **visitation** to Boulder open space?

Results of ANOVA comparing pre and post LNT IQ scores by visitation.

	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Significance</u>
Pre IQ					
Between groups	5.008	4	1.252	1.561	.184
Within groups	293.461	366	.802		
Total	298.469	370			
Post IQ					
Between groups	4.875	4	1.219	1.936	.104
Within groups	227.942	362	.630		
Total	232.817	366			

Result: There were no significant differences observed by users with varying previous visitation regarding Leave No Trace knowledge levels. Whether an individual visited multiple times in a week, or only a few times a year, they all appeared to share the same level of knowledge about the six LNT principles listed previously, in both the pre-test and the post-tests.

Question: Did pre and post Leave No Trace IQ differ by **years of residence** in Boulder?

Results of ANOVA comparing pre and post LNT IQ scores by years of residence in Boulder:

	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Significance</u>
Pre IQ					
Between groups	2.188	4	.547	.699	.593
Within groups	284.787	364	.782		
Total	286.976	368			
Post IQ					
Between groups	1.851	4	.463	.742	.564
Within groups	224.653	360	.624		
Total	226.504	364			

Result: There were no significant differences observed by users with varying years of residence in Boulder County, regarding Leave No Trace knowledge levels. They all appeared to share the same level of knowledge about the six LNT principles listed previously, in both the pre-test and the post-tests.

Question: Did pre and post Leave No Trace IQ differ by **age** of respondent?

Results of ANOVA comparing pre and post LNT IQ scores by age of respondent:

	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Significance</u>
Pre IQ					
Between groups	1.337	5	.267	.328	.896
Within groups	296.666	364	.815		
Total	298.003	369			
Post IQ					
Between groups	4.590	5	.918	1.450	.206
Within groups	227.924	360	.633		
Total	232.514	365			

Result: There were no significant differences observed by users of different ages regarding Leave No Trace knowledge levels. They all appeared to share the same level of knowledge about the six LNT principles listed previously, in both the pre-test and the post-tests.

Question: Did pre and post Leave No Trace IQ differ by gender?

Results of independent samples test comparing mean LNT IQ scores by gender.

	<u>N</u>	<u>Mean Scores</u>	<u>Std. Deviation</u>	<u>F</u>	<u>Significance</u>
Pre IQ					
male	145	5.1103	1.0146	10.734	.001
female	224	5.4464	.7905		
Post IQ					
male	140	5.2786	.9374	15.811	.000
female	224	5.5511	.6803		

Result: There were significant differences observed by gender of respondents regarding Leave No Trace knowledge levels. Women respondents had higher LNT IQ's both pre and post.

In the pre-test, the average LNT IQ was 5.45 for women and 5.11 for men. In the post-test, averages for both genders increased, to 5.55 for women and 5.27 for men. The differences between male and female respondents in both instances were significant from a statistical standpoint. However, given that in each scenario, both groups demonstrated knowing more than 5 of the 6 principles, the more practical conclusion is that while women know slightly more than men on the LNT principles, both groups seem to know the LNT principles quite well overall.

Question: Have you heard of the Leave No Trace on Open Space Program?

Heard of LNT	Pre-test Results¹		Post-test results¹	
	<u>frequencies</u>	<u>Valid percent</u>	<u>frequencies</u>	<u>Valid percent</u>
Yes	253	66%	257	67%
No	133	34%	126	33%

¹numbers may not equal 100% due to rounding errors and missing data
Chi-square and paired t-tests indicated no significant differences between pre and post test results.

Result: There was no difference in the overall response group in the pre and post-tests. In both instances, approximately two-thirds of respondents were familiar LNT on Open Space program.

Question: Did awareness of the Leave No Trace on Open Space Program differ by activity type?

Pre-test Results

Heard of LNTOS	Open Space Activity Type					
	(N) Walking dog	(N) Bike riding	(N) Hiking	(N) Horse riding	(N) Running	(N) Other
Yes	(65) 66%	(36) 66%	(90) 63%	(6) 86%	(50) 67%	(6) 67%
No	(33) 34%	(19) 35%	(52) 37%	(1) 14%	(25) 33%	(3) 33%

Chi square χ^2 analysis reveals significance at .898 (no significance).

Post-test Results

Heard of LNTOS	Open Space Activity Type					
	(N) Walking dog	(N) Bike riding	(N) Hiking	(N) Horse riding	(N) Running	(N) Other
Yes	(63) 65%	(39) 71%	(92) 65%	(4) 57%	(53) 72%	(6) 67%
No	(34) 35%	(16) 29%	(49) 35%	(3) 43%	(21) 28%	(3) 33%

Chi square χ^2 analysis reveals significance at .878 (no significance).

Result:

This result indicates that in both the pre and post tests, familiarity with the LNT program did not differ by activity type. In both the pre and post tests, approximately two-thirds of the respondents in each activity type had heard of LNT.

Note: While the percent for horse riders was seemingly different from other activity types in both the pre-test (86%) and the post-test (57%), the total number of respondents (i.e., sample size) in this group was considerably low (6 & 4, respectively), and therefore certain conclusions cannot be drawn.

Question: Did awareness of the Leave No Trace on Open Space Program differ by frequency of visitation?

Pre-test results

Heard of LNTOS	About how often do you visit City of Boulder open space?				
	(N) 3 times/wk	(N) 1-2 times/wk	(N) 1-3 times/mo	(N) Less than 1/mo	(N) First visit
Yes	(120) 70%	(70) 62%	(35) 58%	(24) 65%	(4) 80%
No	(51) 30%	(43) 38%	(25) 42%	(13) 35%	(1) 20%

Chi square χ^2 analysis reveals significance at .390 (no significance).

Post-test results

Heard of LNTOS	About how often do you visit City of Boulder open space?				
	(N) 3 times/wk	(N) 1-2 times/wk	(N) 1-3 times/mo	(N) Less than 1/mo	(N) First visit
Yes	(122) 73%	(73) 65%	(35) 58%	(23) 62%	(4) 80%
No	(46) 27%	(40) 35%	(25) 42%	(14) 38%	(1) 20%

Chi square χ^2 analysis reveals significance at .239 (no significance).

Result:

This result indicates that in both the pre and post tests, familiarity with the LNT program did not differ based on frequency of visits. In both the pre and post tests, approximately two-thirds of the respondents in each activity type had heard of LNT.

Note: While the percent for first-time visitors was seemingly different from others in both the pre and post-tests (80%), the total number of respondents (i.e., sample size) in this group was low (4), and therefore any conclusions about their familiarity with LNT cannot be made.

Question: Did awareness of the Leave No Trace on Open Space Program differ by years of residence in Boulder County?

Pre-test results

Heard of LNTOS	How long have you lived in Boulder County?				
	(N) Less than one yr	(N) 2-5 years	(N) 6-10 years	(N) 11 + years	(N) Don't live in B Co.
Yes	(22) 52%	(48) 55%	(45) 72%	(98) 75%	(39) 64%
No	(20) 48%	(39) 45%	(18) 29%	(33) 25%	(22) 36%

Chi square χ^2 analysis reveals significance at .009 (significant) $p=.01$.

Post-test results

Heard of LNTOS	How long have you lived in Boulder County?				
	(N) Less than one yr	(N) 2-5 years	(N) 6-10 years	(N) 11 + years	(N) Don't live in B Co.
Yes	(23) 56%	(57) 65%	(47) 76%	(95) 74%	(33) 54%
No	(18) 44%	(31) 35%	(15) 24%	(34) 26%	(28) 46%

Chi square χ^2 analysis reveals significance at .019 (significant) $p=.01$.

Result:

These results indicate that there is a statistical significance between years of residence in Boulder County and familiarity with the LNT Open Space system. In both the pre and post test, new residents (less than one year) were considerably less familiar than other residents, especially those who lived in Boulder County for more than 6 years. This would seem to indicate that living in Boulder County positively affects familiarity with LNT. Intuitively, this result makes sense; one would hope that living in a county with an LNT program in its open space system would make residents more knowledgeable about LNT on open space.

Question: Did awareness of the Leave No Trace on Open Space Program differ by age?

Pre-test results

Heard LNTOS	(N)	(N)	(N)	(N)	(N)	(N)
	Under 24	25-34	35-44	45-54	55-64	65 +
Yes	(16) 70%	(64) 55%	(87) 67%	(65) 75%	(17) 74%	(3) 50%
No	(7) 30%	(53) 45%	(42) 33%	(22) 25%	(6) 26%	(3) 50%

Chi square χ^2 analysis reveals significance at .051 (significant) $p=.05$.

Post-test results

Heard LNTOS	(N)	(N)	(N)	(N)	(N)	(N)
	Under 24	25-34	35-44	45-54	55-64	65 +
Yes	(19) 83%	(70) 61%	(77) 60%	(66) 77%	(21) 91%	(4) 57%
No	(4) 17%	(45) 40%	(51) 40%	(20) 23%	(2) 9%	(3) 43%

Chi square χ^2 analysis reveals significance at .004 (significant) $p=.01$.

Result:

Pre and post-test analyses revealed significant differences among users regarding awareness of the LNT in open space program. While gains were made in some age groups (e.g., <24, 25-34), the 55-64 65 + cohorts are less compelling. However, given the marginally sufficient sample sizes for these older age groups, certain conclusions are difficult to draw. That said, the percent of 65+ aged visitors familiar with LNTOS only increased to 57% of the respondents in that group – the smallest percent of any age group in the sample.

Question: Did awareness of the Leave No Trace on Open Space Program differ by gender?

Pre-test results

Heard LNTOS	(N)	(N)
	male	female
Yes	(88) 59%	(163) 70%
No	(62) 41%	(71) 30%

Chi square χ^2 analysis reveals significance at .027 (significant) $p=.05$.

Post-test results

Heard LNTOS	(N)	(N)
	male	female
Yes	(89) 59%	(167) 72%
No	(61) 41%	(64) 28%

Chi square χ^2 analysis reveals significance at .008 (significant) $p=.01$.

Result:

This analysis revealed a significant difference among men and women regarding awareness of LNT in the open space program. In both the pre and post tests, women were more familiar with LNTOS than men. In terms of the percent of each gender group, men did not seem to become more familiar, and women's gain was minimal (70% to 72%).

IV. COMPARISONS OF LIKELIHOOD TO ENGAGE IN SPECIFIC LNT BEHAVIORS

Comparisons were made based on how often a specific group reported participating in a specific LNT behavior on a scale of 1 (always) to 5 (never). The specific behaviors included: 1) keeping dog under voice and sound control, 2) picking up poop, 3) picking up trash, 4) leaving flowers, fossils and artifacts as we find them, 5) staying on trails, and 6) sharing trails with other visitors.

The behaviors were compared by a) activity type; b) number of visits to open space; c) years of residence in Boulder County; d) age; and e) gender.

In comparing pre and post mean scores a Scheffe test was computed to determine significant differences. Since the Scheffe test has limited power, significance is computed at $p = 0.1$.

Only the significant differences and comparisons are included here. All other comparisons were found to be non-significant ($p > .10$).

Comparisons by activity type

<u>LNT behavior</u>	<u>Primary activity</u>	<u>Comparison group</u>	<u>Mean</u>	<u>Std. error</u>	<u>Sig.</u>
Stay on trails	Other	Walking dog	.73	.20	.022
		Bike riding	.89	.21	.003
		Hiking	.70	.20	.030
		Running	.76	.20	.016

Result:

The only LNT behavior in which significant differences between activity types were found was in "staying on trails." In this instance, "other" users were slightly more likely to stay on trails than all other activity types. A significant component of "others" included roller bladers.

Comparisons by how often one visits open space

Result:

There were no differences in LNT behaviors based on frequency of visitation regarding how often each of the six LNT behaviors was undertaken.

Comparisons by years of residence in Boulder County

Result:

There were no differences in LNT behaviors based on years of residence regarding how often each of the six LNT behaviors was undertaken.

Comparisons by age

<u>LNT behavior</u>	<u>Age</u>	<u>Comparison group</u>	<u>Mean</u>	<u>Std. error</u>	<u>Sig.</u>
Leaving as find	35-44	65 +	.90	.28	.072
Sharing trails	45-54	65 +	.87	.29	.103

Result:

In both “leaving it as you find it” and “sharing trails,” differences existed between the oldest age group (65+) and the 35-44 and 45-54 age groups, respectively. In each instance, the oldest age group was less likely to engage in the behavior. However, since the average for the oldest age group on “leaving it as you find it” (1.68) and “sharing trails” (1.38) was still on the preferable (i.e., “always”) end of the scale, their results do not seem to indicate a major problem.

Question: Did respondents report a perceived change in their behavior following the LNT outreach effort?

Post-test question: How have your actions changed due to leave no trace?

<u>Action</u>	<u>Frequency</u>	<u>Valid Percent</u>
Much better	14	5%
Somewhat better	73	31%
No change	150	63%
Somewhat worse	1	less than 1%
Total	238	
Missing	150	

Result:

Note: the results listed above are only descriptive; inferences are therefore drawn by the researcher. In terms of self-reports by users, more than a third of respondents indicated that their LNT behaviors improved as a result of the outreach. This might be attributable to social desirability; users perhaps want to appear that they have been receptive to the LNT outreach program, and also want to appear to be compliant users of the open space system.

V. EFFECT OF DIFFERENT VARIABLES ON COMPLIANCE WITH REGULATIONS

Question: How much does *familiarity* with the poop regulation and the *number of reasons* listed for picking up poop contribute to predicting whether or not someone will actually pick up poop?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.151	.001
Familiarity	-.215		.009
# of Reasons	-.284		.001

Results:

While the model and the predictor variables are all determined to be significant ($p < .05$), the r-square value and respective beta weights are comparably small. Significance is most likely being achieved due to sample size. The results of this analysis would indicate that familiarity with the regulation and the number of reasons one can list for following the poop regulation contribute minimally to actually predicting poop pick-up behavior. In comparing the two independent variables, familiarity with the regulation has a greater affect on whether or not the according behavior is followed (as determined by the beta weights) (See following t-test analysis).

Question: Does poop pick-up behavior differ by one's *familiarity* with the poop regulation?

T-Test Results

Familiarity	Mean Score for Poop Pick-up behavior	Significance
Yes	2.88	.001
No	1.86	

Mean is measured on a scale of 1 (always) to 5 (never).

Results:

This result is counter to what intuition might suggest. Those familiar with the regulation were less likely (2.88) to follow the regulation than those who were not familiar it (1.86). This result is difficult to interpret, and the statistical significance might be attributable to sample size, than any true trend for people to ignore poop pick-up regulations.

Question: How much does *the amount of time thinking about dog management and the number of reasons one can list to keep dogs under voice and sight control* contribute to or explain the likelihood of actually **keeping dogs under voice and sight control**?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.003	.875
Time thinking	.037		.723
# of Reasons	-.037		.720

Results:

Neither the time spent thinking about dog management nor the number of reasons one can list were good predictors of whether an individual actually followed the regulation of keeping a dog under voice and sight control. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *time thinking about LNT and number of reasons listed to pick up poop* contribute to predicting whether or not someone will **actually pick up poop**?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.003	.854
Time thinking	.051		.779
# of Reasons	.029		.619

Results:

Neither the time spent thinking about picking up poop nor the number of reasons one can list were good predictors of whether an individual actually followed the regulation of picking up poop. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *time thinking about LNT and number of reasons listed to pick up trash* contribute to predicting whether or not someone will **actually pick up trash?**

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.021	.173
Time thinking	-.110		.180
# of Reasons	-.104		.155

Results:

Neither the time spent thinking about picking up trash nor the number of reasons one can list were good predictors of whether an individual actually followed the regulation of picking up trash. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *time thinking about LNT and number of reasons listed to stay on trail* contribute to predicting whether or not someone will **actually stay on trail?**

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.029	.085
Time thinking	-.031		.027
# of Reasons	-.170		.686

Results:

Neither the time spent thinking about staying on trail nor the number of reasons one can list were good predictors of whether an individual actually followed the regulation of staying on trail. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *time thinking about LNT and number of reasons listed to share the trail* contribute to predicting whether or not someone will **actually share the trail**?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.024	.130
Time thinking	-.063		.056
# of Reasons	-.148		.412

Results:

Neither the time spent thinking about sharing the trail nor the number of reasons one can list were good predictors of whether an individual actually followed the regulation of sharing the trail. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *time thinking about LNT and number of reasons listed to leave an area as you found it* contribute to predicting whether or not someone will **actually leave an area as they found it**?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.016	.253
Time thinking	-.053		.118
# of Reasons	-.121		.496

Results:

Neither the *time spent thinking about leaving an area as they find it* nor the *number of reasons one can list* were good predictors of whether an individual actually followed the regulation of leaving it as you find it. There appear to be other reasons that motivate one to follow, or fail to follow, the rule.

Question: How much does *activity type, visitation, years living in Boulder, age and gender* contribute to predicting how many LNT principles can be listed by an individual?

Regression Results

Variable	Beta Weight	R-square	Significance
Overall model		.036	.273
Activity type	.051		.497
Visitation	.066		.472
Years in Boulder	-.018		.839
Age	-.017		.826
Gender	.183		.018

Results:

Of these variables, only gender had a significant effect for predicting how many LNT behaviors one can identify. Consistent with previous results, female respondents had a positive effect on the dependent variable of LNT principles.

Question: Are there differences in the likelihood that an individual will practice a specific LNT behavior based on activity types?

ANOVA Results

LNT Behavior	F-value	Significance
Keeping dog under voice/sight control	1.537	.180
Picking up dog poop	1.855	.104
Throw away trash	.920	.468
Leave flowers	.935	.458
Stay on trails	.782	.563
Share trails	.953	.447

Results:

There are no differences in terms of one activity type being more likely to follow an LNT behavior than another activity type.