

SMARTPHONE TECHNOLOGY AND SOCIAL INTERFERENCE

Honors Thesis

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By

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Abstract

The purpose of this experiment was to assess the impact of smartphone usage on social interactions. Previous studies have examined the relationship between smartphone usage and social relationships, but little or none with experimental designs. A particular question was whether smartphone use can detract from the establishment of commitment to a new organization and its members (specifically a university program). It was hypothesized that students who limit their smartphone use would have higher levels of belongingness and commitment to their new program and to their new college and less newcomer anxiety than students in the control group. Twenty incoming freshmen (male = 1, females = 19) from a New England university completed pre-tests and post-tests. Participants attending a pre-planned college freshman retreat were randomly assigned to either the experimental group ($n = 6$) or the control group ($n = 6$), where the experimental group were asked to limit their smartphone use on the two-day retreat. The between group variable had three levels (experimental retreat group, control retreat group, and a non-retreat comparison group) and the within group variable was time of measurement (pre-retreat test and post-retreat test). Change in six dependent variables from pre-test to post-test was measured, including college anxiety, affective group commitment, and attitudes toward smartphone use along four dimensions (attachment, social connectedness, exclusion, and social assurance). Results only indicated a significant difference between the experimental and control group on the smartphone exclusion variable ($U = 3.5, p = .03$). This study should be replicated with a stronger manipulation of the independent variable (full limitation of smartphone use vs. regular use) and include a larger sample.

Keywords: College anxiety, affective commitment, smartphone attachment, social connectedness, exclusion, social assurance

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Smartphone Technology and Social Interference

This thesis considers how evolving technology affects modern-day social relationships, specifically the impact of smartphone usage on social bonding. Is smartphone technology hindering relationship formation and feelings of social belongingness? How do individuals behave when they are in group settings and smartphones are present? Today, smartphone use has become a central part of the human experience for many. Indeed, some users report that they cannot go anywhere without them and that they text and check for notifications frequently throughout the day (Thornton, Faires, Robbins, & Rollins, 2014). Could smartphone use in group settings impede users' ability to meaningfully engage with the human beings physically present with them? If so, what are the implications for success in the workplace or educational settings?

Positive Impacts of Smart Phone Technology for Social Relations

It is important to consider that not all of the impacts of smartphone technology on human behavior are negative. Smartphones are an important communication channel connecting people near and far. Some research supports the notion that although there has been a change in the form of communication, there has been an increase in human interaction as a result of new technologies (Wagner, 2015). For example, in the corporate world face-to-face meetings have been replaced with interactions through various social media platforms (Wagner, 2015).

Two recent studies specifically report a positive relationship between smartphone technology and social relationships. Kim, Oh, and Wang (2016) investigated social engagement and smartphone use through a questionnaire completed by 446 US college undergraduate students in communications courses. Results reported a positive correlation between use of smartphones and feelings of belonging. Similarly, researchers Park and Lee (2012) distributed an online questionnaire to 339 Korean college students across several metropolitan universities. The

items on the questionnaire asked respondents to indicate their level of agreements on the statements about the relationship between the functions of cellular phones and social ties. Park & Lee's study found significant positive correlations between different social relationships (bonding and bridging), students' need for smartphones, social support, and loneliness. Since neither of these studies were experimental, it is difficult to assess whether smartphone use, per se, was a causal factor in fostering social bonding and belongingness, and in decreasing loneliness. Smartphones, however, have become an important part of today's relationships.

Negative Impacts of Smart Phone Technology for Social Relations

Today, individuals have a preoccupation with smartphones, also known as smartphone 'behavioral addictions.' Research indicates that text messaging in the US has gone from 31 million per day up to 6 billion (Thornton et al., 2014). Thornton et al. (2014) argue that the smartphones have more *cognitive salience* than ever; that is their uses are dominating individuals' thoughts and focus. Smartphones act as disruptions and distractions from everyday life and perhaps from relationships and communication. Thornton et al. conducted two laboratory studies using participants from two different statistics classes. The experiments employed digit cancellation tasks to consider the effect the presence of a smartphone has on task performance. Evidence and analysis support that smartphones may be leading to attention and performance deficits and that even the "mere presence" of a smartphone can lead to distraction (Thornton et al., 2014). Through neurological evaluations, digit cancellation tasks and trail making tests, the results indicated that the presence of the cell phone in a school setting diminishes attentional capacity and performance, as well as negatively impacting the quality of student work (Thornton et al., 2014).

In addition to being a distraction, smartphone use in the presence of others might send a message of exclusion. Through a one-year long study consisting of observations and interviews Humphreys (2005) observed individuals vs. pairs and their patterns of smart phone behavior and usage. Humphreys found that people tend to feel left out or vulnerable when smartphones take dominance in a situation because they suddenly have no one to interact with them. Humphrey suggests smartphones are merely used in social self-defense; humans feel less social anxiety when they have a form of crosstalk (Humphreys, 2005).

Using Humphreys' analysis of mobile phone usage in public settings, Hall, Baym, and Miltner studied the effects smartphones have on social norms in contexts with relational partners. Hall et al. hypothesized that if relationship partners perceive similarity between their use of mobile phones there will be a positive association with their relationship quality and a negative association with the perception that mobile phones interfere with their relationship, as well as the inverse hypothesis that participants' use of mobile phones will be negatively associated with relationship quality, and positively associated with the perception that mobile phones interfere with their relationship (2014). Humphreys had observed that someone co-present in a conversation 'has an entrenched right of way when compared to talking on the phone' (2005). Through a pilot study with a 54 item survey of five categories, 88 students from a large public Midwestern American university, were asked to rate their norms of mobile phone usage. Additionally, a second (main) study was conducted examining the variations between 69 pairs of friends and relationship partners and their individual, partner, and injunctive norms. Because of generational differences with technology, participants were under age 25. 54% were female (n=75). The surveys consisted of five sections: 4 cell phone usage norm perception sections, one relationship quality. A five-point Likert scale was used to indicate the degree to which the

participant agreed with the norm. Survey responses indicated internalized norms of the participants. The researchers analyzed if partners met each other's internalized norm standards towards smartphone usage and smartphone behavior and found that when the pairs perceived similarity between each other, smartphones interfered to a lesser degree in the relationship in public and private conversation settings (Hall et al., 2014). The relationship variable was used to measure the quality of the relationship and the results discuss mobile phone relationship interference. Regression analysis indicated that if people adhered to their internalized norms, they were less likely to use smartphones while someone they felt similar to was co-present. Additionally, the researchers also found a negative relationship between commitment and mobile phone interference, which may have implications for this thesis.

Rationale for Current Study

In many public settings, it is preferred that cellphones be silenced or left out of reach because they can be distracting to others, but does their use actually impair the formation of social bonds? A small handful of previous studies have investigated smartphone use and social relationships, but no one has conducted experiments to assess the impact of use versus non-use on different aspects of social relationships. Additionally, there is no research about whether smartphones should be discouraged from settings designed to promote group bonding (such as orientation sessions, work outings, and organizational retreats). Therefore, the present study experimentally tests whether smartphone use compared to non-use affects relationship formation for college students attending a pre-college weekend retreat.

The present study also compares whether attending a college retreat vs. not attending really creates a difference in commitment to an organizational program. Meyer and Allen's eight item model of affective commitment provided a framework for surveying participants about their

commitment to an organization on factors of personal fulfillment (satisfaction to needs, expectations met, and achievement of goals) that they feel their organizational program will meet (1997). The literature suggests that relations between individuals within an organization will influence the development of affective organizational commitment and the present study introduces the impact smartphones may have on influencing the relationships made within those organizations and how that affects affective commitment (Meyer & Allen, 1997). It is hypothesized that students who go on the retreat and comply with the experimenter's request to not use their phones will have higher levels of belongingness and commitment to their new program (an honors program) and to their new college, and less newcomer anxiety than students who go on the retreat and use their phones as they normally would and then those who did not attend the retreat at all.

Method

Design

A mixed design was used to determine if the restriction of smartphones at a college incoming-student retreat could impact levels of group commitment, anticipatory college anxiety and attitudes toward smartphone use itself. The between group variable had three levels (experimental retreat group, control retreat group, and a non-retreat comparison group) and the within group variable was time of measurement (pre-retreat test and post-retreat test). Change in six dependent variables from pre-test to post-test was measured, including college anxiety, affective group commitment, and attitudes toward smartphone use along four dimensions (attachment, social connectedness, exclusion, and social assurance).

Participants

Twenty incoming honors freshmen from a New England university participated in the study (males = 1, females = 19). All participants voluntarily chose to participate. Eight participants did not attend the retreat (n = 8) and therefore comprised the no retreat group whose only manipulation was time between pre/post responses. The retreat group was randomly split into the control group (n = 6, who could use their smartphones on the retreat as they normally would) and the experimental group (n = 6, asked to limit their smartphone use). There was one individual who completed the post-test but did not complete the pretest; therefore, they were not included in the participant count.

Instruments

Demographics. The demographic items included college major, gender, year in college, starting semester in college, and birth month/day. All five items were given on both the pre-test and post-test.

Smart Phone Usage Items. On both the pre-test and the post-test, participants were asked to indicate if they had a smartphone or not. If a participant had a smartphone they were asked to fill in the smartphone matrix of frequency of smartphone use per 14 different smartphone applications: texting, phone calls, camera, internet, news, email, games, Facebook, Instagram, Twitter, Netflix, music, Snapchat, and any other app. Using question logic in SurveyMonkey, if participants did not have a smartphone their survey ended. All 20 participants had a smartphone. The smartphone usage matrix on the pre-test indicated each participants' baseline frequency before manipulation on the retreat. On the post-retreat test, two matrices were given for participants to indicate types of usage and frequency of smartphone use on both days of the retreat. Participants who did not go on the retreat (n = 8) answered 'no' to the "did you go on

the retreat?” question and their survey ended before they could complete the matrices. Frequency of use per app was measured on a 6-point scale (1=never, 2=once in a while, 3=daily, 4=hourly, 5=minute-by-minute, 6=every other second). A total smartphone usage score reflected the sum of frequencies of the 14 matrix items.

College Anxiety. Six college anxiety questions were created by the researcher to measure participants' level of college anxiety. All items were scored based on the response given by the participant. The six items were measured based on a 7-point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree). The final score value given was used in calculating the sum of all scores for each participant in order to create one large college anxiety variable. The sum of the six items was then divided by the number of items on the scale that the participant answered.

Affective Commitment. Six affective commitment items were measured on a 7-point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree). All six items were taken from six of the eight items on Meyer and Allen's 1997 affective commitment scale in their organizational commitment model. Organizational commitment measures commitment to an individual's work organization, however, for the purpose of this study, commitment was specified as commitment to the honors program and the university. Meyer and Allen used a 6-point scale to measure their items, therefore, this commitment scale is scored slightly differently. Three of the six items on this study's commitment scale were reverse scored based on Meyer and Allen's scoring measurement scale (1991). Reverse score items subtract the item rating from eight because there were seven points on the rating scale. The sum of item ratings was then divided by six (or by the number of items answered on this scale) to get a total score for affective commitment.

Smartphone Attachment. Five smartphone attachment items were constructed by the researcher. Three of the items asked how easily the participant felt they could live without their phone and were all measured on a reverse scale. One item directly asked how attached the participant feels to their smartphone, and a fifth item asked about smartphone notification checking. The three reverse scale items were calculated toward the total smartphone attachment score by subtracting the question response from eight. All reverse items were subtracted from eight because the five items were measured on a 7- point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree). A total smartphone attachment score was calculated by adding the two normal items and three reverse scale items, and then dividing by six to get a mean smartphone attachment score. For participants who did not answer all six items on this scale, the denominator was adjusted to the number of items that they actually did answer, so that the dependent variable score accurately reflects individual participant results.

Smartphone Social Connectedness. There are nine items on this study's social connectedness scale. Five of the nine items were developed from Lee and Robbins' Social Connectedness Scale (1995) by adding "when I am using my smartphone" to the beginning of one of their items. Two of the nine scale items were developed by the researcher based on how smartphones interrupt proximal relationships and bonds. Two scale items were taken from Pavey, Greitemeyer, and Sparks' Connectedness to Other's Scale (2011) by adding "when I have my smartphone" or "when I am using my smartphone" to their items. Items were scored on a 7- point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree). Five of the nine items are reverse scored because if the participant agrees with the item they are indicating that the smartphone

makes them feel more connected to others and therefore those items are subtracted from eight to create a lower score. The remaining four items were scored based on the participants rating. All nine ratings were added up and divided by the number of items on the scale that the participant responded to. The lower the total score of social connectedness, the less the participant feels that they need their smartphone to feel socially connected.

Smartphone Exclusion. Four items in this scale measure agreement with statements that smartphone use excludes others. Three of the four items were developed from Malone, Pillow, and Osman's Rejection/Exclusion scale of their General Belongingness Scale by adding "when I/others are using their smartphones" to see how smartphones affect how people feel they belong. Based on Malone et al., all exclusion items are reversed scored (2012). These scale items were measured on a 7-point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree) as they are in Malone et al. General Belongingness Scale. The fourth item on the scale was created by the researcher and is also a reversed score item. The final exclusion score was calculated by subtracting each of the four item ratings from eight because there are seven points on the rating scale. The sum of items (after subtracting each from eight) were then divided by six (or by the number of items answered on this scale) to get a total score for affective commitment.

Smartphone Social Assurance. Seven items are measured on a 7-point scale (1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree nor disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree), slightly altered from Lee and Robbins' 6-point scale of agreement (1995). The researcher only used six of Lee and Robbins' eight social assurance items. Items regarding "a relationship to another person" were adjusted to ask about "relationship to smart phone" in order to assess how smartphones influence people's social

assurance. One of the scale items for this study was created by the researcher. Based on Lee and Robbins' scale scoring, all seven items of social assurance are reversed score items (1995). Therefore, each item was subtracted from eight because the lower the score the less a person feels they need their phone to feel socially assured. A sum of all scores was divided by the number of items on the scale that the participant completed. The final score reflected how socially assured a person feels due to their smartphone.

Appendix B provides the items of the scales of college anxiety, affective commitment, smartphone attachment, social connectedness, exclusion, and social assurance and their designated sources.

Procedure

This experiment received IRB approval in July 2016 before administration of any test materials to participants.

Recruitment. At the beginning of August 2016, a month before the start of their first college semester, a recruitment email was sent to all incoming honors freshmen at a New England university asking them to participate in completing a series of two questionnaires. The recruitment letter can be found in Appendix A. Students who wished to participate were asked to respond to the email with a simple 'yes' (indicating they were planning on attending the honors retreat) or a 'no' (indicating that they were not planning on attending the retreat); however, either response indicated that the individual would definitely participate.

Condition Assignment. In the recruitment email, participants were informed that if they were going on the retreat (those who replied 'yes') they would be randomly chosen to participate in a 'special experimental intervention' asking participants to limit their smartphone use on the two-day retreat. Groups were assigned randomly if a participant was attending the retreat,

however, if a participant indicated they were not going on the retreat, then they did not receive any form of random assignment.

Administration of Instrument. After replying to the recruitment email, participants were sent a second email containing a SurveyMonkey collector link pertaining to the pre-test questionnaire. Participants randomly assigned to the experiment group, received the following instructions in their email:

“Congratulations, you have been randomly chosen to participate in a special experimental intervention at the Honors Retreat at Camp Burgess on Aug. 20 and 21!

This intervention only calls for one thing: Limit your smartphone usage to EMERGENCIES ONLY while at the 2-day retreat. This is ONLY a 2-day request and no one will be checking in with you or making sure you are following your instructions. It is all on your own conscience. I just ask that you mindfully watch your smartphone usage and try to engage with those around you and your environment. You will not be penalized in any way if you do not follow this request, however, for the purpose of my research, PLEASE TRY TO BE HONEST TO YOUR INSTRUCTIONS AS MUCH AS POSSIBLE.

It's only 2 days of limiting your smartphone usage!! Shouldn't be too difficult. Let's see what happens!!”

Participants who were not randomly assigned to the experiment group were not given any further instruction and could use their smartphones on the retreat as they normally would. Additionally, participants not attending the retreat were not given any further instruction other than the survey link. All survey links contained the same questionnaire, and therefore, all participants were

supplied with identical questionnaires in both the pre-test and post-test. The only difference was the online collector link provided.

Participants were asked to complete the pre-test before the Honors retreat on the weekend of August 20, 2016. Before a participant could begin the pre-test, they had to agree to read the disclosure statement found in Appendix C and had to acknowledge that they were 18 years old or older. There was only one individual who was not 18 or older, and therefore, they could not participate in this experiment. A week after the Honors retreat, participants were emailed a second collector link connecting them to the post-test on SurveyMonkey.

Pairing of Data. Collector weblinks were used to link participants pre-retreat and post-retreat test scores. Participants also provided their birthday (month and day) in order to link their responses. If more than one participant had the same birthday, college major was also indicated by each participant to further link their survey responses.

Independent Variable Manipulation Check

In order to determine whether participants in the experimental group complied with the limited phone use instructions in contrast to the control group (no instruction regarding smart phones), items were included on the post-test questionnaire directing participants to report on the frequency of actual smartphone use on the retreat based on a variety of smartphone applications. Participants rated their frequency of use on a 6-point scale (1 = never, 2 = once in a while, 3 = daily, 4 = hourly, 5 = minute-by-minute, 6 = every other minute) for the 14 items: texting, phone calls, camera, internet, news, e-mail, games, Facebook, Instagram, Twitter, Netflix, Pandora (or other music apps), Snapchat, and any other applications for Day 1 and Day 2 of the retreat. The sum was calculated combining all frequency ratings of the 14 phone usage items for Day 1 and Day 2 of the retreat. Therefore, the post total phone use variable reflects an estimation of the

total phone use on the retreat for each of the retreat participants in both the experimental and control group. The mean total phone use did not differ between the groups, $t(9) = -2.107$, $p = .065$; the mean was 35 ($SD = 5.63$) for the experimental group and 42.8 ($SD = 5.42$) for the control group. Figure 1 provides the distribution within the experimental group and the control group for total frequencies of smartphone use reported on the retreat over both days.

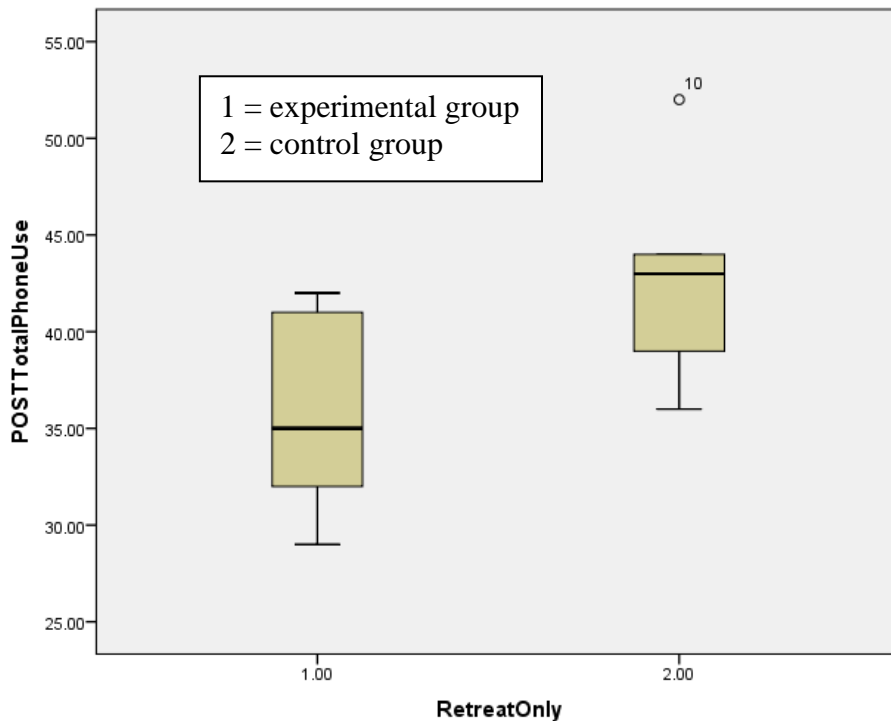


Figure 1. Combined total smartphone use on the retreat.

A second analysis checked the differences between the two groups for just texting behavior. Texting behavior was isolated because in society this is observed as a very common use of phone usage. A sum of the total texting scores were combined for Day 1 and Day 2 of the retreat. The experimental group reported a lower mean ranking for texting ($M_{\text{rank}} = 4.2$) than the control group ($M_{\text{rank}} = 7.5$). However, a Mann Whitney U test revealed the difference only approached significance, $p = .056$.

Results

Change in Dependent Variables

Table 1 below compares the medians of pre-retreat test scores and post-retreat test scores on the 6 dependent variables across all groups.

Table 1
Pre/Post Medians of Dependent Variable Scores

Dependent Variable	Pre-Retreat test Median	Post-Retreat Test Median
College Anxiety	5.58	5.25
Affective Commitment	4.75	5.17
Attachment To Phone	5.00	4.20
Social Connectedness	3.83	3.78
Exclusion due To Phone Use	3.50	3.50
Social Assurance	3.07	2.86

Differences between Experimental and Control Groups

Prior to testing the central hypothesis of this study, preexisting differences between the control group and experimental group were examined. There was a preexisting difference before the retreat between the experimental and control groups for affective commitment, $U = 5.50$, $p = .04$; the experimental group (asked to limit smartphone use) had higher affective commitment ($M_{\text{rank}} = 8.58$) compared to the control group ($M_{\text{rank}} = 4.42$). Additionally, a preexisting difference was observed for social connectedness, $U = 4.0$, $p = .02$; the experimental group had lower social connectedness ($M_{\text{rank}} = 4.17$) compared to the control group ($M_{\text{rank}} = 8.83$). For the remaining dependent variables, there were no significant preexisting differences (see Table 2).

Table 2

Test of Preexisting Differences between Experimental and Control Group Pre-test Scores

Dependent Variable	Retreat Group	N	Mean Rank	Mann-Whitney U	<i>p</i> (2-tailed)
PRE College Anxiety	experimental	6	5.33	11.00	.26
	control	6	7.67		
	Total	12			
PRE Affective Commitment	experimental	6	8.58	5.50	.04
	control	6	4.42		
	Total	12			
PRE Attachment To Phone	experimental	6	6.50	18.00	1.00
	control	6	6.50		
	Total	12			
PRE Social Connectedness	experimental	6	4.17	4.00	.02
	control	6	8.83		
	Total	12			
PRE Exclusion due to Phone Use	experimental	6	5.92	14.50	.57
	control	6	7.08		
	Total	12			
PRE Social Assurance	experimental	6	7.75	10.50	.23
	control	6	5.25		
	Total	12			

Difference scores were calculated for each of the six dependent variables to measure whether the anxiety for college, program commitment, and attitudes towards smart phones (related to phone attachment, social connectedness, exclusion, and social assurance) changed between the pre-retreat test and post-retreat tests. Performing a Mann-Whitney U test to test for between group differences in the change scores, only one difference between the experimental and the control group was found significant. Participants in the experimental group (asked to limit smartphone use) reported a greater difference between their post-test and pre-test rankings in their belief that smartphones exclude others, $U = 3.5, p = .03$ (Table 3). The participants asked

to limit their smartphone use reported greater exclusion due to smart phones ($M_{\text{rank}} = 8.3$) compared to the control group who were not given any instruction about their smartphones on the retreat ($M_{\text{rank}} = 4.08$).

Table 3
Experimental vs. Control Group Change in the Dependent Variables

Change Score on the dependent variable between pre-test and post-test	Retreat Group	N	Mean Rank	Mann-Whitney U	<i>p</i> (2-tailed)
DIFF College Anxiety	experimental	6	6.67	17.00	.87
	control	6	6.33		
	Total	12			
DIFF Affective Commitment	experimental	5	5.50	12.50	.65
	control	6	6.42		
	Total	11			
DIFF Attachment to Phone	experimental	5	5.50	12.50	.65
	control	6	6.42		
	Total	11			
DIFF Social Connectedness	experimental	5	6.50	12.50	.64
	control	6	5.58		
	Total	11			
DIFF Exclusion Due To Smartphones	experimental	5	8.30	3.50	.03
	control	6	4.08		
	Total	11			
DIFF Social Assurance	experimental	5	6.50	12.50	.65
	control	6	5.58		
	Total	11			

Figure 2 below represents the distribution of exclusion due to smartphone scores in both the experimental and control group. The box plot portrays the above significant result of greater exclusion due to smartphones in the experimental group post-test scores compared to the control group.

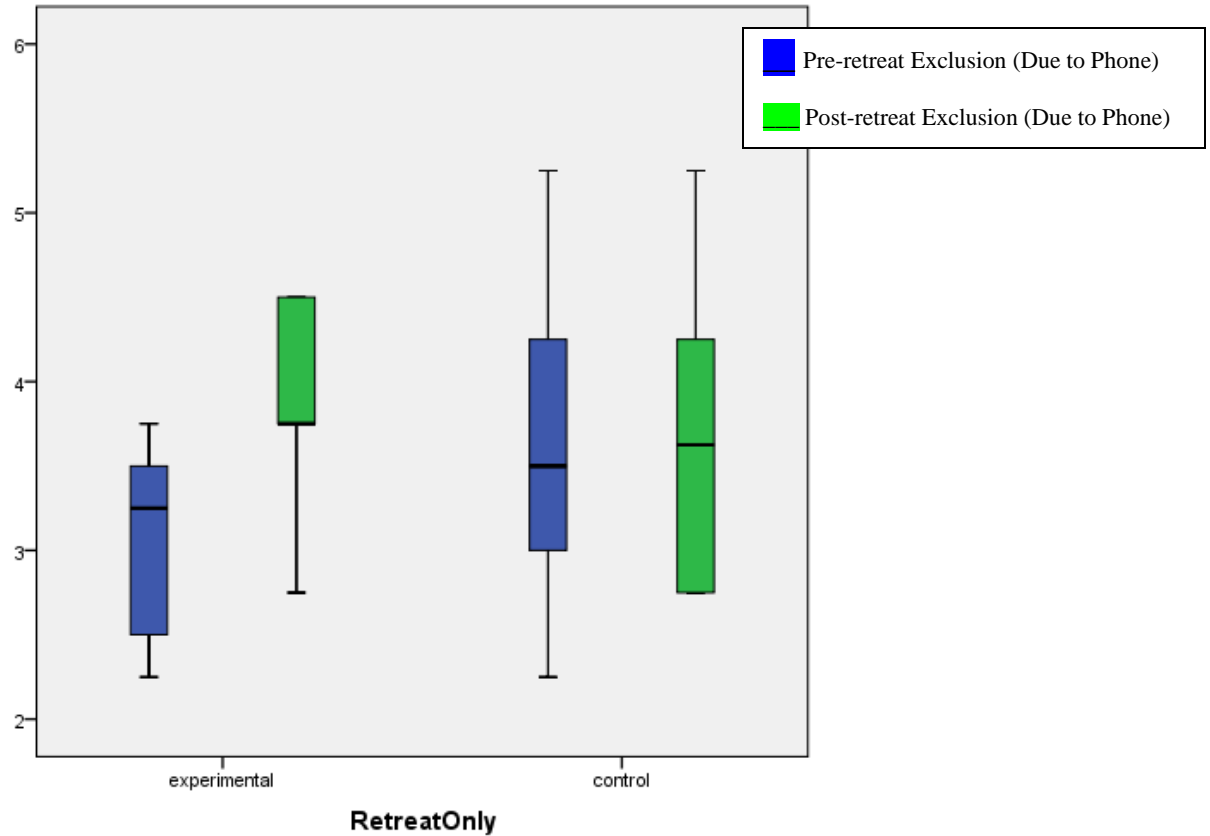


Figure 2. Pre-retreat and post-retreat differences between groups for median exclusion scores.

Figure 3 below shows the distribution of smartphone social connectedness scores and represents the pre-retreat and post-retreat differences between the experimental and control groups for median social connectedness scores. Although the median scores of the experimental group were identical in both the pre- and post-tests, there was slight variability in the pre-test scores of the experimental group. Figure 3 indicates that the distribution of social connectedness scores on the post-test appeared to favor attitudes of less social connectedness due to smartphones.

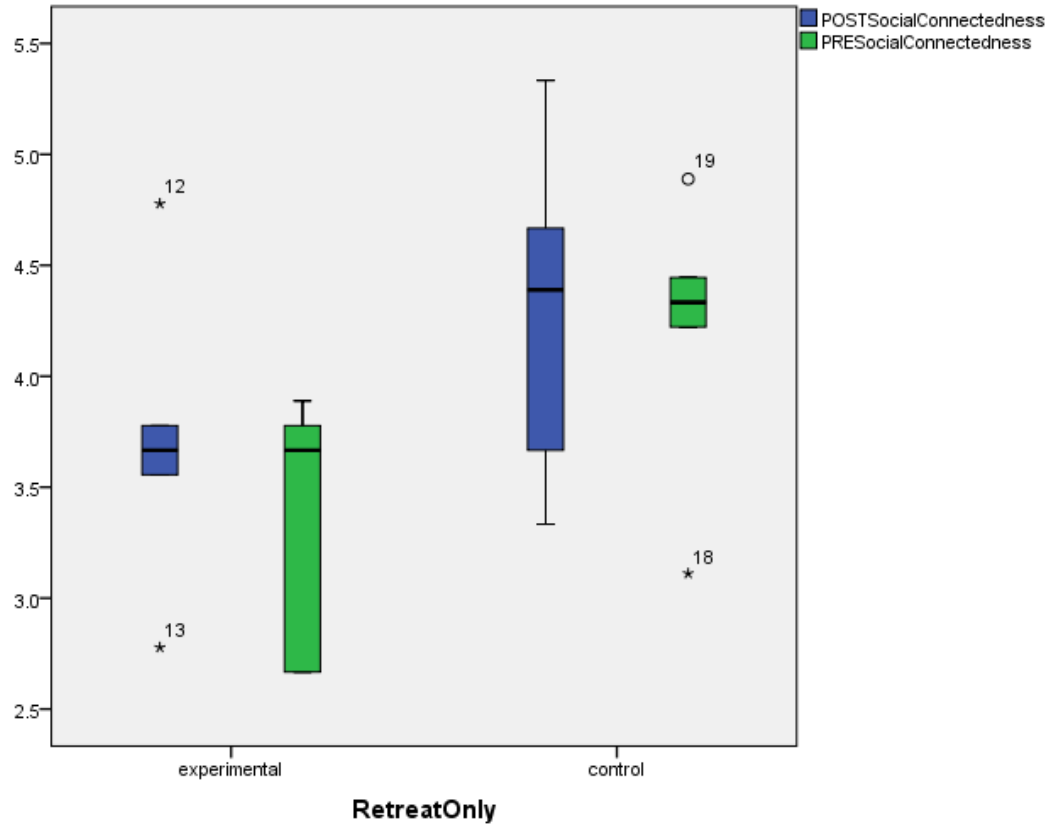


Figure 3. Pre-retreat and post-retreat differences between groups for median social connectedness scores.

Effect of the Retreat

While not the main focus of the study, the researcher was interested in determining whether the retreat itself could impact study variables regardless of smartphone instructions. Preexisting differences between participants who attended the retreat vs. no retreat were examined through a Mann Whitney U. The mean rank for college anxiety at the pretest for the non-retreat goers ($M_{\text{rank}} = 13.56$) was somewhat higher than retreat goers ($M_{\text{rank}} = 8.46$), but this difference was not significant (Table 4). Therefore, there were no preexisting differences between the retreat goers and the non-retreat goers.

Table 4

Pre-test Difference between Both Retreat Groups vs. the No Retreat Group

Dependent Variable Scores	Group	N	Mean Rank	Mann-Whitney <i>U</i>	<i>p</i> (2-tailed)
PRE College Anxiety	no retreat	8	13.56	23.50	.06
	retreaters both groups	12	8.46		
	Total	20			
PRE Affective Commitment	no retreat	8	9.44	39.50	.51
	retreaters both groups	12	11.21		
	Total	20			
PRE Attachment to Phone	no retreat	8	10.25	46.00	.88
	retreaters both groups	12	10.67		
	Total	20			
PRE Social Connectedness	no retreat	8	10.56	47.50	.97
	retreaters both groups	12	10.46		
	Total	20			
PRE Exclusion due to Phone Use	no retreat	8	9.94	43.50	.73
	retreaters both groups	12	10.88		
	Total	20			
PRE Social Assurance	no retreat	8	10.25	46.00	.88
	retreaters both groups	12	10.67		
	Total	20			

Using a Mann Whitney U test to test the effect of the retreat on college anxiety, affective commitment, and attitudes towards smartphones, pre/post differences of the six dependent variables were compared between the retreat group and the no retreat group. Results of the test only indicated a significance in the pre/post difference of exclusion due to smartphones between groups, $U = 19.50$, $p = .042$ (Table 5). One wouldn't expect there to be a difference in the change in attitude regarding smartphone exclusion between retreat goers and non-retreat goers,

therefore, it may be an artifact of the result reported above regarding preexisting differences due to the experimental and control groups on the retreat.

Table 5
Change in the Dependent Variables of Both Retreat Groups vs. the No Retreat Group

Change Score on the dependent variable between pre-test and post-test	Group	N	Mean Rank	Mann-Whitney U	<i>p</i> (2-tailed)
DIFF College Anxiety	no retreat	8	11.81	37.50	.42
	retreaters both groups	12	9.63		
	Total	20			
DIFF Affective Commitment	no retreat	8	8.50	32.00	.32
	retreaters both groups	11	11.09		
	Total	19			
DIFF Social Connectedness	retreaters both groups	8	7.50	24.00	.097
	Total	11	11.82		
	Total	19			
DIFF Exclusion Due to Smartphones	no retreat	8	6.94	19.50	.04
	retreaters both groups	11	12.23		
	Total	19			
DIFF Social Assurance	no retreat	8	8.88	35.00	.46
	retreaters both groups	11	10.82		
	Total	19			
DIFF Attachment to Phone	no retreat	8	9.69	41.50	.84
	retreaters both groups	11	10.23		
	Total	19			

Discussion

This study's purpose was to investigate whether smartphone technology is interfering with social relationships. The experiment set out to test the main hypothesis that students' attitudes of belongingness and college commitment could be changed by limiting smartphone use

during an incoming student retreat. However, the results did not provide support for this hypothesis.

The researcher hypothesized that students who went on the retreat and did not use their phones would have higher levels of belongingness and commitment to their new honors program and to their new college, and would also have less newcomer anxiety than students who did not go on the retreat, as well as those who did attend but did not limit their smartphone usage. The results did not support that students in the experimental group felt greater belongingness or affective commitment to their university or the honors program, however, limiting smartphone behavior may enable the user to attend to what is going on socially and see the negative impact of smartphones.

There was only one pre-retreat/post-retreat difference on the survey measures: compared to the control group, the experimental group had a significant difference between pre-retreat test scores and post-retreat test scores on the exclusion dimension of smartphone attitudes. Both groups attended the retreat, but the experimental group, asked not to use their phone, may have indicated higher exclusion due to smartphones because they were not able to use their smartphones while on the retreat. After the retreat, participants in the experimental group were more likely to agree with statements that smartphone use excludes others in social situations. This may reflect a result the researcher hypothesized, that smartphone behavior in social interaction leads to greater feelings of exclusion. There may have been a moment of clarity for participants in the experimental group because they were attending to the social context and realized a level of exclusion was present. However, participants also may have actually experienced exclusion if they were not using their smartphones in the social setting, but others were.

Additionally, a significant difference was found in the pre/post scores for this exclusion variable between retreat goers and non-retreat goers. However, this difference may be attributed to the change observed for retreat goers in the experimental group (rather than the control group of retreat-goers) reported above.

Limitations

Other outside factors may have influenced how participants responded to questionnaire items. Importantly, there were significant preexisting differences on social connectedness and affective commitment variables between the experimental and control groups. This confound makes it more difficult to detect a difference due to the experimental manipulation alone. Given the timeline of questionnaire distribution, some participants were already residing on the university campus due to preseason sports and were building social relationships before others had moved onto campus for the semester. This outside difference could have added to the unwanted systematic variability in the scale items about college anxiety and affective group commitment. A question the researcher should have asked to further understand participant differences is “Are you participating in other campus programs this summer, such as preseason sports?”

Additionally, there were sources of unsystematic variability in the study, such as the time frame that the pre/post-tests was administered. To allow flexibility for the participants to respond and hoping to yield a greater sample, there were 9 days to complete the pre-test and 16 days allowed to complete the post-tests. Thus, some participants completed the questionnaires a week after others. Additionally, not all participants received identical treatment. Some personally emailed the researcher requesting further instruction regarding their condition group. The

researcher responded individually to their inquiries and these clarifications could have altered their smartphone usage.

There are further concerns regarding the survey's construct validity. Although participants were asked to honestly report their smartphone use on the retreat, their resulting post-test total smartphone usage scores may not be fully valid. They may have reported the responses they thought the researcher 'wanted to hear' vs. their real amount of usage. Self-report research is always subject to response bias which can affect the validity of the questionnaire responses because participants want to be a "good subject" and may provide what they believe are socially desirable responses. Additionally, some scales used (e.g., 1=never, 2=once in a while, 3=daily, 4=hourly, 5=minute-by-minute, 6=every other second) did not reflect equal intervals. There is a large gap between daily and hourly as well as between daily and once in a while. The Likert scale values may be ambiguous and may have been interpreted differently by every participant.

A final limitation was that there were not enough participants in the sample. This limited the power of the study to test the researcher's hypotheses. The original pool of students who received the recruitment email may not have had enough incentive to complete the pre/post-tests. If there were more participants, there would have been greater statistical power.

Future Research

Due to the limitations described above, a future study should be conducted with a stronger manipulation and a larger sample. Participants in the experimental group should be asked to completely limit smartphone use (e.g., phones kept out of sight for the duration of the retreat). If significant results were obtained in such a future study for levels of college anxiety, affective group commitment, and attitudes toward smartphone use, this would have practical

implications for smartphone policies in university settings that involve new students (such as orientations and freshmen activities).

It would also be interesting to include a longitudinal component, surveying participants at the time of their expected college completion, to assess any long term college outcomes for the three study groups (retreat goers with no smartphone use; retreat goers with smartphone use; and those who did not attend the retreat). Participants could be asked to report again about their affective commitment to the program and university and their current enrollment status in both. Items could ask about levels of academic achievement and success while in college.

Future researchers can further study the significant exclusion component of this smartphone study. There are many explanations to why the experimental group felt excluded due to smartphone behavior in a social context. A future survey should ask questions based on the general belongingness scale, rather than limiting exclusion to only when smartphones are involved. General questions of belongingness would merely reflect how participants generally feel they belong in a social context. General belongingness could then be paired with perceptions of smartphones in a social context.

Again, although there was only a significant result for the exclusion variable in the present study, if the experimental manipulation was improved and the design was longitudinal, results would be informative to college administrators who are making decisions about whether or not retreats without smartphones should be offered to new/incoming college students to yield strong affective commitment and group belongingness.

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Appendix A

Recruitment Email Sent to all Participants

Dear Incoming Honors Students,

I hope your summer has been out of this world! Maybe a little traveling, great eats, beach days, fishing. But the sweet summer days are approaching an end as you countdown the days to your new journey . . . Salem State University.

My name is Emily Potorski and I am a senior psychology major in the Salem State Honors Program. In order to graduate with Honors, Honors students are required to complete an Honors Thesis research project their senior year at Salem State. Thesis projects are conducted within your major of study. I am conducting my Honors Thesis research on smartphone technology usage and its social and psychological effects on society. This research is interested in students' adjustment to college and their sense of belonging. This is the type of research that students at Salem participate in. By conducting research, Salem State students are engaged in deeper learning and thrive within their programs. . .

. . . **And this is where I ask you to participate.** Participating in my study will give you a firsthand experience of what your research may look like when you have to conduct your Honors Thesis as a Senior Honors student three years from now.

But most interestingly for you, participating in this study, like participating in Honors classes, will provide an opportunity to have a shared experience with your fellow Honors classmates. Participating in my thesis research might give you something to talk about with other students the first few days of school. So please participate in my study! It only requires completing two surveys, and you may even be asked to participate in a special experimental intervention if you are going on the Honors Retreat to Camp Burgesses. Remember however, that all research participation is **voluntary** and you can stop participating at any time if you feel uncomfortable.

This is a long email and some of you are probably only skimming it, and I don't blame you, I'd probably do the same thing. **So here is what you really need to read:**

Do you want to participate?

If you want to participate, I am asking that you REPLY to this email. When you send back a reply, this is verifying that you will DEFINITELY participate in taking my study. Your response will indicate that you will be a participant and this is how I will know who to send the survey links to.

Are you going on the Honors Retreat?

When you reply, please only reply with either a YES or NO. Reply YES if you are going on the retreat, and NO if you are not going on the retreat. Your response will let me know who is going on the retreat, but simply emailing me back tells me that you are going to participate and complete the surveys. **But your reply email will only be ONE WORD: YES or NO!**

***If I have emailed both your personal and Salem State email, please only reply with one email address.**

After you have replied yes, I will send you a new email with the link to the pretest survey. The survey takes five minutes to complete and is given twice, now and by September 2. The first survey needs to be completed by August 18th. I will send you a reminder email on August 17th.

Again, this survey is administered twice and I will send you a second email with a second link in a week, so be looking for this email the week of August 22nd.

If you want to be a participant I NEED YOU TO TAKE BOTH SURVEYS in order for your responses to be included in the data set.

When I send you the link to the survey, after you have indicated that you want to participate survey, I may also invite you to be part of a special experimental intervention. This intervention will only involve those who decide to attend the upcoming Honors Camp Burgesses Retreat on August 20 and 21 in Cape Cod. **However, EVERYONE is invited to complete the surveys even if you are not going to the retreat!**

Please watch for an email after you have replied to this one. I will send you a link and maybe an invitation for further participation in the intervention.

And remember, this is completely voluntary.

Thank You in advance if you choose to participate, I will be looking for your reply.

Have fun at the Honors Retreat if you will be attending (I will be looking for Yes and No).

Emily Potorski
e_potorski@salemstate.edu
Psychology Department
Honors Program
Class of 2016

Appendix B

Survey Items and designated sources which items were retrieved from.

Pre/Post-test Dependent Variable Scales

(R) indicates that the item on the scale was reverse scored

**Items that were created by the researcher do not cite a reference, however, references are cited for items which were taken from already existing scales and reconstructed to fit the context of this study.

College Anxiety

7 = very anxious

1 = not anxious

- I am anxious about starting college.
- I am anxious about making new friends at Salem State.
- (If applicable) I am anxious about getting along with roommate(s).
- I am anxious about regular college level coursework.
- I am anxious about Honors level coursework.
- I am anxious about spending less time with existing friends and family.

Affective Commitment to Honors Program

7 = high affective commitment

1 = low affective commitment

- I believe I will be very happy to spend my time at Salem State as a member of the Honors Program. **#1 Affective Commitment scale, Meyer and Allen (1997)**
- I believe I will not feel emotionally attached to the Honors Program. **R**
#6 Affective Commitment scale, Meyer and Allen (1997)
- I believe I will not feel a strong sense of belonging to the Honors Program. **R**
#8 Affective Commitment scale, Meyer and Allen (1997)
- I believe the Honors Program will have a great deal of personal meaning for me.
#7 Affective Commitment scale, Meyer and Allen (1997)
- I believe I will feel like a “part of the family” within the Honors Program.
#5 Affective Commitment scale, Meyer and Allen (1997)
- I believe I could become as attached to another program at Salem State as I will be to the Honors Program. **R**
#4 Affective Commitment scale, Meyer and Allen (1997)

Smartphone Attachment

7 = attached to smartphone

1 = not attached to smartphone

- I am attached to my smartphone.
- I could easily live without a smartphone. **R**
- I could easily live without my smartphone for two days. **R**

I could live without my smartphone for a whole week without feeling withdraws from having it.

R

It bothers me when I am not constantly checking my notifications.

Social Connectedness

7 = smart phone use makes user feel more connected

1 = smartphone use makes user feel less socially connected

I feel disconnected from those physically around me if they are using their smartphones. **R**

#1 Social Connectedness Scale, Lee & Robbins (1995)

When I am using my smartphone, I feel disconnected from those physically around me. **R**

#1 Social Connectedness Scale, Lee & Robbins (1995)

My smartphone interrupts the relationships/connections I make with my peers/family physically in my surroundings. **R**

When using/preoccupied with my smartphone, I catch myself losing all sense of connectedness with society. **R**

#6 Social Connectedness Scale, Lee & Robbins (1995)

When my smartphone is in my hand and others are on their smartphones, I identify with those around me. **#2 Connectedness to Others Scale, Pavey, Greitemeyer, & Sparks (2011)**

When I do not have my smartphone, I do not feel that I belong.

#2 Social Connectedness Scale, Lee & Robbins (1995)

When I am using my smartphone, I am respectful of those physically around me.

#5 Connectedness to Others Scale, Pavey, Greitemeyer, & Sparks (2011)

When I am using my smartphone, I feel distant from those physically in your surroundings. **R**

#3 Social Connectedness Scale, Lee & Robbins (1995)

When my smartphone is constantly in my hand and on my mind, I feel a bond/relation with other people in my physical surroundings.

Exclusion

7 = smartphone makes people feel more excluded

1 = smartphone makes people feel less excluded

When others are using smartphones, I feel as if they do not care about me. **R**

#4 General Belongingness Scale (Exclusion), Malone, Pillow, & Osman (2012)

When using my smartphone, I feel isolated from the rest of the world. **R**

#7 General Belongingness Scale (Exclusion), Malone, Pillow, & Osman (2012)

I feel it is rude to use my smartphone when I go out with friends/family/significant other. **R**

#9 General Belongingness Scale (Exclusion), Malone, Pillow, & Osman (2012)

When using my smartphone, my full attention is not given to those physically in my surroundings. **R**

Social Assurance

7 = smartphone makes user feel more socially assured

1 = smartphone is not needed to feel socially assured

I feel more comfortable when my phone is constantly with me. **R**

#1 Social Assurance Scale, Lee & Robbins (1995)

It is hard for me to concentrate without my smartphone beside me. **R**

#5 Social Assurance Scale, Lee & Robbins (1995)

I feel more at ease doing things together with other people when my smartphone is on my person. **R**

#2 Social Assurance Scale, Lee & Robbins (1995)

Daily activities are more comfortable when I have my phone on me rather than doing things without my smartphone. **R**

#3 Social Assurance Scale, Lee & Robbins (1995)

Daily activities are more comfortable when I know where my smartphone is rather than when I completely forget about it. **R**

#3 Social Assurance Scale, Lee & Robbins (1995)

I prefer my smartphone to be on me or within arms' reach all of the time. **R**

#6 Social Assurance Scale, Lee & Robbins (1995)

I need my smartphone to feel socially assured. **R**

Appendix C

Salem State University
Institutional Review Board (IRB)
Disclosure Statement

My name is Emily Potorski. This questionnaire is for an Honors Thesis research project I am doing to complete my senior graduation requirements. It will ask you questions about your attitudes toward smartphone technology usage, anxieties about attending college this fall 2016 and about your commitment levels to the Honors Program and to Salem State as a whole.

Filling out both the pre-test and post-test questionnaires is completely voluntary. There are no right or wrong answers. You may stop at any time. All answers will remain completely anonymous. You do not have to answer any questions that make you feel uncomfortable. However, if you wish to be included as a participant in the analysis of this data, you must submit both the pre- and post-test questionnaires.

The risks may include psychological uneasiness due to the nature of the items regarding attitudes towards smartphone usage. Additional risks may rise due to indicating your levels of anxiety regarding attending college due to levels of commitment and belongingness. However, benefits will outweigh these potential risks because this research will act as an indication to how smartphone usage is affecting society socially and psychologically. This research hopes to bring participants' and society's attention to what has happened to human relationships and behavior as a result of smartphone technology and hopefully yield the negative effects that society has been experiencing in today's world.

Understand that your name or identity will not be used in reports or presentations of the findings of this research. The information provided to the researchers will be kept confidential with the exception of information which must be reported under Massachusetts and Federal law such as cases of child or elder abuse. The results will be available online at <http://digitalcommons.salemstate.edu/> on June 1, 2017.

This research project has been approved by the Institutional Review Board at Salem State University. Thank you for your help.

For questions or concerns about the research, please contact researcher Emily Potorski at e_potorski@salemstate.edu or faculty sponsor Joanna Gonsalves at jgonsalves@salemstate.edu

For concerns about your treatment as a research participant, please contact:

Institutional Review Board (IRB)

Sponsored Programs and Research Administration Salem State University

352 Lafayette Street

Salem, MA 01970 (978) 542-7556 or (978) 542-7177 or irb@salemstate.edu

This research project has been reviewed by the Institutional Review Board at Salem State University in accordance with US Department of Health and Human Services Office of Human Research Protections 45 CFR part 46 and does not constitute approval by the host institution.