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Peterson, Erik L. *Student Survey Response: Use of SMS in Higher Education to Encourage Survey Participation*

Abstract

Surveys have been an integral mode of data collection for various industries and disciplines. Recently, a downward trend of response rates has been reported. Survey methodology has attempted to mitigate low response rates through various interventions with some degree of success. Electronic surveys, primarily Email, have gained popularity due to their low-cost and easy implementation. A newer style of contact method is now available due to smartphones and their capabilities. This research set out to explore the feasibility of Short Message Service (SMS) communication with an undergraduate student population. Participants (N = 732) were equally divided among three pre-notification levels (none, SMS, and Email), two survey delivery modes (SMS and Email), and three different follow-up reminder sequences (no reminder, one reminder, and three reminders). It was predicted that overall response rates would be different between the two modes of survey delivery, that pre-notification will increase overall response rates, and lastly number of follow-up contact attempts will be positively correlated with response rates. The population under investigation were primarily undergraduate students at an upper Midwest college. Analyses indicates that none of the interventions worked better than another.

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Table of Contents

Abstract2

Table of Contents4

List of Tables6

Chapter I: Literature Review7

 Purpose of the Study10

 Figure 1: Proposed Study Design11

 Theoretical Background.....11

 Figure 2. Interactions of Hypotheses on Response Rates13

 Sponsorship.....13

 Incentives14

 Timing of Electronic Survey Sends16

 Pre-notification17

 Initial Delivery Mode of Electronic Surveys19

 Follow-up Reminders.....20

Chapter II: Methodology.....22

 Participants.....22

 Measures23

 Pre-notification 23

 Delivery Mode 23

 Reminders 23

 Response Rate..... 23

 Survey Content..... 23

| | |
|--|----|
| Procedure | 24 |
| Chapter III: Results | 27 |
| Chapter IV: Discussion, Conclusion and Recommendation..... | 35 |
| Practical Implications..... | 35 |
| Limitations and Future Directions | 36 |
| Conclusion | 38 |
| References..... | 40 |
| Appendix A: Pre-notification Contact Script..... | 48 |
| Appendix B: Survey Invitation Script..... | 49 |
| Appendix C: Reminder Script..... | 50 |
| Appendix D: Survey Measure..... | 51 |

List of Tables

| | |
|--|----|
| Table 1: Participant Intervention Randomization | 25 |
| Table 2: Logistic Regression Predicting Survey Response from Pre-notificaton Mode, Survey Delivery Mode, and Number of Reminders (N = 732)..... | 28 |
| Table 3: Response Rate as a Function of Participant Pre-notification..... | 29 |
| Table 4: Response Rate as a Function of Participant Pre-notification Mode | 29 |
| Table 5: REsponse Rate as a Function of Participant Survey Delivery Mode | 30 |
| Table 6: Response Rate as a Function of Number of Reminder Contacts..... | 30 |
| Table 7: Response Rate as a Function of Reminder Contact Mode | 31 |
| Table 8: Means and Standard Deviations of Demographic Variables Broken Down by Pre- notificaton Level | 32 |
| Table 9: Means and Standard Deviations of Demographic Variables Broken Down by Delivery Mode | 33 |
| Table 10: Means and Standard Deviations of Demographic Variables Broken Down by Number of Reminders..... | 34 |

Chapter I: Literature Review

Since many universities utilize surveys to gauge the student body for various reasons, it is of importance to explore ways to engage students. Surveys are a popular method of data collection in academia due to their cost effectiveness and ease of reaching a large sample (Pike, 2007). Unfortunately, a major drawback of using the survey method is the trend of decreasing response rates that have been reported in the last decade (Brick & Williams, 2013). There is consensus in the literature that response rates have been declining for surveys (Atrostic, Bates, Burt, & Silberstein, 2001; Battaglia et al., 2007; Steeh, Kirgis, Cannon, & DeWitt, 2001). Meyer, Mok, and Sullivan (2015) describe a common downward trend of response rates across differing modes of survey collection in national surveys. Curtin, Presser, and Singer (2005) examined the overall response rate of a national survey and found that response rates declined about 1.5% annually between the years of 1997 and 2003. A variety of interventions to increase response rates have been utilized (Cook, Heath, & Thompson, 2000; Fan & Yan, 2010; Porter, 2004; Umbach, 2004). Due to the exponential growth of technology and a linear growth of the literature, a disconnect appears to exist when it comes to technology use in survey methods. The lag between the literature and practice gives the impression that survey research is transferable throughout collection methods whether conducted via electronically or through traditional mail. This study examines factors associated only with response rates for questionnaires utilizing electronic methods. Specifically, this study will contribute to the literature by examining the use of short message service (SMS) and survey participation at a college in the upper Midwest.

Survey non-response has been a growing concern in the literature for the last few decades. Atrostic et al., (2001) reviewed federal surveys and found that nonresponse has been increasing since the early 90's in the United States. Singer (2006) also examined multiple

sources finding similar patterns as Atrostic et al. (2001). Brick and Williams (2013) also examined survey nonresponse in household surveys. They have found that, since 1997, increases in nonresponse have been trending upwards over time. The decrease in response rates poses a problem for higher education. Pike (2007) indicates that around 60% of research published in education journals use surveys as a mode of data collection. Galea and Tracy (2007) described two main reasons why survey response rates have declined over the last few decades; refusals have increased and obtaining potential participants has become more difficult in years past. Galea and Tracy (2007) conclude that research participants are over-burdened by survey requests that can involve complicated research protocols while the general population has seen a decrease in volunteerism in the recent decades. Another issue that they described is a blurred perception of the survey research goal (marketing or research) and the potential respondents' inability to distinguish between the two leading to what they describe as a reduced sense of the trust in science. Presser and McCulloch (2011) examined federally sponsored surveys that were filed for approval between 1984 and 2004. They attempted to examine the credibility of the assumption that the United States has become an "over-surveyed" society. By examining the amount of surveys that were administered by the federal government, they were able to gain some credence that the US has become "over-surveyed". They report that the number of survey requests had about a 50% increase over the 20-year period that they examined. They also found that during that same timespan, sample sizes increased nearly 300%. With the combination of larger samples and more surveys it is clear that the US population has become surveyed more frequently. Presser and McCulloch (2011) clearly acknowledged the limitations of their research by stating that the survey data that they had collected may not be directly compared to all sectors/industries

in the US. However, they express optimism that their results can be used as a general guide of various sectors/industries in the US.

Non-response to surveys can potentially alter or bias the data that are collected, leading to conclusions that may be incorrect about the population under investigation (Massey & Tourangeau, 2013). One way that researchers attempt to mitigate this effect is to obtain high response rates. By definition, as response rates increase, the likelihood of obtaining bias responses should decrease (Keeter et al., 2000). This inverse relationship has been the main defense of researchers combating biased results. Kreuter, Muller, and Trappmann (2010) found that increased effort to obtain a higher response rate reduced bias in respondent characteristics. Mazor, Clauser, Field, Yood, and Gurwitz (2002) also found that patient satisfaction of providers yielded biased data when response rates were low. However, the relationship of unit non-response and response rate should be examined with healthy skepticism. Research investigating the effect of biased results has described that a low response rate is not always a legitimate reason to dismiss collected survey data. Pernger, Chamot, and Bovier (2005) explored different time frames of responders and found that data collected from early-responders (representing a 30% response rate) was not significantly different from the full sample (which had an overall response rate around 70%). Van Horn, Green, and Martinussen (2009) conducted a meta-analysis consisting of 308 articles representing about 170,000 survey participants. Between all studies they found that the weighted average of survey response rates were 49.6%. Interestingly, their literature search revealed very few web surveys with adequate sample sizes and were withheld from the main analyses; of the web surveys that they did reveal, they calculated a mean response rate of 43.0%. Manfreda, Berzelak, Bosnjak, Haas, and Vehovar (2008) conducted a meta-analysis comparing surveys that were conducted via web and another method. They concluded

that, on average, web surveys received an 11% lower response rate than other survey modes. Although not significant, they found some supporting evidence that when population type was used as a moderator the response rate differences were more similar between web and other survey methods compared to other population types (employees, professionals, and the general public). Another study by Millar and Dillman (2011) examined response rates of college students who were randomized into different groups of contact modes. They found that initial web invitations with a mailed follow-up reminder was just as effective as mailed invites with mailed follow-up reminders. Overall, the literature gives guidance on what may or may not work. However, it appears that little research is conducted solely on survey response rates, but rather, that this goal is a secondary interest in most research (e.g., it appears that data are typically collected on real variables as well so as not to “waste” a data collection effort).

Purpose of the Study

The primary purpose of this study was to examine survey response rates of two different electronic modes of distribution with a student population. The survey distribution modes to be examined will be SMS and Email (see Figure 1). The findings of this research were used to gain further insight into the practicality of using SMS communication and Email communication methods in survey research. Independent variables examined by this study will be pre-notification, number of follow-ups, and method of survey delivery and the affects that they have on survey response rates. Since little information currently exists on the utilization of SMS survey delivery mode in survey research, this study aims to explore the feasibility of SMS survey delivery to participants. Findings will not only shed light on the feasibility of SMS as a survey delivery mode but will also offer a foundation for further exploration by having a direct comparison between the established and widely used Email method of survey delivery.

The paper is organized in as follows. First, a review of the literature will be offered, which will include the theoretical foundation, pre-notification, initial delivery mode of electronic surveys, timing of electronic survey sends, follow-up reminders, sponsorship, and incentives. This will be followed by the proposed study methodology examining the two different survey modes and survey response rates among a college population. Results and discussion will follow.

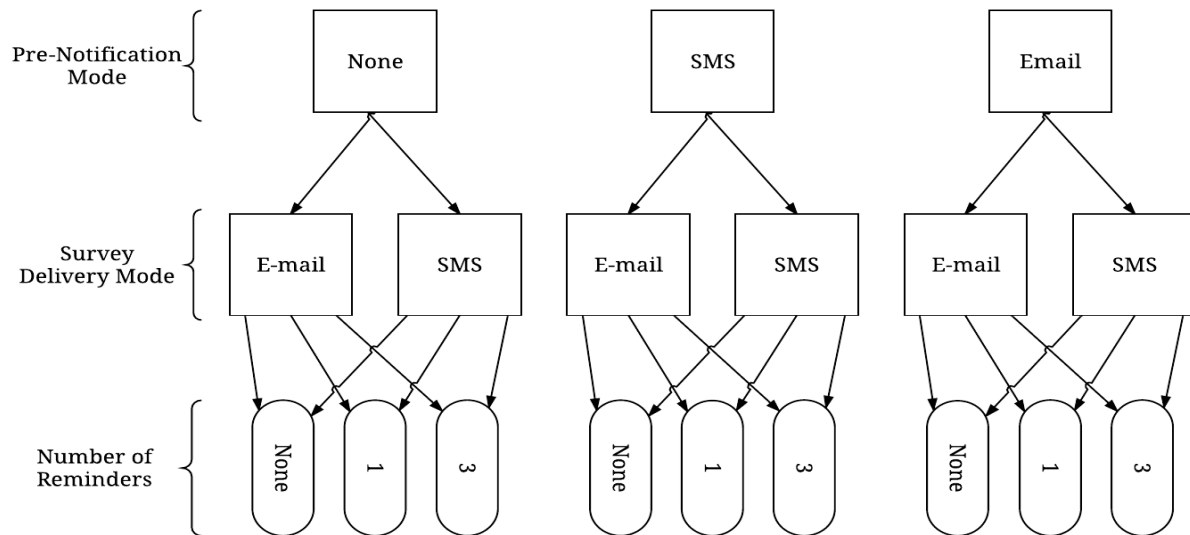


Figure 1. Proposed study design.

Theoretical Background

According to Leverage-Saliency theory, as proposed by Groves, Singer, and Corning (2000), individuals decide to participate in a survey when an individual perceives more positive survey attributes than negative survey attributes. They describe these survey attributes as being on opposite sides of a beam that is balanced on a fulcrum – thus, the benefits must outweigh the costs for someone to engage in the survey. The point that the fulcrum intersects the beam is dependent on the salience of the topic for the individual. This implies that, for each individual, the factors that may encourage a response can differ. The positive and negative attributes, as perceived by the respondent, are driven by how the researcher solicits the attributes. The

solicitation made to the respondent should make the positive attributes (e.g., survey topic importance, minimal time to complete, potential benefits of the research, incentives) of the survey more salient than the negative attributes (e.g., topic, confidentiality concerns). When an individual's perception of the positive survey attributes carry more weight than the negative attributes, a respondent is more likely to respond to the request. Consider the following ten individuals. Five individuals have a vested interest in politics, whereas the other five have very little interest in politics. According to Leverage-Saliency theory, it will be more likely that the individuals with a vested interest in politics will respond more often than the five individuals who have little interest in politics simply due to the topic salience. Each of the ten individuals may view the survey attributes differently by ranking them differently, thus assigning different weights to specific attributes. The weighting of these specific attributes can be a combination of conscious and sub-conscious thought. According to this theory, the individuals who view the topic as being more salient will be easier to encourage to participate in the survey than those who have less interest in the topic.

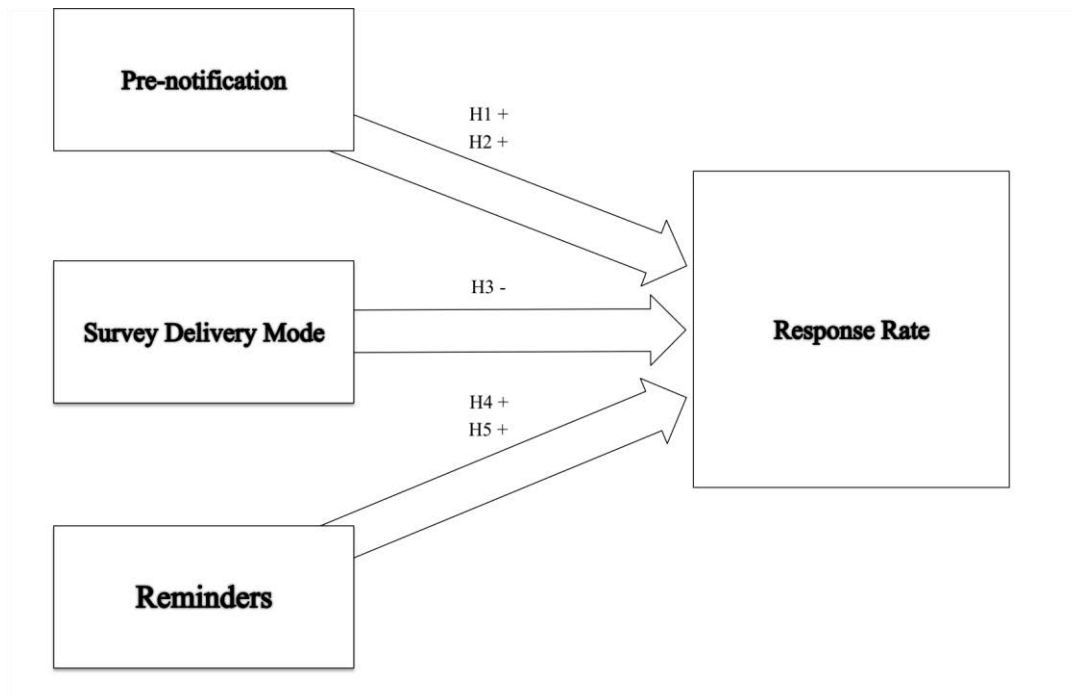


Figure 2. Interactions of hypotheses on response rates.

Sponsorship

Sponsorship of surveys is also a factor that has shown to influence survey response rates. Sponsorship refers to the person, institution, or organization that is requesting the survey. In academia, it is common for students to get surveys from various departments of the university such as housing, admissions, safety, and educational departments. Research indicates that response rates are generally higher when sponsors are associated with academia and government agencies when compared to businesses (Fan & Yan, 2010; Groves, Presser, West, & Couper, 2012; Porter, 2004). For example, Joinson and Reips (2007) examined the power of the survey sender. They found that, in combination with a personalized salutation, that those who received requests were more likely to respond to the survey request (Joinson & Reips, 2007). In a related vein, Edwards, Dillman, and Smyth (2014) manipulated survey sponsors between two universities for two regions in the US to determine if a local university would produce different response rates than a university that was geographically further away. Participants were

randomized to two different sponsor levels, local and non-local, they found that participants that received a survey sponsored by a local university had the highest responses rates between the two conditions. Boulianne, Klofstad, and Basson (2011) examined university faculty and students to determine if the university research center would perform as equally as well as the actual department sponsoring the survey in an online survey. While they found no difference in response rates between the two sponsors, they did find that those exposed to the actual department had a significantly lower break-off rate (participants who enter a survey but never complete the survey) than those who were exposed to the more generic university research center sponsor condition.

In summary, the literature supports that a prominent individual or entity tied to the survey topic appears to increase response rates for surveys, whereas sponsors that have loosely tied affiliations, are not prominent with the survey topic, or that are a sponsoring organization that is not geographically close in proximity to the respondent may not be beneficial to increasing response rates.

Incentives

In addition to sponsorship, Singer and Ye (2013) stated that incentives have been particularly useful at increasing response rates in all modes of surveys. Two types of incentives are commonly used within the survey research realm, pre- and post-paid incentives. A pre-paid incentive commonly used is monetary in nature. Survey researchers commonly include a dollar bill or some amount of money in the survey when it is initially sent out. The research on the amount to include with the initial mailing is somewhat unclear (Görizt, 2006). It has been demonstrated that as the incentive amount increases responses are likely to increase as well (Singer & Ye, 2013). However, the relationship between increased incentive amount and

response rates are commonly non-linear and have diminishing returns (Cantor, O'Hare, & O'Connor, 2007). The variability found within the research is likely to be a product of many variables at play. A prominent variable is likely the difference in the mode of the survey such as face-to-face interviews, telephone, mail, and Email distribution. Mercer, Caporaso, Cantor, and Townsend (2015) explored response rates and the effect of incentive value in household surveys using different methods of contact over a twenty-one-year period. They determined that pre-paid incentives were the most efficient at increasing response rates in mail and telephone surveys. They also found that the most effective dollar value for increasing response rates is between \$0 and \$1 while response rates taper off relatively fast once incentives exceed \$2. Likewise, Larose and Tsai (2014) found that college students who were offered a pre-paid incentive responded most frequently, followed by students who were entered into a sweepstakes drawing, while the student group that had the lowest response rates were not offered an incentive. A post-paid incentive is another alternative used in survey research. In general, most post-paid incentives are in the form of a gift card or novelty service conditional upon the completion of the survey. Brown et al. (2016) explored the use of post-paid incentives in an electronic survey of California medical patients and found that a five-dollar incentive was effective at increasing response rates.

Lottery incentives are a type of post-paid incentive frequently used in survey research (Singer & Ye, 2013). This type of incentive enters a participant into a raffle giving them a chance to win a prize. Lottery incentives ultimately can be used to reduce the costs of the incentive to the researcher by only offering a limited quantity of prizes to the survey participants. Due to the feasibility of sending out a pre-paid incentive in web surveys, it is likely that post-paid incentives are offered more often when surveys are web based. A meta-analysis by Church (1993) revealed no supporting evidence of post-paid incentives in mail surveys. Porter and

Whitcomb (2003) explored the use of lottery incentives in survey research and concluded that lottery incentives can be wasteful when applied to college and universities. On the other hand, some research indicates that lottery incentives are more effective in certain populations, college students being one of them. Laguilles, Williams, and Saunders (2011) found evidence that lottery incentives are effective in higher education. They examined four different studies conducted at a university and found that incentives lead to around a five- to ten-percent increase in response rate when compared to their control group that did not receive any incentive. Similarly, Heerwegh (2006) also found that lotteries can be a useful tool to encourage survey participation in the student population. Interestingly, he also found a difference in response rates between males and females in participation indicating that the lottery incentive was more effective at encouraging females to respond.

Timing of Electronic Survey Sends

Very few studies can be found in the literature regarding the send time of electronic surveys. Faught, Whitten, and Green (2004) appear to be the first to examine the relationship of initial electronic survey send times and response rates. With a relatively large sample, they examined time of day (AM/PM) and day of week send times and the effect that they had on response rates. They concluded that Wednesday mornings produced the highest response rates. Lewis and Hess (2017) examined response rates as a factor of send times as well and found support that Tuesday mornings were the most productive time to send Email surveys and receive a response. However, their research only examined send times in the morning and afternoon of Tuesday, Wednesday, and Thursday. Paraschiv (2013) systematically examined send times and click rates of electronic surveys in a national US sample. They found that sending a survey invitation on a Friday elicited the highest survey open rates. They examined the timing of sends

as well and found that surveys sent between 12pm EST and 8pm EST had the highest survey entrance rates. However, Paraschiv (2013) did not factor in respondent location, therefore not taking into consideration that the US spans 4 time zones. It would be beneficial to narrow down the percentage of respondents by time zone, as EST is 4 hours earlier than PST. Therefore, these findings indicate that people on the east coast (PST time zone) are more likely to enter into a survey between the hours of 8am and 4pm. The difference found between these studies could possibly be due to the different populations used for the sample and other survey attributes. Although the combined research on the timing of electronic survey send times does not give definitive direction on what day of the week or time of day to deliver surveys it does offer some insight and direction on what may not be the most effective at increasing response rates.

While the above influences on response rates have been explored with some frequency, the following factors have less evidence. In review of the literature, a variety of interventions exploring response rates in electronic survey methods have been explored. The factors reviewed in this research include pre-notification, initial delivery mode of surveys, timing of electronic sends, follow-up reminders, sponsorship, and incentives. Researchers have also examined other factors influencing response rates such as scrolling vs paging survey designs (Mavletova & Couper, 2014; Peytchev, Couper, McCabe, & Crawford, 2006), invitation design (Porter & Whitcomb, 2003), and personalization (Heerwegh, Vanhove, Matthijs, & Loosveldt, 2005). The variables to be examined in this study include: pre-notification by delivery mode, invitation delivery mode, as well as number of subsequent reminders by delivery mode.

Pre-notification

Some survey researchers use a technique of notifying participants that they may be receiving a survey – this is commonly referred to as a pre-notification letter or pre-contact. This

technique is typically sent in some form of a cover letter or brochure that addresses respondents and notifies them that they will be receiving a survey. In the context of electronic surveys, researchers may not have enough information on participants that allow them to reach out through the postal system to physically mail a pre-notification letter/brochure. In these instances, some researchers have opted-in to an electronic method of delivery. Keusch (2012) explored Email pre-notification in a group of IT managers from Austria. They found that people who were pre-notified via Email of an upcoming web survey were more responsive to the survey request. Overall, survey response rates were about seven percent higher when they were pre-notified (Keusch, 2012). McCallister and Otto (2008) explored post-card and Email pre-notification modes for a mail survey and found that people who were sent an Email pre-notification were the most likely to respond to the survey request than their post-card counterparts. Some researchers have also examined the effectiveness of SMS pre-notification and have published mixed results. A national Australian study examined the effectiveness of SMS pre-notification in a telephone survey, they found people who received an SMS pre-notification were more likely to cooperate and respond compared to people who did not receive any pre-notification (Dal Grande, Chittleborough, Campostrini, Dollard, & Taylor, 2016). Bosnjak, Neubarth, Couper, Bandilla, and Kaczmirek (2007) examined SMS pre-notification and Email pre-notification at a German university. They found that people responded to an Email survey more frequently when an SMS pre-notification was used compared to an Email pre-notification. Unfortunately, the findings of SMS contact methods do not appear to be transferable to all studies or samples. Starr, McPherson, Forrest, and Cotton (2015) found no difference in overall response rates between SMS pre-notification and group who received no pre-notification for a medical survey delivered by mail in the United Kingdom.

Overall, it appears that survey pre-notification can be effective at encouraging participants to respond to web survey requests. Given the mixed findings within the literature, it appears that there may be more complex factors associated with pre-notification in electronic surveys. Here, it is hypothesized that individuals who have been pre-notified will have a higher response rate than those who have not been pre-notified of an upcoming survey request.

H1: Groups that have been pre-notified will have a higher response rate compared to the control group that did not receive a pre-notification.

H2: Those who received a pre-notification via SMS will have higher participation rates than those who received a pre-notification via Email.

Initial Delivery Mode of Electronic Surveys

A secondary variable of interest in this research is the difference of overall response rates between Email and SMS initial survey delivery. Only one article pertaining to the comparison of Email and SMS invitation mode has been found in the literature. Mavletova and Couper (2014) examined contact mode (Email and SMS) for survey invitations and follow-ups in a study in Russia and found that SMS survey invitations did not outperform its Email counterpart. This immediate research will explore the initial invitation of feasibility of SMS as a delivery mode in the United States. Mavletova and Couper (2014) explained that the participants utilized resided in Russia with a very different technology infrastructure that is not comparable to other countries (i.e., mobile speeds 16 times slower and less mobile coverage overall than the US). The other difference between this immediate research and previous work done by Mavletova and Couper (2014) was the condition that all participants were completing a follow-up survey and were asked if they could be contacted by Email or text. This research will be examining initial contacts and subsequent follow-up contacts.

H3: SMS survey delivery mode will have lower overall response rates compared to the Email group.

Follow-up Reminders

Number of contacts has been a factor of interest in survey research for quite some time. It has been well established in the literature that follow-up reminders can be a great tool to encourage participants to respond to surveys in traditional mail surveys (Cook, Dickinson, & Eccles, 2009; Edwards et al., 2009; Erdogan & Baker, 2002) and Email surveys (Cook et al., 2000). Most research indicates little difference between collection methods (Email or mail distribution) and the impact of frequency of contacts has on response rates (Cho, Johnson, & Vangeest, 2013). Some research suggests that after initial contact, at least one follow up reminder be sent for Email surveys (Umbach, 2004). Dillman (2000) explains that one- to three- follow-ups yield the highest response rates. Lewis and Hess (2017) explored the three different reminder sequences of a web survey and found that reminders that were sent on a Tuesday performed substantially better than a rotating or dynamic reminder sequence. The rotating sequence had pre-determined send times for the whole cohort. For example, those who received an initial send time on Tuesday AM would receive their first reminder on Tuesday PM the following week while their second reminder would be sent on Wednesday AM the week after. This sequence would continue through Thursday PM. Those assigned to the dynamic sequence condition did not have pre-determined send times, but rather used a statistical technique that was updated weekly that predicted what the best send time would be. Studies have also recently demonstrated that SMS reminders can be useful at encouraging people to respond to surveys. Virtanen, Sirkia, and Jokiranta (2007) examined the effectiveness of SMS reminders and traditional post card reminders in a national sample in Finland. They found that SMS reminders

were more efficient at increasing response rates compared to postcards in a paper survey.

Likewise, SMS reminders were found to be more effective in mobile web surveys than an Email counterpart (Mavletova & Couper, 2014). As such, the following predictions are made:

H4: Those who receive three reminders will have a higher response rate than those who received one reminder or no reminders.

H5: Those who receive SMS reminders will have a higher response rate than those who received an Email reminder.

Chapter II: Methodology

The objective of this paper was to determine if different types of contact modes and number of contacts had any impact on survey participation rates in undergraduate students. Participants were randomly assigned to one of the conditions 18 conditions and sent an invitation to complete a survey. Responses rates were then explored via logistic regression.

Participants

Participants of interest in this research were students attending institutes of higher education. For this research, the sample consisted primarily of undergraduate students at the University of Wisconsin – Stout. Eight-hundred participants that had a phone number and Email address on file were obtained from the university and randomly assigned into one of the study conditions. In order to create equal groups among the 18 intervention levels participants were randomly assigned into a pre-notification level, delivery mode level, and a reminder level. In order to be eligible to be randomized into a SMS level for pre-notification or delivery mode, all phone numbers of participants were run through a system hosted by Twilio® to determine if phone numbers were valid mobile phone numbers capable of receiving SMS messages. Of the 800 participants, only 487 participants had valid mobile phone numbers. The remaining phone numbers were classified as: not a valid phone number (n = 3), VoIP (n = 8), or a landline (n = 302). One phone number was linked to two student email addresses. These two participants were placed into Email only conditions. After determining the number of valid phone numbers, randomization of the sample was conducted. The goal was to have a nearly equal number of participants in each condition. SMS capable phone numbers dictated the number of people placed in each condition. This led to using only 732 participants from the pool of 800. The randomization breakdown can be seen below in Table 1.

Measures

The primary interest of the researcher was whether, based on the manipulation of 3 independent variables, students would respond to a survey.

Pre-notification. Pre-notification consisted of two levels: those who received a pre-notification contact and those who did not. If participants were randomly selected to receive a pre-notification, they were also randomly assigned to a specific delivery mode for pre-notifications. See Appendix A for pre-notification script.

Delivery mode. Participants were randomly assigned to either receive invitations and reminders through Email or SMS. Pre-notification delivery mode was independent of initial invitation and reminder contacts. For example, a participant could have received a pre-notification through an SMS and then received the initial survey invitation and reminders via Email. Refer to Figure 1 for a visual representation.

Reminders. Participants were split among three levels of reminders: no reminder, one reminder, and three reminders. Reminders were delivered through the same method as the survey invitation was delivered. See Appendix C for reminder contact script.

Response rate. Response rates were captured for each of the conditions by computing the number of students that responded in each condition by the total number invited to respond.

Survey content. The survey consisted of a variety of measures compiled together to gauge time use and sense of school-life balance in college students. The measure descriptions can be found below with a reference to the associated appendix with the specific measure questions. See Appendix D.

Procedure

Eight-hundred student Email addresses and telephone numbers were requested from the university. A total of 732 of the 800 students with both telephone numbers and Email addresses were randomly assigned to one of the three pre-notification levels (none, Email, and SMS). Each of those three groups were further broken down into the two survey delivery modes (SMS and Email). The survey link was sent through either Email or SMS (See Figure 1). The link was a shortened hyperlink (such as bit.ly) to accommodate the limitations inherit in SMS protocols. Three levels of follow-up reminders were created from each delivery level of the study (none, one, and three). See Table 1.

Table 1

Participant Intervention Randomization

| Pre-notification Mode | <i>n</i> | Delivery Mode | <i>n</i> | Number of Reminders | <i>n</i> |
|-----------------------|----------|---------------|----------|---------------------|----------|
| None | 244 | Email | 123 | None | 41 |
| | | | | One | 41 |
| | | | | Three | 41 |
| | | SMS | 121 | None | 40 |
| | | | | One | 40 |
| | | | | Three | 41 |
| Email | 244 | Email | 123 | None | 41 |
| | | | | One | 41 |
| | | | | Three | 41 |
| | | SMS | 121 | None | 40 |
| | | | | One | 40 |
| | | | | Three | 41 |
| SMS | 244 | Email | 122 | None | 40 |
| | | | | One | 41 |
| | | | | Three | 41 |
| | | SMS | 122 | None | 40 |
| | | | | One | 41 |
| | | | | Three | 41 |

Since SMS messages have a 160-character length maximum, all contacts to participants, regardless of method, were the same with the exception of an email subject line for those who

were randomized into an email condition. Therefore, if participants were contacted through Email, the body of the email contained the same message as those that were contacted through SMS. The reasoning behind participants receiving the same message regardless of contact method was to control any difference between wording or length of pre-notification and contact letters that were sent to the respondents.

All participant contact was mediated by the university Qualtrics system using a student account. Pre-notification was sent to all students that were randomized into a pre-notification level (see Appendix J for pre-notification contact letter). Participants were contacted through their assigned method (SMS or Email) on a Tuesday morning. Pre-notification was identical between the two pre-notification groups except *where* the student should expect to receive their survey. About 48-hours after the pre-notification was sent (Thursday morning), the survey was delivered to all students in the study through their assigned method (see Appendix K for survey invitation letter). Monday morning (72-hours after the invitation was sent) the first wave of reminders was sent out to all students in a reminder condition (see Appendix L for reminder contact letter). The three-reminder group was sent the second and third reminders later in the week, about 72-hours after each subsequent contact. All reminders were delivered through the same method that they received their survey through. All reminder scripts were the same regardless of contact attempt.

Chapter III: Results

The primary goal of this research was to gain further insight into survey response rates of electronic surveys. The focus of this research was based around Email and SMS contact modes. The research attempted to examine the use of pre-notifications, survey delivery, and reminders as a function of contact modes. Further examination of the research hypotheses can be found below.

A logistic regression was conducted to examine the set of predictors consisting of pre-notification mode, survey delivery mode, and number of reminders on response (responded/did not respond). The referent group was students who received no pre-notification and no reminders. The full model containing all predictors was statistically nonsignificant, $\chi^2 (5, N = 732) = 3.45, p = .631$, indicating that pre-notification, survey delivery mode, and reminders did not have an impact on participation in the online survey. The full model including the three intervention variables was no better than predicting survey participation as indicated by a Nagelkerke R^2 value of .01. Although the full model classification table indicates that 93.2% of the participants were correctly classified, this is not an improvement over the constant only model. No relationships were found between any intervention type and survey participation. See Table 2.

Table 2

Logistic Regression Predicting Survey Response from Pre-notification Mode, Survey Delivery Mode, and Number of Reminders (N = 732)

| Survey Participation | <i>B</i> | <i>SE B</i> | Wald | <i>p</i> | Odds ratio | 95% CI |
|------------------------|----------|-------------|-------|----------|------------|------------|
| Constant | -2.92 | 0.39 | 56.32 | .000 | 0.54 | |
| No Pre-notification | | | 0.56 | .754 | | |
| Email Pre-notification | 0.19 | 0.35 | 0.28 | .598 | 1.20 | 0.60, 2.40 |
| SMS Pre-notification | -0.07 | 0.37 | 0.04 | .849 | 0.93 | 0.45, 1.93 |
| Delivery Mode | -0.16 | 0.30 | 0.30 | .586 | 0.85 | 0.48, 1.52 |
| No Reminders | | | 2.51 | .285 | | |
| 1 Reminder | 0.59 | 0.37 | 2.51 | .113 | 1.81 | 0.87, 3.76 |
| 3 Reminders | 0.35 | 0.39 | 0.83 | .362 | 1.43 | .07, 3.05 |

Response rates for each intervention group have been calculated by number of individuals in the intervention group over number of individuals completing over 80% of survey. The compiled survey consisted of 62 questions and took an average time of 7 minutes and 29 seconds to complete. Overall, 83 participants started the survey and 50 completed at least 80% of the survey. The remaining 33 participants completed less than 80%. Thus, the dropout rate, or those who started the survey but did not complete the survey, was about 40%. Descriptive statistics were conducted for each intervention grouping and compared across all study conditions to determine if certain demographics are more likely to respond to an intervention these demographics can be found in Table 8, Table 9, and Table 10 below.

The first prediction was that having a pre-notification would result in higher response rates compared to those that did not receive a pre-notification (H1). Although there was a *slightly* larger percentage of responses with a pre-notification, this difference was not significant (see Table 3).

Table 3

Response Rate as a Function of Participant Pre-notification

| | Participant Pre-notified | | Total |
|-------------------|--------------------------|------|-------|
| | No | Yes | |
| Response Rate (%) | 6.6% | 7.0% | 6.8% |

The second prediction was that those who received a pre-notification via SMS would have higher participation rates than those who received a pre-notification via Email (H2). A relatively modest spread of response rates between pre-notification modes was found. However, the differences were not significant (see Table 4).

Table 4

Response Rate as a Function of Participant Pre-notification Mode

| | Pre-notification Mode | | | Total |
|-------------------|-----------------------|------|-------|-------|
| | None | SMS | Email | |
| Response Rate (%) | 6.6% | 6.1% | 7.8% | 6.8% |

The third prediction was that SMS survey delivery mode would have lower overall response rates compared to the Email group (H3). Although SMS delivery mode did have a lower response rate than the Email delivery mode, the difference between the delivery mode was not significant (see Table 5).

Table 5

Response Rate as a Function of Participant Survey Delivery Mode

| | Delivery Mode | | |
|-------------------|---------------|-------|-------|
| | SMS | Email | Total |
| Response Rate (%) | 6.3% | 7.3% | 6.8% |

The fourth prediction was that those who receive three reminders would have a higher response rate than those who received one reminder or no reminders (H4). The data indicated that those who receive one reminder performed the best. However, this difference between the number of reminder contacts was not significant (see Table 6).

Table 6

Response Rate as a Function of Number of Reminder Contacts

| | Number of Reminders Contacts | | | |
|-------------------|------------------------------|------|-------|-------|
| | None | One | Three | Total |
| Response Rate (%) | 5.0% | 8.6% | 6.9% | 6.8% |

Lastly the final prediction was those who receive SMS reminders would have a higher response rate than those who received an Email reminder (H5). The data supported a contradictory trend. Although a 1% difference was found between the groups, this difference was not significant (see Table 7).

Table 7

Response Rate as a Function of Reminder Contact Mode

| | Reminder Mode | | |
|-------------------|---------------|-------|-------|
| | SMS | Email | Total |
| Response Rate (%) | 6.3% | 7.3% | 6.8% |

Demographic descriptive statistics were broken down by randomized pre-notification mode, survey delivery mode, and number of reminder contacts. See Tables 8, 9, and 10, respectively.

Table 8

*Means and Standard Deviations of Demographic Variables Broken Down by Pre-notification**Level*

| Demographic variable | Pre – notification category | | |
|--|---|--|--|
| | No pre-notification (<i>n</i> = 16) | SMS pre-notification (<i>n</i> = 15) | Email pre-notification (<i>n</i> = 19) |
| Age (<i>M</i> [<i>SD</i>]) | 23.1 (9.2) | 23.2 (7.1)* | 25.9 (12.6) |
| Class Standing Frequency (% within) | | | |
| Freshman | 6 (37.5%) | 2 (13.3%) | 6 (31.6%) |
| Sophomore | 2 (12.5%) | 3 (20.0%) | 2 (10.5%) |
| Junior | 3 (18.8%) | 3 (20.0%) | 5 (26.3%) |
| Senior | 5 (31.3%) | 7 (46.7%) | 6 (31.6%) |
| Gender Frequency (% within) | | | |
| Male | 6 (37.5%) | 7 (46.7%) | 13 (68.4%) |
| Female | 9 (56.3%) | 8 (53.3%) | 5 (26.3%) |
| Transgender | 1 (6.3%) | 0 (0.0%) | 1 (5.3%) |

* *n* = 14

Table 9

Means and Standard Deviations of Demographic Variables Broken Down by Delivery Mode

| Demographic variable | Survey Delivery Mode | |
|--|-------------------------|---------------------------|
| | SMS (<i>n</i> = 23) | Email (<i>n</i> = 27) |
| Reported Age <i>M</i> (<i>SD</i>) | 26.2 (9.7) | 23.0 (8.2)* |
| Class Standing Frequency (% within) | | |
| Freshman | 6 (26.1%) | 8 (29.6%) |
| Sophomore | 2 (8.7%) | 5 (18.5%) |
| Junior | 8 (34.8%) | 3 (11.1%) |
| Senior | 7 (30.4%) | 11 (40.7%) |
| Gender Frequency (% within) | | |
| Male | 12 (52.2%) | 14 (51.9%) |
| Female | 11 (47.8%) | 11 (40.7%) |
| Transgender | 0 (0.0%) | 2 (7.4%) |

* *n* = 26

Table 10

Means and Standard Deviations of Demographic Variables Broken Down by Number of Reminders

| Demographic variable | Number of Reminders | | |
|--|----------------------------------|----------------------------------|-------------------------------------|
| | No Reminders (<i>n</i> = 12) | One Reminder (<i>n</i> = 21) | Three reminders (<i>n</i> = 17) |
| Reported Age <i>M</i> (<i>SD</i>) | 22.7 (SD = 10.9)* | 24.0 (SD = 8.9) | 24.94 (SD = 9.8) |
| Class Standing | | | |
| Freshman | 3 (25.0%) | 7 (33.3%) | 4 (23.5%) |
| Sophomore | 2 (16.7%) | 3 (14.3%) | 2 (11.8%) |
| Junior | 5 (41.7%) | 2 (9.5%) | 4 (23.5%) |
| Senior | 2 (16.7%) | 9 (42.9%) | 7 (41.2%) |
| Gender | | | |
| Male | 5 (41.7%) | 11 (52.4%) | 9 (52.9%) |
| Female | 6 (50.0%) | 9 (42.9%) | 8 (47.1%) |
| Transgender | 1 (8.3%) | 1 (4.8%) | 0 (0.0%) |

* *n* = 11

Chapter IV: Discussion, Conclusion and Recommendation

With a recent decline of survey participation in the recent decades, survey researchers have attempted to determine a variety of interventions to increase the likelihood of receiving survey responses, thus increasing response rates. Low response rates can bias collected survey data, thus giving researchers inaccurate information to base their decisions on. Among other topics of interests, researchers have examined the use of pre-notification, survey delivery modes, and number of reminder contacts. This research attempted to examine these same areas of interest, but with differing modes of contact. This research focused solely on electronic methods, which included Email and SMS, to determine if one mode would perform better than the other. Results suggest that no specific intervention type was significantly better than a control condition of a survey invitation without pre-notification or reminders. Poynton, Defouw, and Morizio (2019) reviewed nearly 100 studies published from 2008 to 2018 and found that the average response rate for online recruitment studies was 34.2%. The immediate research obtained a substantially lower response rate of 6.8%. This could be due to a variety of factors not limited to: history effects, survey saliency, timing of survey, and reminder sends. While no statistical testing was done on any of the demographic data, it is interesting to see the variability within age on nearly every intervention breakdown. The data suggests that older participants may be more likely to respond to a survey when delivered by SMS.

Practical Implications

The research at hand indicates that no significant difference in response rates can be found by varying (or including) pre-notification contacts, using two different methods of survey delivery, or including a variety of reminders. The immediate data collected makes it difficult to support Leverage-Saliency theory proposed by Groves et al., (2000). This could be due to a

variety of reasons, but one potential reason is that the interventions used here may not make the survey attributes a more positive experience for the end user. Therefore, offering more electronic modes of contacts with this population does not appear to make the survey request more salient. This could simply be due to the fact that in the current age, participants tend to have both mediums connected to their smartphones. This would imply that the mediums are not completely discrete as they were thought to be, and it could be difficult to determine if one mode will outperform the other. Another reason could be the lack of study description in the contact materials that were used. The contact materials that were developed were shortened to limit the characters for SMS delivery. This inherently limited the amount of content that was put into the contact scripts and in turn limited the amount of study description that could be included. This, in turn, could have been a been an attribute that was viewed negatively by many participants and reduced the likelihood of a participant responding. Additionally, with the current sample the more expensive SMS survey delivery did not outperform its cheaper Email delivery counterpart. Therefore, in the sake of saving university money the cheaper alternative should be used. Lastly, increasing the number of reminders did not increase participation rates. It is suggested that researchers limit the number of reminders to the absolute bare minimum of reminders to combat participant survey request desensitization.

Limitations and Future Directions

While this project was a good step in furthering our understanding of survey response behavior, it is not without limitations. One limitation to this study was quality contact information, specifically the lack of phone number verification that was available. The researcher took all steps possible to determine that the phone numbers received for the participant were indeed mobile phone numbers. However, just because a phone number is a mobile phone number

does not indicate that the participant is able to receive SMS messages at that phone number. This was not thought to be a large problem due to the population under examination but none the less it is a limitation. Another issue with the samples' phone numbers was that these were never actually a confirmed phone number from the participant but rather they were phone numbers on file with the university. Therefore, some phone numbers could potentially be incorrect. It is not to the researcher's knowledge that any type of "bounce back" alert is possible for SMS messages. Therefore, it is difficult to ascertain the exact denominator for the SMS group.

The scripts used in this research were limited to 160 characters due to the limitation of SMS messages. The primary reason for limiting the scripts to such a short script was to allow the whole message to fit into a single message which eliminates the participants message being broken into multiple messages. Some devices re-order the message when received by the participant. In retrospect, this self-imposed limitation should have been lifted which would have allowed a more descriptive explanation of the survey topic, time commitment, and importance.

Another limitation in the current research effort is the potential confound of the timing of the survey. At the time that the study procedure was being implemented the Midwest was undergoing above average snowfall and record-breaking low temperatures, causing many cancellations and delays. Thus, typical schedules were, in many cases, severely disrupted. This could have influenced the ability and/or willingness of students wanting to take part in the survey request. Had this research been conducted at a different time of year while the weather did not interrupt schedules, results may have differed.

Future research should attempt to replicate this research with a larger sample and the addition of mail pre-notification, delivery, and reminders. The current research sample, while relatively large, ideally would have been larger. When the sample was randomized into 18

different interventions the sub-samples become relatively small. A larger sample replicating this work would lend more power to determine if any differences do exist. The addition of the mail mode as well as the two electronic modes could potentially be useful for researchers to gain more insight on what mode/combination of modes illicit the highest response rates for this population. To the researcher's knowledge, no research in the literature has directly compared the three different modes of contact. By including the 3rd contact mode and examining interactions between the various contact modes, light may be shed on the most effective way to increase participation rates. It could be difficult with a college population to verify mailing addresses as some students might only have their home addresses on file with the university. A way around that is to narrow the selection process to include only students living on campus. Future research could also examine demographics more closely to determine if a specific mode is over- or under-representing the sample pool.

Another potential fruitful area for future research would be to explore interaction effects between the differing modes of contacts. The current research design and participant randomization would lend itself well to examining these potential hypotheses. However, specific predictions were not made in this case. It is possible that interaction effects in the design used for this research could be useful at increasing response rates simply by varying the different modes of contacts. By interaction effects an optimal amount of reminders could be found for different contact modes.

Conclusion

The goals of the immediate research were to examine the feasibility of the use of SMS contact modes and expand this topic in the literature. This research attempted to examine the use of pre-notification and different contact modes using pre-notification. The data that was collected

did not support the use of pre-notification, let alone the use of different contact modes for it. Low response rates overall likely hindered the ability to uncover any meaningful differences across conditions. Given such low overall response rates it is difficult to give concrete direction supported by the data that was collected. If response rates of 15-20% could have been obtained and the same trend was found in the data it would suggest that the more expensive, more personnel labor, and more frequent contact with this sample was not actually more productive at increasing response rates. Since no significant findings were found between any modes of pre-notification (None, SMS, or Email) this research would also suggest that pre-notification is not necessary. However, pre-notification may be necessary due to variety of reasons such as giving the opportunity for participants to opt-out of the research or pre-notify them of a potentially sensitive topic.

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Appendix A: Pre-notification Contact Script

Hello,

We will be reaching out to you within the next few days asking you for feedback about school-life balance. (The survey link will be sent to your university email. / The Survey link will be sent to the mobile phone number you have on file with the university.) Thank you in advance for your feedback.

Appendix B: Survey Invitation Script

Hello,

We would like to understand school-life balance of students. Please take 5-10 minutes to answer our survey. Thank you in advance!

Appendix C: Reminder Script

We still haven't heard from you! Please help us learn more about school-life balance by filling out the short 5-10 minute long survey. Thanks!

Appendix D: Survey Measure**Technology Use Measure (Baker et al., 2010)**

1. Do you have access to a computer? (Check all that apply)
 - Own a desktop
 - Own a laptop
 - Computer at work
 - No

2. Computer use on a typical day when school is in session:
 - None
 - >1 hour
 - 1-2 hours
 - 2-4 hours
 - 4-6 hours
 - >6 hours

3. Do you own a cell phone?
 - Yes
 - No

4. Cell phone use on a typical day:
 - None
 - <10 minutes
 - 10-30 minutes
 - 30-60 minutes
 - 1-2 hours
 - 2-3 hours
 - 3-4 hours
 - 5-6 hours
 - > 6 hours

5. What other technologies do you use in a typical day? _____

Adult Temperament Questionnaire (Rothbart, Ahadi, and Evans, 2000)

1. When I am trying to focus my attention, I am easily distracted (R).
2. When interrupted or distracted, I usually can easily shift my attention back to whatever I was doing before.
3. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts (R).
4. I am usually pretty good at keeping track of several things that are happening around me.
5. When trying to study something, I have difficulty tuning out background noise and concentrating (R).
6. It's often hard for me to alternate between two different tasks (R).

1 = *Very inaccurate* to 5 = *Very accurate*

Polychronic Values Inventory (PVI) (Bluedorn, Kalliath, Strube, and Martin , 1999)

1. I like to juggle several activities at the same time.
2. I would rather complete an entire project every day than complete part of several projects (R).
3. I believe people should try to do many things at once.
4. When I work by myself, I usually work on one project at a time (R).
5. I prefer to do one thing at a time (R).
6. I believe people do their best work when they have many tasks to complete.
7. I believe it is best to complete one task before beginning another (R).
8. I believe it is best for people to be given several tasks and assignments to perform.
9. I seldom like to work on more than a single task or assignment at the same time (R)
10. I would rather complete parts of several projects every day than complete an entire project.

1 = *Strongly disagree* to 5 = *Strongly agree*

Fear of Missing Out (FoMO) (Przybylski, Murayama, DeHaan, & Gladwell, 2013)

1. I fear others have more rewarding experiences than me.
2. I fear my friends have more rewarding experiences than me.
3. I get worried when I find out my friends are having fun without me.
4. I get anxious when I don't know what my friends are up to.
5. It is important that I understand my friends "in jokes".
6. Sometimes, I wonder if I spend too much time keeping up with what is going on.
7. It bothers me when I miss an opportunity to meet up with friends.
8. When I have a good time it is important for me to share the details online (e.g. updating status).
9. When I miss out on a planned get-together it bothers me.
10. When I go on vacation, I continue to keep tabs on what my friends are doing.

1 = *Not at all true of me* to 5 = *Extremely true of me*

Demographics

1. Age _____

2. Please indicate your class standing according to number of credits earned:
Freshman (1-29.5 credits)
Sophomore (30-59.5 credits)
Junior (60-89.5 credits)
Senior (90 or more credits)
Dual Enrollment (grad/undergrad)
Graduate student

3. Sex/Gender:
Female
Male
Intersex
Transgender
Alternative identity (specify)_____