DEVELOPMENT OF A THEORY BASED TEXT MESSAGE INTERVENTION TO PROMOTE PHYSICAL ACTIVITY AMONG COLLEGE STUDENTS

by

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ABSTRACT

MARIE HAYES. Development of a theory based text message intervention to promote physical activity among college students. (Under the direction of DR. AMY PETERMAN)

College undergraduate students traditionally reduce their engagement in physical activity during college, despite the negative health consequences sedentary behavior has been linked to. Mobile health (mhealth) interventions have become increasingly popular for health behavior change, however theoretically based interventions via mhealth are often unclear or vague in how they are developed and how successfully the theory is incorporated into these interventions. This current project explores whether Self-Determination-Theory (SDT) can be successfully translated into a text messaging program designed to increase physical activity in college students. 359 undergraduates participated in a three-phase study to investigate whether SDT needs can be successfully fulfilled by messages of 140 characters or less. 65 theory-based messages were compared to 60 control messages on the degree to which they successfully elicit feelings of relatedness, autonomy, and competence. Results suggest that messages created to fulfil the three needs posited by SDT did so successfully, however in aggregate these messages did not do so more than the control messages did. These results suggest that it is possible for SDT to be translated to text messages, however more research is needed to understand how exactly the messages may be doing so if a group of inspirational messages yielded similar results. Regardless, this project adds to the literature because it is one of the first to detail the process of theory translated into an mhealth intervention.

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LIST OF ABBREVIATIONS

IPAQ	International Physical Activity Questionnaire
mhealth	mobile health
PNSE	Psychological Needs Satisfaction in Exercise
SDT	Self-Determination theory
SMS	short message service

INTRODUCTION

Background Information and Significance

Engaging in positive health behaviors has been repeatedly shown to be beneficial to one's current and long-term health. The age at which individuals traditionally attend college is a time of transition from adolescence to adulthood. During this transitional period, many young adults engage in behaviors that adversely affect their health (VanKim et al., 2010) including alcohol use, poor sleep habits and reduced physical activity. Physical inactivity contributes to being overweight during late adolescence and young adulthood, which been linked to an increased risk of being overweight in adulthood (Guo, Roche, Chumlea, Gardner, & Siervogel, 1994) and contributes to the development of cardiovascular disease, type 2 diabetes, and cancer. Because physical activity levels have been found to decline from high school to college (Kilpatrick, Herbert, & Bartholomew, 2005), increasing the amount of physical activity in which college students engage is of particular importance. Research has been conducted to test various approaches to addressing this concern in college populations. Designed interventions include using technological platforms such as the internet (Franco et al., 2008), and mobile phones (Brown, O'Connor & Saviano, 2014). It is imperative that researchers and health providers continue to look for new ways to reach college students to improve their health.

Of late, providers and interventionists have been turning to technology to help promote health. At the same time, mobile phones have become a staple in American culture. In a study published in 2010, ninety-four percent of college-aged students (18-26

years old) reported having a cell phone and 89% reported having it with them at all times, including at bedtime (PEW Research Center, 2010). Updated statistics reveal that 100% of individuals aged 18-29, which includes the group of traditional college-aged individuals, own a cell phone (PEW, 2018). Research suggests most cell phone owners rarely (45%), or never (31%), turn off their cell phones (PEW Research Center, 2015). In addition to using mobile phones for phone calls, individuals are using the short message service (SMS) available on their mobile-phones, which allows users to send messages of 140 characters or less to other mobile phones or computers. Text messaging is both instant and inexpensive (Cole-Lewis & Kershaw, 2010), and an increasingly popular way for health-care providers to be in touch with their patients in real time as either an adjunct to, or in replacement of, in-person medical or behavioral treatment. Given the cost effectiveness and relative ease of access, text messaging via SMS helps facilitate care in populations who might not otherwise seek treatment. Over the past decade, SMS programs have been used to improve medication and treatment plan adherence, medical appointment attendance, and as stand-alone interventions for health behavior change (DeKoekkoek et al., 2015; Gurol-Urganci et al. 2013).

Studies have shown that SMS interventions yield small to moderate effect sizes compared to no-treatment control groups, and can be used as a stand-alone intervention, as well as a supplementary feature of a web-based intervention for health behaviors (Heron & Smyth, 2010; Muench et al., 2014). Interventions delivered solely via text message to an undergraduate population have involved smoking cessation (Riley, Obermayer, & Jean-Mary, 2008), physical activity (Prestwich, Perugini, & Hurling, 2009) and readiness to change alcohol use (Mason et al., 2014). Young adult (18-35)

populations outside of a University setting have received SMS interventions pertaining to sexual health promotion (Gold et al., 2011). Additional interventions have been conducted on college students incorporating text messaging and social media, the internet, and other platforms. However, including components other than text messaging requires participants to have mobile phones with more than just SMS capabilities, which can limit accessibility, particularly in lower-income populations. Moreover, some findings suggest text messaging components are easier to navigate than web-based portions of multi-method interventions (Obermayer et al., 2010). Text messaging interventions have been utilized effectively outside of undergraduate populations in adults to promote medication adherence (see review by DeKoekkoek et al., 2015), increase primary care attendance (Leong et al., 2006), manage chronic illnesses, to increase physical activity (Fukuoka, 2010; Hurling et al., 2007), and maintain behavior change targeting weight loss (Spark et al., 2015). Of note, text message programs for physical activity and smoking cessation have yielded larger effect sizes than those targeted to other health outcomes (for a review see: Head et al., 2013) indicating that the mechanisms involved in SMS interventions may differ across health behaviors. In a review, Ludwig et al. (2018) found that there is currently limited evidence examining the effectiveness of SMS interventions on physical activity level and sedentary behavior in younger populations. Moreover, the authors report that these studies employ heterogeneous methods which do not allow for an analysis to determine which interventions may be most effective (Ludwig et al., 2018). More work is needed to understand the mechanisms involved in SMS interventions, and more transparency is

needed in the literature to understand how messaging programs are developed and why different programs may impact behaviors differently.

Multiple health behavior change theories have been used to inform print and technology-based interventions to modify health behaviors. Such theories often focus on determinants of health at multiple levels, and interventions based on such theories aspire to produce change utilizing the proposed mechanisms within the theory (Painter et al., 2008). It is argued that basing interventions in theory facilitates a deeper understanding and correction of mechanisms underlying the behavior intended for change (Michie et al., 2008). Even medical organizations have begun to advocate for interventions to have explicit theoretical foundations before moving into experimental stages (Medical Research Council, 2000). While the effectiveness of theoretical interventions for health behavior change has been established (Michie et al., 2008), few researchers are explicit in how theoretical components of behavior change interventions have been operationalized, included in analysis or the design of the intervention (Painter et al., 2008). Moreover, the evidence regarding the effectiveness of traditional theoretical interventions for behavior change transcribed into a SMS program is relatively limited.

Despite the lack of transparency in how theory-based interventions are developed and evaluated in the literature, theory based-behavior change interventions continue to be implemented utilizing new technology. Recently, a study evaluating interventions based in social cognitive theory demonstrated a greater increase in physical activity in women who received a Facebook and Text message version of the intervention as compared to a print on paper version (Joseph et al., 2015). Another study using SMS to increase physical activity in college students utilized messages based upon the Protection

Motivation Theory and implementation intentions. In this study, participants were able to generate their own messages and it is unclear how validly theory was present in those messages created by participants (Prestwich, Perugini, & Hurling, 2009). Furthermore, this study reported that one portion of experimental manipulation, designed to tap into the proposed theoretical component of the intervention, was ineffective (Prestwich, Perugini, & Hurling, 2009). Messages developed using crowd-sourcing techniques as described by de Vries et al. (2016) based in the Transtheoretical Model proved to be motivational or not for participants depending on the current stage of change with which they identified. Other theoretical models such as the health belief model, and the theory of planned behavior have been utilized to deliver prevention interventions via mobile health (mhealth; Rimer & Glanz, 2005), although how these researchers translated theory into message content also remains unclear. Additional research has been conducted to examine message content preferences for SMS interventions, and an inclination has been discovered towards grammatically correct messages without textese (ex: C U L8ER) that are polite, directive and include benefit-based content (Muench et al., 2014; Thompson et al., 2014; Woolford et al., 2011). With hundreds of mhealth studies having already been conducted by the year 2013 (Tomlinson et al., 2013), more attention is needed to translate behavior change theory into effective stand-alone SMS interventions.

Self-Determination theory (SDT) has widely and effectively been adapted in various ways to promote physical activity and exercise (Patrick & Canavello, 2011; see review by Teixeira et al., 2012). SDT is motivationally-based in that it is posited that satisfying three psychological needs (autonomy, competence, and relatedness), will foster intrinsic motivation. Increased motivation is then thought to enhance engagement in a

behavior (Deci & Ryan, 1985, 1994). More specifically, the need for autonomy reflects the sense of choice and control; competence describes the need to feel capable of a goal and as though one has the skills and ability to achieve the goal; and relatedness speaks to the need for connectedness to, and understanding from, others. Hsu et al. (2013) operationalized the three psychological needs in the context of increasing physical activity in the following ways: the need for competence is targeted by increasing knowledge of exercise, setting realistic and attainable goals surrounding exercise, and providing training on and giving positive feedback for engaging in physical activity. The need for autonomy is implemented by removing external controls and motivators for physical activity (e.g., exercising to lose weight, a sense of obligation to exercise) and replacing them with personally-relevant motivators (e.g., physical activity can be a way to have fun, you can choose how you would like to be active) that are tailored to the individual's current physical abilities, goals and limitations. Finally, the need for relatedness is targeted using validation (e.g., starting a new exercise routine is difficult and sometimes painful) and empathy (e.g., it is understandable one may feel self-conscious in a gym filled with fit individuals) (Hsu et al., 2013). This study did not utilize text messaging in its design, but it did find that an SDT-based intervention was effective at increasing physical activity in sedentary overweight women. Similar results have been found demonstrating the effectiveness of a SDT-based intervention for increasing physical activity delivered face-to-face over the course of 30 sessions of therapy (Silva et al., 2010), for increasing leisure time in youths (Chatzisarantis & Hagger, 2009) and for youths to increase their physical activity in a school setting (Gonzalez-Cutre et al., 2018), among others.

This current study attempts to develop messages to be used in a text message intervention based on the principles of SDT, to be ultimately implemented with college students who are interested in increasing their physical activity. The primary aim of the study is to translate SDT fundamentals into a text messaging intervention. A secondary aim of the study is to determine if the SDT-based text messages that are generated can adequately and successfully meet the three psychological needs of SDT.

Research Questions

1. Can the core components of SDT be translated into a text messaging campaign geared towards college students?
2. Do text messages with content based in SDT adequately and successfully meet the three psychological needs of SDT within UNC Charlotte undergraduate volunteers above and beyond a series of control messages?

CHAPTER 2: MATERIALS AND METHOD

Text Message Development

During message development, the primary author solicited the help of 7 fellow graduate students to develop individual text messages to undergo evaluation. The author provided the assisting graduate students with information about SDT, how it is posited to function, background information about each of the psychological needs and an overview of existing message preferences literature (reviewed below). Each person, including the author, was tasked with writing 5 messages to fulfill each need. The author then compiled the messages, eliminating ones that were deemed very similar to another already compiled message. No other pre-testing was conducted on the messages.

Preliminary research has been conducted using the UNC Charlotte SONA systems research pool indicating that 59% of the participants were interested in a text messaging program to improve health. Furthermore, these participants tend to prefer messages based in theory over non-theoretical messages, although the strength of preference varied depending on the theory on which the message was based. Findings from Thompson et al. (2014) that suggest messages should "not sound like school" and "not nag" were incorporated into the development of messages for the current study. Due to the nature of SDT, messages truly based in this theory would inherently be unlikely to feel academic or "naggy", however the researchers took care to adhere to previous findings in the literature. Additional findings from Thompson et al. (2014) align with previous research, and indicate that messages should be grammatically correct, polite, non-aggressive, directive, and benefit-oriented (Muench et al., 2014), use full text (rather than textese), and be straightforward and realistic. Participants from the feasibility study

confirm some of these preferences; for example, ninety-five percent (94.7%) preferred a grammatically correct message over one using textese.

Because the intended text-messaging program is ultimately expected to deliver 2 messages per day for 4 weeks, 112 total messages will be needed in the final program to have an experimental group (56 messages), and control group (56 messages). Techniques and applications of needs for physical activity previously operationalized by Hsu et al. (2013) were used to guide SDT-based message development. A second series of inspirational quotes containing 140 characters or fewer that were found in an online search were compiled to be used as a comparison control group. The keyword "inspirational quotes" was entered into the Google search engine to compile these messages from publically available websites.

Since not all messages developed and evaluated were likely to pass the evaluation procedures to be used in the final program, more than 56 messages from each category were evaluated. In total, 63 total experimental messages and 60 control messages were evaluated by participants. More specifically, 25 messages were developed and evaluated to align with the need for autonomy, 18 messages were developed and evaluated for the need for competence, and 21 messages were developed and evaluated for the need for relatedness.

Procedure

The SONA System online platform was utilized to recruit undergraduate student participants at UNC Charlotte to sort and evaluate developed messages, in three separate surveys. More specifically, one survey (sorting survey) provided participants with 3 categories comprised each of a definition of one psychological need, and asked

participants to sort each theory message into one of the three categories. The next two surveys (survey 1 and survey 2) included an individual message evaluation component, and an overall psychological needs satisfaction component for a group of theory messages and control messages. For example, to evaluate an individual relatedness message, participants were asked about the degree to which the message made them feel as though they were understood, or that their feelings or specific situation were being considered. Participants were told to imagine that they are trying to increase physical activity when responding to how the messages make them feel. To decrease participant fatigue and acquiescent responding, two separate surveys were administered to evaluate all 123 text messages. Survey 1 consisted of 30 experimental messages and 30 control messages; survey 2 consisted of 35 different experimental messages and 30 different control messages. Survey 2 also contained one message representing each need (3 total) that appeared in survey 1. Each survey took approximately 30 minutes to complete and participants were awarded .5 SONA credits for their participation upon completion. Because there is concern for a carry-over effect from exposure to SDT messages, participants were only allowed to enroll and complete one survey.

For all three surveys, participants were recruited via the SONA system, and were directed to a link to the survey in Qualtrics via the SONA System website. The opening page of the survey was a consent form, to which the participants agreed in order to proceed. If a participant did not wish to provide consent he/she had the option to select "I do not agree"; upon doing so they were brought to the end of the survey. If a participant selected "I agree" to consent, they were directed to the beginning of the survey. All study procedures had IRB approval from the University of North Carolina at Charlotte IRB

prior to the start of recruitment. Recruitment occurred from Spring of 2016 through Winter of 2017.

Measures

Various questions were used to evaluate the degree to which each message makes a participant feel a certain way, and the degree to which a grouping of messages meets the psychological needs specified by SDT. Current physical activity levels and goals were captured, along with demographic information. Appendix A contains the questionnaires that were used in this study. Participants were told to imagine that they are trying to increase their physical activity levels when responding to how the messages make them feel.

Individual Message Evaluation. Three face-valid questions assessed the degree to which every individual message makes the participant feel each of the three psychological needs on a scale of 0 (not at all) to 5 (completely). To evaluate the psychological need for relatedness, the item asked: "To what degree does this message make you feel understood - that your feelings or your specific situation are being considered?" To evaluate the psychological need for autonomy the item asked: "To what degree does this message make you feel as though you have a choice, and you are in control?", and, finally, the need for competence was assessed via "To what degree does this message make you feel that you are capable of your goal –that you have the skills and ability to achieve your goal?" Participants responded to these three items for both the theory-based messages and the control messages. Because the theory-based messages are individually designed to meet one specific psychological need per message, these face-

valid questions were used to determine how successfully each component of SDT was translated into a text message of 140 (or fewer) characters.

Psychological Needs Satisfaction in Exercise (PNSE). To assess alignment with the SDT model's overall psychological needs, the PNSE was administered. This measure was modified to determine if the three psychological needs outlined by Deci and Ryan (1984) were met via a compilation of messages. For example: "I feel I have made a lot of progress in relation to the goal I want to achieve" was modified to: "I feel these messages will help me make a lot of progress in relation to the goal I want to achieve" This questionnaire was administered twice; first after evaluating the entire group of the control messages, and again after evaluating the group of SDT-based messages. It will supplement the face-valid questions administered for each individual message. 18 items were used to assess the psychological needs (6 items per need) on a 5-point likert response scale. High internal consistency has been found for the original PNSE subscales both generally (Wilson et al., 2006), and in the context of physical activity (Barbeau et al., 2009). Since the primary aim of this project is to determine whether SDT can be translated into a series of text messages, this measure in combination with the face-valid questions will allow the researchers to determine if the group of messages in their entirety are were eliciting the intended responses. Reliability estimates of each administration the PNSE for each survey are as follows: Survey 1: control: $\alpha = .97$, theory: $\alpha = .96$; Survey 2, control: $\alpha = .95$, theory: $\alpha = .97$.

Physical Activity. Because the way in which someone responds to evaluation of messages may differ based on their current levels of physical activity, meaning someone who is very active might respond differently than someone who is sedentary, current

physical activity engagement was assessed using the Short Last 7 Days version of the International Physical Activity Questionnaire (IPAQ; Craig et al, 2003). This measure asks the respondent to recall how many days in the past week the participant engaged in physical activity, and for how long. The questions were repeated for varying activity levels, including vigorous, moderate and simply walking, for a total of nine questions. In previous reliability studies, the internal consistency of the IPAQ short form has been demonstrated to be acceptable ($\alpha = .76$; Hagströmer et al., 2006) and criterion validity for the IPAQ using accelerometers has been established ($r = .34$, Ekelund et al., 2006).

Physical activity goals. Because participants were instructed to imagine they are currently trying to increase physical activity engagement, the way in which someone responded to evaluation of messages may differ for someone who had specific physical activity goals than from someone without physical activity goals. Consequently, current physical activity goals were assessed. A series of questions were designed based on the International Physical Activity Questionnaire (Booth et al., 2003) to measure participants' goals surrounding physical activity. Based on the IPAQ, three goal questions asked participants to indicate, on a scale of 0 (not at all) to 5 (very much), the degree to which they would like to increase the number of days per week they engage in exercise, the duration of exercise per engagement, and the intensity of exercise per engagement. For example, "To what degree would like to increase the number of days per week that you engage in moderate physical activity?"; "To what degree would you like to increase the intensity of the exercise in which you engage each week?". Because there is no clear way to score and weight the sum of these goals, the single goal of reducing sedentary behavior

was used in the current analysis, i.e. “to what degree would you like to reduce the amount of time you usually spend sitting in a week?”

Plan of analysis

Sample description. Descriptive statistics were calculated for all variables, including sample demographic characteristics, evaluations of each control and experimental message, the PNSE scores, IPAQ scores, and goal to reduce sedentary behavior. Zero-order correlations were used to help the researchers determine if there were any respondent characteristics that were associated with the PNSE scores, IPAQ score, or sedentary goals.

Individual message evaluation. Individual message responses indicating the degree to which a message makes a participant feel each psychological need (original response scale of 0-5) were recoded to indicate the message is successfully eliciting a need (a response of 3-5) or unsuccessfully eliciting a need (a response of 0-2). Frequency analyses were used to indicate whether each message (theory and control) were meeting participant’s needs. Theory messages were only examined to determine whether the message met the intended need it was designed to fulfil, whereas control messages were evaluated on all three needs. For example, does a message from the experimental group designed to fulfill the need for relatedness do so to a significant degree; does a message designed to not elicit a psychological need not do so to a significant degree?

Self-determination theory evaluation of message groups. To determine whether the messages as two groups elicits a feeling of needs being met as outlined by SDT, responses from the PNSE will be summed for all respondents to create 2 PNSE scores, theory and control. A paired samples t-test was conducted to determine whether

PNSE scores differ for the two groups of messages (i.e., those developed to meet SDT needs vs. those developed to be generally inspirational). Finally, to further understand how current physical activity levels and sedentary goals might be influencing PNSE scores, a multiple regression analysis was used.

CHAPTER 3: RESULTS

Participants

A total of 359 individuals accessed one of three surveys. Specifically, 74 individuals accessed the sorting questionnaire, while 141 and 144 individuals accessed one of the two questionnaires asking participants to individually evaluate messages and respond to how the messages made them feel. For the sorting task, participants who did not complete at least 20% of the survey (n = 6) and who did not pass a validity tests (i.e. who did not respond correctly when directed to select response choice "a"; n = 17) were removed from analyses. Consequently, 51 participants' responses were analyzed for the sorting portion of the study. Moreover, 18 individuals (9 from each survey) were removed from the message evaluation portion of the study, meaning a total of 267 participants (n = 132 for survey 1, n = 135 for survey 2) completed the message evaluation portion. Participants who completed the sorting portion were analyzed separately from message evaluation participants.

Overall, participants who completed either individual message evaluation task (i.e. Survey 1 or Survey 2) are predominantly White (64.8%), male (51.7%) and single (98.1%), with a mean age of 19.45 (SD = 2.65), and mean GPA of 3.19 (SD = .66). Participants who completed the sorting task were also predominantly White (60.8%), female (58.8%) and between the ages of 18-21 (81.6%), with a mean age of 20.35. Participants in both surveys were very active, (survey 1 IPAQ M= 4130.84, SD= 5541.78; survey 2 M=3339.59 SD=3090.74), but still reported feeling that on average, they would like to reduce their amount of sedentary time per day (survey 1 M= 4.20 ,

SD=1.33; survey 2 M=4.02 , SD=1.40). For a full description of demographic statistics, see Table 1.

A series of independent samples T-Tests were conducted to determine whether there were statistically significant differences between key variables among participants in individual message evaluation survey 1 and survey 2. No statistically significant differences in any demographic characteristics, PNSE scores, IPAQ scores or sedentary goal scores were observed between the two samples.

Sorting Task.

A full description of how each individual message was sorted is presented in Appendix B. A total of 45 messages were accurately sorted into the categories for which they were designed to fit by a majority of participants (>50%), while 45 messages were sorted into alternate categories. Fifteen messages were correctly categorized by more than 75% of participants, and 6 messages were just shy of the majority (49%). Of the 45 messages that were sorted into the categories for which they were intended to fill, 21 were autonomy messages, 13 were competence messages and 11 were Relatedness messages.

Message evaluation.

Survey 1. More than 50% of the participants reported that all 30 messages made them feel the SDT-related need that was intended: this includes 11 autonomy messages, 9 competence messages, and 10 relatedness messages. At least 75% of participants endorsed the intended needed for 23 of the messages; and 80% endorsed it for 12 messages. More than 50% of the participants also endorsed all three needs for all 30 of the control messages.

To further examine the SDT need satisfaction of theory-based and control messages, PNSE scores were analyzed. Pearson product moment correlation analyses indicate a positive relationship between PNSE-control and PNSE-theory scores ($r = .67$, $p < .01$), To determine whether there were significant differences between the two PNSE scores, a paired samples t-test analysis was conducted. This showed no significant differences between the control ($M = 73.22$, $SD = 18.28$) and theory scores ($M = 73.62$, $SD = 21.10$) on psychological needs satisfaction ($t(129) = -.22$, $p = .83$). Additionally, the relationship between PNSE scores and physical activity variables were explored. A positive relationship was found between having a goal to reduce sedentary behavior and the PNSE scores, (theory $r=.19$, $p < .05$, control $r = .23$, $p<.05$) however, IPAQ score was not related control PNSE score ($r = -.10$) or to sedentary goals ($r = -.05$), but was positively correlated with PNSE theory scores ($r = -.20$, $p < .05$). Because sedentary goals were related to PNSE scores, the impacts that sedentary behavior, physical activity level, and sedentary goals on PNSE scores were examined. Full Pearson's product correlation results are presented in Table 4.

Given the conceptual relatedness of physical activity, sedentary goals, and PNSE scores, a multiple regression analysis was conducted to investigate whether PNSE control scores, physical activity level, and sedentary goals could predict the PNSE theory score. The results of the regression indicated that the model explained 45% of the variance and that the model was a significant predictor of the PNSE theory score ($F(3,122) = 33.86$, $p < .001$). Although sedentary goals did not contribute to the model to a statistically significant degree ($B=.66$, $p=.54$), physical activity levels ($B= -.001$, $p= .04$) and PNSE control scores ($B=.74$, $p<.001$) did significantly contribute to PNSE theory scores.

Survey 2. More than 50% of the participants reported that all 36 messages made them feel the SDT-related need that was intended: this included 14 autonomy messages, 10 competence messages and 12 relatedness messages. At least 75% of participants endorsed the intended needed for 30 of the messages; and 80% endorsed it for 16 messages. More than 50% of the participants also endorsed all three needs for all 30 of the control messages.

To further examine the SDT need satisfaction of theory-based and control messages, PNSE scores were analyzed. Pearson product moment correlation analyses indicate a positive relationship between PNSE-control and PNSE-theory scores ($r = .55$, $p < .01$). To determine whether there were significant differences between the two PNSE scores, a paired samples t-test analysis was conducted, which showed no significant differences between the control ($M = 72.99$, $SD = 16.62$) and theory scores ($M = 74.90$, $SD = 19.36$) on psychological needs satisfaction ($t(117) = -1.24$, $p = .22$).

Additional relationships were explored between physical activity variables, sedentary behaviors, and PNSE scores. Pearson product moment correlation analyses indicate a positive relationship between having a goal to reduce sedentary behavior and both PNSE scores, (theory $r = .34$, $p < .01$, control $r = .30$, $p < .01$). IPAQ score was not related to either PNSE score (theory $r = -.09$; control $r = .08$) or to sedentary goals ($r = -.06$). Full Pearson's product moment correlation results are presented in Table 7.

Given the conceptual relatedness of physical activity, sedentary goals, and PNSE scores, a multiple regression analysis was conducted to investigate whether PNSE control scores, physical activity level, and sedentary goals could predict the PNSE theory score. The results of the regression indicated that the model explained 36% of the variance and

that the model was a significant predictor of the PNSE theory score ($F(3,110)=20.47$ $p<.001$). Although sedentary goals did not contribute to the model to a statistically significant degree ($B=1.61$, $p=.16$), physical activity levels ($B= -.001$, $p= .03$) and PNSE control scores ($B=.61$, $p<.001$) did significantly contribute to PNSE theory scores.

CHAPTER 4: DISCUSSION

The purpose of this study was to determine the feasibility of translating an intervention to increase physical activity based in SDT into a text messaging format. This was investigated in two parts; first, by having participants evaluate individual messages created by a team of experts; and second, to evaluate the ways in which a series of these developed messages functioned together as compared to how a group of control messages comprised of inspirational messages functioned. These two parts were investigated using three separate surveys. A total of 65 theoretically based messages were evaluated and compared to 60 control messages. All theory messages were created with the intention of fulfilling one of three specific needs posited by SDT (competence, relatedness or autonomy; Deci & Ryan, 1985, 1994), based on Hsu et al.'s operationalization of those needs (2013).

The results indicate that, overall, the messages generated in this study did not fulfill the mechanisms proposed by SDT above and beyond a set of control messages comprised of inspirational messages. While all of the individual messages did successfully make a majority of participants feel as though specific needs of SDT were being met, in aggregate these needs were not fulfilled to a greater degree after reading theory messages than after reading a series of control messages. Interestingly, all of the control messages also made a majority of participants feel at least one of the three needs, oftentimes multiple needs. Moreover, control messages produced almost an identical score on the PNSE, indicating that participants felt the same amount of fulfillment of SDT needs after reading the control messages as the theoretically derived messages. Because we controlled for an order effect by presenting the control messages first, these

results can not be explained due to contamination of exposure to SDT messages prior to reading and evaluating control messages. Broadly, these results support some perceptions in the field that traditional theories of health behavior change cannot successfully be translated to mhealth settings, and expansion on existing theory or development of new theory might be needed (Riley et al., 2011).

An alternative explanation of the current results is that the theoretically derived messages were not operationalized or created successfully, however it may be possible that this could be accomplished in another context or by other experts. Additionally, SDT may not be the most effective theoretical orientation on which to base an mhealth intervention, whereas other theories might be more effective. It is also important to consider whether the inspirational messages, designed to act as a control, in and of themselves may be authentically meeting the needs posited by SDT. Because these messages were found using an online search, it is plausible that these are essentially already "expert" validated messages given they are appearing readily in a search online, and likely are already commonly viewed by individuals seeking to increase intrinsic motivation for behavior change. These messages did not specifically reference physical activity, but neither did all of the theory messages.

Although the current samples are considered very active based on their mean IPAQ scores, the activity level in this population is similar to that found in a college student sample in the United States used to validate the IPAQ versus accelerometers (Dinger, Behrens & Han, 2013). Regardless, it is possible that the theoretical messages were not more fulfilling than the control messages because of participant's already high physical activity levels. Alternatively, a hypothetical situation in which individuals are

asked to imagine how a message would make them feel if given a hypothetical goal to increase physical activity may be too artificial of a scenario to evaluate whether the mechanisms of SDT are being tapped into via text messages, especially for an already active group of individuals.

Despite our results not supporting our hypotheses, the current study adds to the literature in a unique way because it explicitly states how a behavior change theory previously found to be effective for increasing physical activity was translated into a text messaging program, and explores the degree of fidelity to the theoretical foundation. These results suggest that there is no difference between theoretically based and inspirationally based messages in regards to the mechanisms posited by SDT. This supports the critique from mhealth researchers that existing behavior change theories may not be applicable to mhealth interventions.

Moreover, as there is a shift to include newer technological components to mhealth interventions, specifically ones that require the internet, researchers need to bear in mind the importance of cost-effective interventions specifically for individuals who are disadvantaged and might not have a smartphone, or one that is extremely user friendly to support multiple elements to an intervention. Lewis et al. (2017) continue to encourage researchers to consider maximum public health impacts for these ease-of-access interventions, which includes individuals who may not have smart phones. Consequently, stand-alone SMS interventions continue to be a relevant tool to combat a decrease in physical activity levels.

Future Directions

One major critique of the behavior change via mhealth literature is the lack of clarity in how researchers develop mobile interventions that they assert to be based in theory (Borrelli & Ritterband, 2015). Future studies should consider some of the factors listed above when deciding on a theoretical foundation for mhealth intervention, and be more explicit in how theory was included in their intervention. Perhaps, this could use a similar framework for scale or measurement development, including step-by-step process to determine message inclusion or elimination. This contrasts with the current study in that messages developed by researchers were not evaluated in a step-wise manner (i.e. messages that were not sorted into correct categories were not necessarily discarded before evaluating the messages on the degree to which the fulfil SDT needs). Despite lack of results for this particular study, mhealth interventions should not abandon a basis in theoretical framework, or discount the importance of the scientific method in investigating their effectiveness.

MHealth interventions, including text messaging interventions, have already been shown to positively impact specific health behaviors. These include smoking cessation (Riley, Obermayer, & Jean-Mary, 2008), physical activity (Prestwich, Perugini, & Hurling, 2009) and alcohol use (Mason et al., 2014). Future studies using this type of intervention platform should improve on their reports of intervention development. Alternatively, more studies can be conducted to understand how theoretically-supported components of an intervention might operate in mhealth contexts, and to parse out the similarities or differences between mhealth mechanisms and traditional intervention mechanisms. Finally, since much of the existing literature utilizes small sample sizes or

reports pilot data (Zhao, Freeman & Li, 2016) large scale studies with larger sample sizes should be implemented. Increased sample sizes can allow for exploration of the interaction of constructions within a theory, rather than stand alone unique components. For example, are the three needs posited by SDT really that different from one another, or might they be more interconnected than we are currently realizing?

A very basic model for a theoretical framework for behavior intervention technology has been proposed for mhealth interventions (Mohr et al., 2014). This model suggests being explicit in the what, why and how of behavior change technology interventions, (i.e. intervention elements, goals, and behavior change strategies). Moreover, the authors argue that existing theories to describe successful behavior change are not clear enough in terms of how their posited mechanisms align with mhealth capabilities (Mohr et al., 2014). Because current interventions that incorporate technology have the capability to be tailored to the user, adaptable to the user's current situation, and offer feedback in real time, general mhealth intervention mechanisms might also not be applicable to stand alone SMS interventions. Researchers should continue to explore theoretical foundations for successful behavior change via mhealth while considering accessibility of the interventions, especially for those who may not have access to more expensive technology.

TABLES

Table 1
Demographic characteristics

	M (SD)	n (%)
Sorting Task		
Age	20.35 (5.41)	
Gender		
Male		18 (36.7)
Female		30 (61.2)
Trans		1 (2)
Other		0
Year in school		
1st year		20 (40.8)
2nd year		17 (34.7)
3rd year		10 (20.4)
4th year		1 (2.0)
5th or higher		1 (2.)
GPA	3.47 (.95)	
Ethnicity		
African American/Black		5 (10.2)
Asian		8 (16.3)
		3 (6.1)
Hispanic/Latino		
White		31 (63.3)
Multi-ethnic		1 (2)
Other		1 (2)
Marital Status		
Single/Never married		43 (87.8)
Married		5 (10.2)
Divorced		1 (2.0)
Widowed		0
Sexual Orientation		
Heterosexual		39 (79.6)
Homosexual		4 (8.2)
Bisexual		2 (4.1)
Survey 1		
Age	19.55 (2.52)	
Gender		
Male		67 (51.9)
Female		60 (46.5)

Trans		0
Other		2 (1.6)
Year in school		
1st year		58 (45)
2nd year		45 (34.9)
3rd year		17 (13.2)
4th year		6 (4.4)
5th or higher		3 (2.2)
GPA	3.11 (.75)	
Ethnicity		
African American/Black		27 (20.9)
Asian		9 (7.0)
		8 (6.2)
Hispanic/Latino		
White		77 (59.7)
Multi-ethnic		3 (2.3)
Other		4 (3.1)
Marital Status		
Single/Never married		125 (97.7)
Married		2 1.6)
Divorced		0
Widowed		1 (.8)
Sexual Orientation		
Heterosexual		119 (93.0)
Homosexual		2 (1.6)
Bisexual		5 (3.9)
Other		2 (1.6)
Survey 2		
Age	19.34 (2.78)	
Gender		
Male		68 (51.5)
Female		62 (47.0)
Trans		1 (.8)
Other		1 (.8)
Year in school		
1st year		71 (53.8)
2nd year		43 (32.6)
3rd year		11 (8.3)
4th year		5 (3.8)
5th or higher		2 (1.5)
GPA	3.27 (.54)	
Ethnicity		

African American/Black	24 (18.2)
Asian	7 (5.3)
	3 (2.3)
Hispanic/Latino	
White	92 (69.7)
Multi-ethnic	5 (3.8)
Marital Status	
Single/Never married	130 (98.5)
Married	1 (.8)
Divorced	1 (.8)
Widowed	0
Sexual Orientation	
Heterosexual	121 (91.7)
Homosexual	6 (4.5)
Bisexual	5 (3.8)
Other	0

Table 2

Survey 1 results: Theory message evaluation

Text Message	Need	N	%
Choose one activity for today: walking, bike riding, yoga, swimming, jogging, hiking, weight lifting. Do this activity for at least 10 minutes today.	autonomy	93	68.9
Try a restorative yoga class this week. They are slow-paced, relaxing, and will encourage you to feel renewed while still working towards your goal!	competence	93	70.5
When you're feeling down, just remember that Michael Phelps had to learn to swim.	relatedness	95	72
Find a nature trail near by that looks fun to you. You'll get exercise, and be able to enjoy the great outdoors.	competence	95	72.5
Choose to take the stairs today.	competence	97	73.5
It's hard to stick to a plan, but the more that you do it, the more natural it will become.	relatedness	97	73.5
Go for a walk with a friend, walk at a speed where your breathing is a little heavy but you can still maintain a conversation	competence	98	74.8
Ask a friend to join you in an activity today. Talking while being active can help make the time go quicker, and forces you to pace yourself!	autonomy	99	75
You can multitask: did you know that things like vacuuming and gardening are physical activities too?	competence	97	75.2
Everyone starts at the beginning.	relatedness	100	75.8
Instead of taking the elevator, take the stairs today. Even if it is only once.	competence	100	75.8

Millions of other people are trying to do exactly what you are ... we're in it together!	relatedness	101	76.5
How are you going to be active today?	autonomy	103	78
What's your activity going to be today?	autonomy	104	79.4
You don't have to be able to run a marathon to be healthy.			
You're doing a great job just by choosing to take a walk today!	Competence	105	79.5
Everyone has their likes and dislikes...what works for you?	autonomy	105	79.5
Mastery of anything takes hard work and persistence.			
Remember that at one point even learning to walk was difficult!	relatedness	105	79.5
Don't forget to thank yourself for choosing to be healthy. It's not easy, and your actions are admirable	relatedness	105	79.5
Scheduling time in your day for yourself isn't a bad thing.			
Take 20 minutes to clear your head today.	competence	107	81.1
Sometimes it's helpful to try a lot of different activities to find your perfect match.	autonomy	108	81.8
Go at your own pace today...whether it's taking a stroll or running, your workout is your own and you should be proud!	autonomy	108	81.8
It's your choice how you would like to stay active today.	autonomy	108	81.8
The only thing holding you back from meeting your goal is you.	autonomy	107	82.3
We all start at the beginning.			
You get a little bit stronger, faster, energetic, and more brave every day.	relatedness	108	82.4

Different people enjoy different things. Find activities that you enjoy and will help you meet your activity goal.	competence	109	82.6
You know yourself best. Tell yourself the best way you can meet your goal today.	autonomy	109	83.2
It's difficult to get going sometimes, but remember that you aren't alone!	relatedness	111	84.1
You are not alone. Everyone struggles when they start something new!	relatedness	129	84.5
Everyone starts somewhere! You can improve from where you are right now.	relatedness	112	84.8
It's your body. You can choose how you want to treat it.	autonomy	111	85.4

N= number of participants endorsed, %= valid percent

Table 3
Survey 1 results: Control message evaluation

Message	Need	N	%
The Way Get Started Is To Quit Talking And Begin Doing.	relatedness	88	75.2
	autonomy	86	81.1
	competence	88	84.6
The Pessimist Sees Difficulty In Every Opportunity. The Optimist Sees Opportunity In Every Difficulty.	relatedness	102	89.5
	autonomy	96	93.2
	competence	86	86.9
Don't Let Yesterday Take Up Too Much Of Today.	relatedness	95	86.4
	autonomy	89	95.7
	competence	91	94.8
You Learn More From Failure Than From Success. Don't Let It Stop You. Failure Builds Character.	relatedness	97	96
	autonomy	89	92.7
	competence	78	94
It's Not Whether You Get Knocked Down, It's Whether You Get Up.	relatedness	94	88.7
	autonomy	78	90.7
	competence	76	95
If You Are Working On Something That You Really Care About, You Don't Have To Be Pushed. The Vision Pulls You.	relatedness	96	84.2
	autonomy	89	83.2
	competence	91	88.3
Failure Will Never Overtake Me If My Determination To Succeed Is Strong Enough.	relatedness	96	85.7
	autonomy	90	91.8
	competence	81	91

We May Encounter Many Defeats But We Must Not Be Defeated.	relatedness	95	90.5
	autonomy	89	89.9
	competence	87	91.6
Knowing Is Not Enough; We Must Apply. Wishing Is Not Enough; We Must Do.	relatedness	94	88.7
	autonomy	91	92.9
	competence	87	89.7
Imagine Your Life Is Perfect In Every Respect; What Would It Look Like?	relatedness	89	79.5
	autonomy	84	78.5
	competence	91	81.3
We Generate Fears While We Sit. We Overcome Them By Action.	relatedness	96	85.7
	autonomy	97	91.5
	competence	93	89.4
Whether You Think You Can Or Think You Can't, You're Right.	relatedness	85	78.7
	autonomy	88	83
	competence	89	79.5
The Man Who Has Confidence In Himself Gains The Confidence Of Others.	relatedness	94	85.5
	autonomy	93	89.4
	competence	88	86.3
The Only Limit To Our Realization Of Tomorrow Will Be Our Doubts Of Today.	relatedness	91	82.7
	autonomy	86	87.8
	competence	90	86.5
What You Lack In Talent Can Be Made Up With Desire, Hustle And Giving 110% All The Time.	relatedness	93	84.5
	autonomy	83	89.2
	competence	87	91.6

Do What You Can With All You Have, Wherever You Are.	relatedness	78	83.9
	autonomy	80	88.9
	competence	84	93.3
Develop An ‘Attitude Of Gratitude’. Say Thank You To Everyone You Meet For Everything They Do For You.	relatedness	85	81
	autonomy	87	84.5
	competence	80	77.7
You Are Never Too Old To Set Another Goal Or To Dream A New Dream.	relatedness	90	88.2
	autonomy	84	95.5
	competence	83	90.2
This too, shall pass.	relatedness	75	73.5
	autonomy	77	72.6
	competence	77	77.8
Keep your eyes on the stars and your feet on the ground.	relatedness	92	80.7
	autonomy	79	75.2
	competence	81	75.7
The only person you should try to be better than is the person you were yesterday.	relatedness	87	89.7
	autonomy	80	90.9
	competence	78	89.7
It's not about how hard you can hit; it's about how hard you can get hit and keep moving forward.	relatedness	80	85.1
	autonomy	73	83
	competence	71	85.5
If you want to go fast, go alone. If you want to go far, go together.	relatedness	90	81.8
	autonomy	81	82.7
	competence	90	91.8
Believe you can and you're halfway there.	relatedness	88	86.3
	autonomy	91	93.8
	competence	74	87.1

Those who don't believe in magic will never find it.	relatedness	77	68.8
	autonomy	76	70.4
	competence	80	72.7
There is no elevator to success — you have to take the stairs.	relatedness	88	82.2
	autonomy	89	84
	competence	84	84.8
It does not do to dwell on dreams and forget to live.	relatedness	91	79.1
	autonomy	94	84.7
	competence	87	81.3
It's supposed to be hard. If it were easy, everyone would do it.	relatedness	88	86.3
	autonomy	92	90.2
	competence	80	88.9
Ask yourself if what you're doing today will get you closer to where you want to be tomorrow.	relatedness	93	89.4
	autonomy	88	89.8
	competence	84	91.3
Do not wait; the time will never be 'just right.' Start where you stand, and work with whatever tools you may have at your command, and better tools will be found as you go along.	relatedness	88	91.7
	autonomy	90	95.7
	competence	81	94.2

N= number of participants endorsed, %= valid percent

Table 4

Survey 1: Descriptive Statistics and Zero-order Correlations

Variable	*M*	*SD*	1	2	3
1. PNSE Control	73.22	18.28	--		
2. PNSE Theory	73.62	21.10	.67**	--	
3. IPAQ	4130.84	5541.78	-.10	-.20**	--
4. Sedentary Goal	4.20	1.33	.23**	.19*	-.05

Note. $N = 132$.

Table 5
Survey 2 results: Theory message evaluation

Message	Need	N	%
You don't have to be able to run a marathon to be healthy. You're doing a great job just by choosing to take a walk today!	competence	101	76.5
It's difficult to get going sometimes, but remember that you aren't alone!	relatedness	105	78.4
How are you going to be active today?	autonomy	99	73.9
Everyone has their likes and dislikes...what works for you?	autonomy	108	80.6
Try a restorative yoga class this week. They are slow-paced, relaxing, and will encourage you to feel renewed while still working towards your goal!	competence	87	64.9
Everyone starts at the beginning	relatedness	107	79.9
Different people enjoy different things. Find activities that you enjoy and will help you meet your activity goal	autonomy	108	80.6
Mastery of anything takes hard work and persistence. Remember that at one point even learning to walk was difficult!	relatedness	111	82.8
Sometimes it's helpful to try a lot of different activities to find your perfect match	autonomy	105	78.4
Choose to take the stairs today.	competence	93	69.4
You are strong. You can do this.	competence	118	88.1
You're not the only one who has found that starting a new workout routine can be challenging at times. Stick with it.	relatedness	106	79.1
Why not choose today to do something different? Don't put it off until tomorrow.	autonomy	103	76.9
You make the choice of when and how to be active today.	autonomy	117	87.3
Some days will be harder than others. Hang in there! You can do this.	relatedness	111	82.8
Stretching is a great way to wake up, and you can do it almost anywhere.	competence	100	74.6
Getting started is the hardest part, but soon it will feel like part of your routine.	competence	117	87.3
It's your choice- what can you do right now to move one step closer towards your goal?	autonomy	110	82.7
It can be really hard to keep yourself motivated every day. Celebrate the small victories too.	relatedness	112	83.6
You don't need to do the same thing each day, try being active in different ways.	autonomy	104	77.6
Do everything at your own pace, you can always take a break.	competence	107	79.9

Having a friend to be active with makes exercise more fun	relatedness	108	80.6
Gyms have lot of classes to pick from. If you try something new you might enjoy it!	autonomy	103	76.9
You know yourself best. Tell yourself the best way you can meet your goal today.	competence	113	84.3
Take a moment to plan what you're doing to do for your body and health today.	autonomy	101	75.4
Just find 5 minutes in your day to be more active today. This could be as easy as parking your car farther away in the parking lot.	competence	105	79.5
It's hard trying a new activity. Don't get discouraged!	relatedness	111	83.5
What kind of activities that encourage you to move do you like best? Do that activity at least once today.	autonomy	103	77.4
You've been working very hard. Take a slow lap around the block today when you get home from work as an easy way to get in more steps.	relatedness	104	78.2
Ask a friend how s/he gets back on track after missing a goal.	relatedness	96	72.2
Today, choose a new activity to try out! You might enjoy it	autonomy	104	78.2
The beginning of a new workout may be hard, but it will get easier as time goes on.	relatedness	108	81.8
Walk around your house, or do jumping jacks during the commercials on the TV.	competence	96	72.7
Remember, you decide how physical activity works best in your life	autonomy	110	83.3
Being active is your choice.	autonomy	113	85.6
It's normal to get discouraged sometimes-- just get back on track tomorrow!	relatedness	111	84.1

N= number of participants endorsed, %= valid percent

Table 6
Survey 2 results: Control message evaluation

Message	Need	N	%
The Way Get Started Is To Quit Talking And Begin Doing.	relatedness	80	85
	autonomy	95	88.8
	competence	100	93.5
The Pessimist Sees Difficulty In Every Opportunity. The Optimist Sees Opportunity In Every Difficulty.	relatedness	102	86.4
	autonomy	99	93.4
	competence	97	91.5
Don't Let Yesterday Take Up Too Much Of Today.	relatedness	104	91.2
	autonomy	103	96.3
	competence	101	97.1
You Learn More From Failure Than From Success. Don't Let It Stop You. Failure Builds Character.	relatedness	95	91.3
	autonomy	92	93.9
	competence	83	96.5
It's Not Whether You Get Knocked Down, It's Whether You Get Up.	relatedness	101	89.4
	autonomy	95	95
	competence	91	93.8
Press forward. Do not stop, do not linger in your journey, but strive for the mark set before you.	relatedness	113	93.4
	autonomy	105	97.2
	competence	91	94.8
Change your life today. Don't gamble on the future, act now, without delay.	relatedness	107	92.2
	autonomy	101	92.7
	competence	105	96.3
Start where you are. Use what you have. Do what you can.	relatedness	97	95.1
	autonomy	91	94.8
	competence	93	93
Success is walking from failure to failure with no loss of enthusiasm.	relatedness	102	91.1
	autonomy	110	92.4
	competence	97	92.4
If you do what you always did, you will get what you always got.	relatedness	103	87.3

	autonomy	98	87.5
	competence	98	87.5
I have not failed. I've just found 10,000 ways that won't work.	relatedness	101	87.1
	autonomy	96	85
	competence	90	84.1
No masterpiece was ever created by a lazy artist.	relatedness	99	84.6
	autonomy	99	90
	competence	103	92.8
Do one thing every day that scares you.	relatedness	99	83.2
	autonomy	93	85.3
	competence	100	87.7
I find that the harder I work, the more luck I seem to have.	relatedness	102	87.2
	autonomy	102	89.5
	competence	91	88.3
The starting point of all achievement is desire.	relatedness	95	90.5
	autonomy	97	96
	competence	101	95.3
Success is the sum of small efforts, repeated day-in and day-out.	relatedness	97	89
	autonomy	101	94.4
	competence	94	93.1
All progress takes place outside the comfort zone.	relatedness	94	82.5
	autonomy	105	89.7
	competence	102	92.7
The only place where success comes before work is in the dictionary.	relatedness	97	80.2
	autonomy	98	81.7
	competence	101	85.6
Success is liking yourself, liking what you do, and liking how you do it.	relatedness	89	87.3
	autonomy	95	90.5
	competence	85	88.5
If you genuinely want something, don't wait for it — teach yourself to be impatient.	relatedness	95	80.5
	autonomy	101	89.4
	competence	101	87.8
You must expect great things of yourself before you can do them.	relatedness	109	93.2
	autonomy	99	94.3

	competence	107	98.2
Motivation is what gets you started. Habit is what keeps you going.	relatedness	103	93.6
	autonomy	106	97.2
	competence	98	95.1
Be miserable. Or motivate yourself. Whatever has to be done, it's always your choice.	relatedness	88	79.3
	autonomy	78	88.6
	competence	94	87
You may have to fight a battle more than once to win it.	relatedness	105	93.8
	autonomy	96	90.6
	competence	99	96.1
Hard work beats talent when talent doesn't work hard.	relatedness	94	88.7
	autonomy	95	91.3
	competence	96	93.2
Every great story on the planet happened when someone decided not to give up, but kept going no matter what.	relatedness	103	92.8
	autonomy	104	94.5
	competence	102	97.1
Don't stop when you're tired. STOP when you are DONE.	relatedness	95	85.6
	autonomy	96	87.3
	competence	97	95.1
Successful people do what unsuccessful people are not willing to do.	relatedness	85	78
	autonomy	91	85
	competence	90	84.9
It does not matter how slowly you go, so long as you do not stop.	relatedness	98	93.3
	autonomy	101	95.3
	competence	94	96.9
You don't have to be great to start, but you have to start to be great.	relatedness	97	92.4
	autonomy	94	93.1
	competence	92	93.9

N= number of participants endorsed, %= valid percent

Table 7
Survey 2: Descriptive Statistics and Zero-order Correlations

Variable	*M*	*SD*	1	2	3
1. PNSE Control	72.99	16.62	--		
2. PNSE Theory	74.90	19.36	.55**	--	
3. IPAQ	3339.59	3090.74	.08	-.09	--
4. Sedentary Goal	4.20	1.40	.30**	.34**	-.06

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APPENDIX A: SURVEY 1 & 2 QUESTIONNAIRE

Instructions: Please imagine that you are trying to increase your level of physical activity when responding to how each message makes you feel.

"CONTROL MESSAGE 1"

1. "To what degree does this message make you feel understood - that your feelings or your specific situation are being considered?"
2. "To what degree does this message make you feel as though you have a choice, and you are in control?",
3. "To what degree does this message make you feel that you are capable of your goal –that you have the skills and ability to achieve your goal?"

"CONTROL MESSAGE 2"

1. "To what degree does this message make you feel understood - that your feelings or your specific situation are being considered?"
2. "To what degree does this message make you feel as though you have a choice, and you are in control?",
3. "To what degree does this message make you feel that you are capable of your goal –that you have the skills and ability to achieve your goal?"

[Will be repeated for ALL control messages)

Psychological Needs Satisfaction in Exercise- Control Messages

[Will be administered after ALL control messages have been evaluated]

Perceived Competence:

1. These messages will help me to complete exercises that are personally challenging
2. These messages will make me feel confident I can do even the most challenging exercises
3. These messages will make me feel confident in my ability to perform exercises that personally challenge me
4. These messages will make me feel capable of completing exercises that are challenging to me
5. These messages will make me feel I am capable of doing even the most challenging exercises
6. These messages will make me feel good about the way I am able to complete challenging exercises

Perceived Autonomy

7. These messages will help me feel free to exercise in my own way
8. These messages will help me feel free to make my own exercise program decisions
9. These messages will help me feel l like I am in charge of my exercise program decisions
10. These messages will help me feel like I have a say in choosing the exercises that I do
11. These messages will help me feel free to choose which exercises I participate in
12. These messages will help me feel like I am the one who decides what exercises I do

Perceived Relatedness

13. These messages will help me feel attached to my exercise companions because they accept me for who I am
14. These messages will help me feel like I share a common bond with people who are important to me when we exercise together
15. These messages will help me feel a sense of camaraderie with my exercise companions because we exercise for the same reasons
16. These messages will help me feel close to my exercise companions who appreciate how difficult exercise can be
17. These messages will help me feel connected to the people who I interact with while we exercise together
18. These messages will help me feel like I get along well with other people who I interact with while we exercise together

Individual Message Evaluation- Theory Messages

Instructions: Please imagine that you are trying to increase your level of physical activity when responding to how each message makes you feel.

"THEORY MESSAGE 1"

4. "To what degree does this message make you feel understood - that your feelings or your specific situation are being considered?"
5. "To what degree does this message make you feel as though you have a choice, and you are in control?",
6. "To what degree does this message make you feel that you are capable of your goal –that you have the skills and ability to achieve your goal?"

"THEORY MESSAGE 2"

4. "To what degree does this message make you feel understood - that your feelings or your specific situation are being considered?"
5. "To what degree does this message make you feel as though you have a choice, and you are in control?",
6. "To what degree does this message make you feel that you are capable of your goal –that you have the skills and ability to achieve your goal?"

[Will be repeated for ALL theory messages]

Psychological Needs Satisfaction in Exercise- Theory Messages

[Will be administered after ALL theory messages have been evaluated]

Perceived Competence:

19. These messages will help me to complete exercises that are personally challenging
20. These messages will make me feel confident I can do even the most challenging exercises
21. These messages will make me feel confident in my ability to perform exercises that personally challenge me
22. These messages will make me feel capable of completing exercises that are challenging to me
23. These messages will make me feel I am capable of doing even the most challenging exercises
24. These messages will make me feel good about the way I am able to complete challenging exercises

Perceived Autonomy
25. These messages will help me feel free to exercise in my own way
26. These messages will help me feel free to make my own exercise program decisions
27. These messages will help me feel l like I am in charge of my exercise program decisions
28. These messages will help me feel like I have a say in choosing the exercises that I do
29. These messages will help me feel free to choose which exercises I participate in
30. These messages will help me feel like I am the one who decides what exercises I do

Perceived Relatedness
31. These messages will help me feel attached to my exercise companions because they accept me for who I am
32. These messages will help me feel like I share a common bond with people who are important to me when we exercise together
33. These messages will help me feel a sense of camaraderie with my exercise companions because we exercise for the same reasons
34. These messages will help me feel close to my exercise companions who appreciate how difficult exercise can be
35. These messages will help me feel connected to the people who I interact with while we exercise together
36. These messages will help me feel like I get along well with other people who I interact with while we exercise together

International Physical Activity Questionnaire- Short Form

The following questions ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Vigorous. Think about all the vigorous activities which take hard physical effort that you did in the last 7 days. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities?
_____ Days per week
Don't Know/Not Sure

2. How much time did you usually spend doing vigorous physical activities on one of those days?
__ __ Hours per day
__ __ __ Minutes per day
Don't Know/Not Sure

Moderate. Now think about activities which take moderate physical effort that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or

doubles tennis. Do not include walking. Again, think about only those physical activities that you did for at least 10 minutes at a time.
3. During the last 7 days, on how many days did you do moderate physical activities?
____ Days per week
4. How much time did you usually spend doing moderate physical activities on one of those days?
__ __ Hours per day
__ __ __ Minutes per day
Now think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.
5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?
____ Days per week
6. How much time did you usually spend walking on one of those days?
__ __ Hours per day
__ __ __ Minutes per day
Now think about the time you spent sitting on week days during the last 7 days. Include time spent at work, at home, while doing course work, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.
7. During the last 7 days, how much time did you usually spend sitting on a week day?
__ __ Hours per weekday
__ __ __ Minutes per weekday

Physical Activity Goals

The following questions ask about your current physical activity goals. Please respond to the following questions, even if you do not have any goals for physical activity. Please indicate from 0 (not at all) to 5 (very much):
1. "To what degree would like to increase the number of days per week that you engage in vigorous physical activity?"
0 (not at all) 1 2 3 4 5 (very much)
2. "To what degree would you like to increase the amount of time that you engage in vigorous physical activity per session?"
0 (not at all) 1 2 3 4 5 (very much)
3. "To what degree would like to increase the number of days per week that you engage in moderate physical activity?"
0 (not at all) 1 2 3 4 5 (very much)
4. To what degree would you like to increase the amount of time that you engage in moderate physical activity per session?"
0 (not at all) 1 2 3 4 5 (very much)
5. To what degree would you like to <u>decrease</u> the amount of time you usually spend sitting on a week day?
0 (not at all) 1 2 3 4 5 (very much)

Demographics

1. Age: _____ yrs.
Gender: Female Male Trans Other

Weight: _____ lbs.
Height: _____ ft _____inches
Year in college: 1 st year 2 nd year 3 rd year 4 th year 5 th or higher
GPA: _____/4.0
With which of the following ethnic groups do you identify?
African American/Black
Asian American/Asian
Hispanic/Latino
Native American
White/European American
Multi-ethnic
Other
Marital Status:
Single/Never married
Married/Long-term life-partner
Divorced/Separated
Widow/Widower

Sexual orientation (Check one)
Heterosexual
Homosexual
Bisexual

If the above do not apply, please describe_____

How many children do you have? (Circle one)
No children
1 child
2 children
3 children
4 or more children

Are you the first person in your family to attend college? Yes ___ No ____
If no, has anyone in your family graduated from college? Yes ___ No ___

Do you currently work for pay? YES NO
If YES, Approximately how many hours per week do you work? _____hrs/week
What is your approximate take home pay (after taxes) per month? $_____

Please describe your current job(s).

Job 1 _____
Job 2 _____
Job 3 _____

In general, would you say that you have:

1) more money than you need
2) just enough for your needs
3) not enough to meet your needs

How difficult is it for you to pay your monthly bills with your current income from all sources?
1) Not at all difficult 2) 3) 4) Very difficult
What is your father's highest levels of education?
Less than High School
High school, not currently in college or tech school
High school, currently in college/tech school
Associate Degree (or other two-year degree)
Bachelor's degree, not currently in grad school
Bachelor's degree, currently in grad school
Master's Degree
Terminal Degree (e.g. PhD, MD, JD)
What is your Mother's highest levels of education?
Less than High School
High school, not currently in college or tech school
High school, currently in college/tech school
Associate Degree (or other two-year degree)
Bachelor's degree, not currently in grad school
Bachelor's degree, currently in grad school
Master's Degree
Terminal Degree (e.g. PhD, MD, JD)

Thinking back to when you were a child, which of the following words best describes your family's financial situation?
POOR
AVERAGE
WELL-OFF

Thinking back to when you were a child, did your family ever have to move because of financial problems? (Circle one)
YES
NO
If you circled yes for the question above, how many times did this happen?
_____

Do your parents currently own or rent the residence in which they live?
RENT
OWN

When you were 5 years old, was the residence in which you lived owned or rented by your family?
RENT OWN

APPENDIX B: SORTING RESULTS

Note. Results are presented n(%), and the need for which a message was designed to fill is presented by the bold text.

1. Try doing yoga this week. It's a great way to be active and it relaxes your mind
a. Autonomy 25 (49)
b. Competence 16 (31.4)
c. Relatedness 10 (19.6)

2. Everyone falls off the wagon at some point, but the most important part is to get back on.
a. Autonomy 13 (25.5)
b. Competence 21 (41.2)
c. Relatedness 17 (33.3)

3. I's hard to stick to a plan, but the more that you do it, the more natural it will become.
a. autonomy 13 (25.5)
b. Competence 21 (42.2)
c. relatedness 16 (31.4)
d. Unsure 1 (2)

4. Choose one activity for today: walking, bike riding, yoga, swimming, jogging, hiking, weight lifting. Do this activity for at least 10 minutes today.
a. Autonomy 36 (70.6)
b. Competence 10 (19.6)
c. Relatedness 1 (2)
d. Unsure 4 (7.8)

5. Everyone starts at the beginning
a. Autonomy 6 (11.8)
b. Competence 14 (27.5)
c. Relatedness 28 (54.9)
d. Unsure 3 (5.9)

6. You can do this.
a. Autonomy 4 (7.8)
b. Competence 31 (60.8)
c. Relatedness 16 (31.4)

7. It's hard to stick to a plan, but the more that you do it the more natural it will become
a. Autonomy 16 (31.4)
b. Competence 22 (43.1)

c. Relatedness 12 (23.5)
d. Unsure 1 (2)

8. You are strong.
a. Autonomy 4 (7.8)
b. Competence 25 (49)
c. Relatedness 20 (39.2)
d. 2 (3.9)

9. Everyone has the choice to get active, but only you can make it happen for yourself
a. Autonomy 32 (62.7)
b. Competence 7 (13.7)
c. Relatedness 11 (21.6)
d. Unsure 1 (2)

10. Before you go to bed tonight, plan out your activity tomorrow so it works for your schedule and mood!
a. Autonomy 32 (62.7)
b. Competence 12 (23.5)
c. Relatedness 4 (7.8)
d. Unsure 3 (5.9)

11. You're not the only one who has found that starting a new workout routine can be challenging at times. Stick with it.
a. Autonomy 6 (11.8)
b. Competence 15 (29.4)
c. Relatedness 28 (54.9)
d. Unsure 2 (3.9)

12. It's difficult to get going sometimes, but remember that you aren't alone!
a. Autonomy 3 (5.9)
b. Competence 13 (25.5)
c. Relatedness 34 (66.7)
d. Unsure 1 (2)

13. You don't have to be able to run a marathon to be healthy. You're doing a great job by choosing to take a walk today!
a. Autonomy 10 (19.6)
b. Competence 31 (60.8)
c. Relatedness 9 (17.6)
d. Unsure 1 (2)

14. Try a restorative yoga class this week. They are slow-paced, relaxing, and will encourage you to feel renewed while still working towards your goal!
a. Autonomy 21 (41.2)

b. Competence 21 (41.2)
c. Relatedness 8 (15.7)
d. Unsure 1 (2)

15. Mastery of anything takes hard work and persistence. Remember that at one point even learning to walk was difficult!
a. Autonomy 6 (11.8)
b. Competence 37 (72.5)
c. Relatedness 8 (15.7)

16. Different people enjoy different things. Find activities that you enjoy and will help you meet your activity goal.
a. Autonomy 25 (49)
b. Competence 11 (21.6)
c. Relatedness 14 (27.5)
d. Unsure 1 (2)

17. Millions of other people are trying to do exactly what you are... we're in it together!
a. Autonomy 1 (2.0)
b. Competence 2 (3.9)
c. Relatedness 46 (90.2)
d. Unsure 2 (3.9)

18. Choose to take the stairs today.
a. Autonomy 38 (74.5)
b. Competence 7 (13.7)
c. Relatedness 1 (2)
d. Unsure 5 (9.8)

19. You've been working very hard. Take a slow lap around the block today when you get home from work as an easy easy to get in more steps.
a. Autonomy 19 (37.3)
b. Competence 26 (51)
c. Relatedness 4 (7.8)
d. Unsure 2 (3.9)

20. Find a natural trail near by that looks fun to you. You'll get exercise and be able to enjoy the great outdoors.
a. Autonomy 24 (47.1)
b. Competence 20 (39.2)
c. Relatedness 5 (9.8)
d. Unsure 2 (3.9)

21. Sometimes it's helpful to try a lot of different activities to find your perfect match
a. Autonomy 26 (51)

b. Competence 14 (27.5)
c. Relatedness 9 (17.6)
d. Unsure 2 (3.9)

22. What's your activity going to be today?
a. Autonomy 41 (80.4)
b. Competence 4 (7.8)
c. Relatedness 4 (7.8)
d. Unsure 2 (3.9)

23. Ask a friend to join you in an activity today. Talking while being active can help make the time go quicker, and forces you to pace yourself!
a. Autonomy 8 (15.7)
b. **Competence 15 (29.4**)
c. Relatedness 27 (52.9)
d. Unsure 1 (2)

24. Instead of taking the elevator, take the stairs today. Even if it is only once
a. Autonomy 29 (56.9)
b. Competence 15 (29.4)
c. Relatedness 4 (7.8)
d. Unsure 3 (5.9)

25. When you're feeling down, just remember that Michael Phelps had to learn to swim.
a. Autonomy 1 (2)
b. Competence 22 (43.1)
c. Relatedness 25 (49)
d. Unsure 3 (5.9)

26. Go at your own pace today...whether it's taking a stroll or running, your workout is your own and you should be proud!
a. Autonomy 24 (47.1)
b. Competence 24 (47.1)
c. Relatedness 3 (5.9)

27. Don't forget to thank yourself for choosing to be healthy. It's not easy and your actions are admirable.
a. Autonomy 11 (21.6)
b. Competence 30 (58.8)
c. Relatedness 9 (17.6)
d. Unsure 1

28. Everyone has their likes and dislikes... what works for you?
a. Autonomy 25 (49)
b. Competence 5 (9.8)

c. Relatedness 17 (33.3)
d. Unsure 4 (7.8)

29. Go for a walk with a friend, walk at a speed where your breathing is a little heavy but you can still maintain a conversation.
a. Autonomy 13 (25.5)
b. Competence 15 (29.4)
c. Relatedness 20 (39.2)
d. Unsure 5 (5.9)

30. Starting something new is always the hardest part, but persistence is key.
a. Autonomy 6 (11.8)
b. Competence 34 (66.7)
c. Relatedness 9 (17.6)
d. Unsure 2 (3.9)

31. It's your choice how you would like to stay active today.
a. Autonomy 41 (80.4)
b. Competence 7 (13.7)
c. Relatedness 3 (5.9)

32. Go for a light jog or quick walk today.
a. Autonomy 31 (60.8)
b. Competence 13 (25.5)
c. Relatedness 4 (7.8)
d. Unsure 3 (5.9)

33. Why not choose today to do something different? Don't put it off until tomorrow.
a. Autonomy 30 (58.8)
b. Competence 16 (31.4)
c. Relatedness 4 (7.8)
d. Unsure 1 (2)

34. You're not alone in this- others are working towards their goals too!
a. Autonomy 1 (2.0)
b. Competence 7 (13.7)
c. Relatedness 43 (84.3)

35. The beginning of a new workout may be hard, but it will get easier as time goes on.
a. Autonomy 5 (9.8)
b. Competence 39 (76.5)
c. Relatedness 7 (13.7)

36. You are the master of your own fate.

a. Autonomy 34 (66.7)
b. Competence 11 (21.6)
c. Relatedness 5 (9.8)
d. Unsure 1 (2)

37. You make the choice of when and how to be active today.
a. Autonomy 45 (88.2)
b. Competence 4 (7.8)
c. Relatedness 1
d. Unsure 1

38. Before you go to bed tonight, plan out your activity tomorrow so it works for your schedule and mood!
a. Autonomy 23 (45.1)
b. Competence 21 (41.2)
c. Relatedness 4 (7.8)
d. Unsure 3 (5.9)

39. It's normal to get discouraged sometimes—just get back on track tomorrow!
a. Autonomy 8 (15.7)
b. Competence 28 (54.9)
c. Relatedness 14 (27.5)
d. Unsure 1

40. What kind of activities that encourage you to move do you like best? Do that activity at least once today.
a. Autonomy 36 (70.6)
b. Competence 9 (17.6)
c. Relatedness 4 (7.8)
d. Unsure 2

41. Ask a friend how s/he gets back on track after missing a goal.
a. Autonomy 8 (15.7)
b. Competence 4 (7.8)
c. Relatedness 37 (72.5)
d. Unsure 2 (3.9)

42. Today, choose a new activity to try out! You might enjoy it.
a. Autonomy 38 (74.5)
b. Competence 7 (13.7)
c. Relatedness 3 (5.9)
d. Unsure 3 (5.9)

43. The more you do it, the easier it will become for you!
a. Autonomy 3 (5.9)
b. Competence 43 (84.3)

c. Relatedness 2 (39)
d. Unsure 2 (3.9)

44. Walk around your house, or do jumping jacks during the commercials on TV.
a. Autonomy 24 (47.1)
b. Competence 19 (37.3)
c. Relatedness Relatedness 2 (3.9)
d. Unsure 6 (11.8)

45. Pick your favorite activity and do it for 15 minutes
a. Autonomy 39 (76.5)
b. Competence 7 (13.7)
c. Relatedness 4 (7.8)
d. Unsure 1 (2)

46. Everyone has those days when they can't be as active as they'd like
a. Autonomy 6 (11.8)
b. Competence 10 (19.6)
c. Relatedness 32 (62.7)
d. Unsure 3 (5.9)

47. Remember, you decide how physical activity works best in your life.
a. Autonomy 35 (68.6)
b. Competence 11 (21.6)
c. Relatedness 3 (5.9)
d. Unsure 2 (3.9)

48. Start your day in a positive way! Do 10 jumping jacks tomorrow when you get out of bed. This will boost your energy and get your blood flowing.
a. Autonomy 20 (39.2)
b. Competence 26 (51.0)
c. Relatedness 4 (7.8)
d. Unsure 1 (2.0)

49. You are not alone. Everyone struggles when they start something new!
a. Autonomy 4 (7.8)
b. Competence 9 (17.6)
c. Relatedness 38 (74.5)

50. Just find 5 minutes in your day to be more active today. This could be as easy as parking your car further away in the parking lot.
a. Autonomy 20 (39.2)
b. Competence 26 (51.0)
c. Relatedness 3 (5.9)
d. Unsure 2 (3.9)

51. You can choose to walk the long way home (or to school, to the store).
a. Autonomy 41 (80.4)
b. Competence 7 (13.7)
c. Relatedness 3 (5.9)

52. Being active is your choice,
a. Autonomy 43 (84.3)
b. Competence 4 (7.8)
c. Relatedness 4 (7.8)

53. You can do it- set an alarm each hour and move for 30 seconds. Maybe get a drink of water, or go to the bathroom.
a. Autonomy 17 (33.3)
b. **Competence 29 (56.9**)
c. Relatedness 4 (7.8)
d. Unsure 1 (2.0)

54. It's hard trying a new activity. Don't get discouraged!
a. Autonomy 7 (13.7)
b. Competence 28 (54.9)
c. Relatedness 16 (31.4)

55. Change takes time. Praise or reward yourself for all of the small things you accomplish today.
a. Autonomy 9 (17.6)
b. Competence 31 (60.8)
c. Relatedness 10 (19.6)
d. Unsure 1 (2.0)

56. You picked this goal yourself. You can make yourself proud.
a. Autonomy 24 (47.1)
b. Competence 22 (43.1)
c. Relatedness 5 (9.8)

57. Gradually increase your physical activity- just add on 2 minutes each day until you reach your goal!
a. Autonomy 16 (31.4)
b. Competence 30 (58.8)
c. Relatedness 4 (7.8)
d. Unsure 1 (2.0)

58. You can set an attainable goal for tomorrow.
a. Autonomy 21 (41.2)
b. Competence 28 (54.9)
c. Relatedness 2 (3.9)

59. You can multitask: did you know that things like vacuuming and gardening are physical activities too?
a. Autonomy 20 (39.2)
b. Competence 18 (35.3)
c. Relatedness 10 (19.6)
d. Unsure 3 (5.9)

60. Share the successes and difficulties of your new routine with someone. They have probably experienced similar ups and downs.
a. Autonomy 5 (9.8)
b. Competence 2 (3.9)
c. Relatedness 41 (80.4)
d. Unsure 3 (5.9)

61. It's your body. You can choose how you want to treat it.
a. Autonomy 41 (80.4)
b. Competence 6 (11.8)
c. Relatedness 3 (5.9)
d. Unsure 1 (2.0)
62. Everyone is at different points in their fitness journey. Don't get discouraged if some people seem more advanced than you.
a. Autonomy 5 (9.8)
b. Competence 12 (23.5)
c. Relatedness 31 (60.8)
d. Unsure 3 (5.9)

63. It's hard to begin to workout, but it's so rewarding in the end.
a. Autonomy 4 (7.8)
b. Competence 33 (64.7)
c. Relatedness 14 (27.5)

64. Remember, you don't need any equipment to be physically active- you can walk, run, stretch, do jumping jacks, push ups, sit ups, or more!
a. Autonomy 22 (43.1)
b. Competence 21 (41.2)
c. Relatedness 5 (9.8)
d. Unsure 3 (5.9)

65. Take a moment to plan what you're doing to do for your body and health today.
a. Autonomy 34 (66.7)
b. Competence 13 (25.5)
c. Relatedness 1 (2.0)
d. Unsure 3 (5.9)

66. Sometimes it is difficult for us to meet our goals.
a. Autonomy 3 (5.9)

b. Competence 20 (39.2)
c. Relatedness 24 (47.1)
d. Unsure 4 (7.8)

67. You can use soup cans or water bottles instead of buying weights to increase resistance and tone muscles
a. Autonomy 23 (45.1)
b. Competence 21 (41.2)
c. Relatedness 6 (11.8)
d. Unsure 1 (2.0)

68. We all start at the beginning. You get a little bit stronger, faster, energetic, and more brave every day.
a. Autonomy 3 (5.9)
b. Competence 28 (54.9)
c. Relatedness 19 (37.3)
d. Unsure 1 (2.0)

69. Stretching in a great way to wake up, and you can do it almost anywhere.
a. Autonomy 19 (37.3)
b. Competence 25 (49)
c. Relatedness 5 (9.8)
d. Unsure 3 (3.9)

70. When you feel like giving up or throwing in the towel, take a moment to group and consider how to proceed.
a. Autonomy 18 (35.3)
b. Competence 25 (49.0)
c. Relatedness 6 (11.8)
d. Unsure 2 (4.0)

71. How are you going to be active today?
a. Autonomy 39 (76.5)
b. Competence 2 (3.9)
c. Relatedness 4 (7.8)
d. Unsure 6 (11.8)

72. Do everything at your own pace, you can always take a break.
a. Autonomy 28 (54.9)
b. Competence 18 (35.3)
c. Relatedness 4 (7.8)
d. Unsure 1 (2.0)

73. It' hard being a student. You are deserving of a few minutes in your day to focus on you. Be kind to yourself.
a. Autonomy 15 (29.4)

b. Competence 18 (35.3)
c. Relatedness 17 (33.3)
d. Unsure 1 (2.0)

74. It's your choice- what can you do right now to move one step closer towards your goal?
a. Autonomy 41 (80.4)
b. Competence 18 (35.3)
c. Relatedness 17 (33.3)
d. Unsure 1 (2.0)

75. Sometimes doing new things can feel awkward, or might seem embarrassing. You will be proud of yourself later for trying.
a. Autonomy 10 (19.6)
b. Competence 30 (58.8)
c. Relatedness 10 (19.6)
d. Unsure 1 (2.0)

76. Getting started is the hardest part, but soon it will feel like part of your routine.
a. Autonomy 12 (23.5)
b. Competence 27 (52.9)
c. Relatedness 12 (23.5)
d. Unsure 0

77. You know yourself best. Tell yourself the best way you can meet your goal today.
a. Autonomy 26 (51.0)
b. Competence 21 (41.2)
c. Relatedness 4 (7.8)
d. Unsure 0

78. There are many ways to "do cardio": running, biking, dancing, even walking fast. Choose which works best for you
a. **Autonomy 42 (82.4)**
b. Competence 6 (11.8)
c. Relatedness 2 (3.9)
d. Unsure 1 (2.0)

79. You have so much to gain from being more active! You are able to do this, don't sell yourself short.
a. Autonomy 6 (11.8)
b. Competence 36 (70.6)
c. Relatedness 8 (15.7)
d. Unsure 1 (2.0)

80. You are able to meet your goal today. Get up and stand for the next 60 seconds.
a. Autonomy 15 (29.4)

b. Competence 31 (60.8)
c. Relatedness 4 (7.8)
d. Unsure 1 (2.0)

81. Everyone feels tired and sore some days. Don't be discouraged, you're making progress.
a. Autonomy 8 (15.7)
b. Competence 16 (31.4)
c. Relatedness 27 (52.9)
d. Unsure 0

82. Being active doesn't have to mean being sweaty and breathless. Take an extra bathroom break, or the long way to class.
a. Autonomy 13 (25.5)
b. Competence 28 (54.9)
c. Relatedness 8 (15.7)
d. Unsure 2 (3.9)

83. Write down 5 ways you can walk for 5 extra minutes this week. Then, put them in your planner as you would a homework assignment.
a. Autonomy 28 (54.9)
b. Competence 20 (39.2)
c. Relatedness 3 (5.9)
d. Unsure

84. Consider the different ways you can be active today- is it sunny? Are you going to the mall? Pick what works best in your life today.
a. Autonomy 40 (78.4)
b. Competence 9 (17.6)
c. Relatedness 2 (3.9)
d. Unsure

85. If you're feeling tired in the middle of the day, a few jumping jacks or stretches can make you feel energized.
a. Autonomy 17 (33.3)
b. Competence 25 (49.0)
c. Relatedness 8 (15.7)
d. Unsure 1 (2.0)

86. Do 5 push ups right now- you can modify them by going on your knees, or leaning against the wall.
a. Autonomy 33 (64.7)
b. Competence 14 (27.5)
c. Relatedness 2 (3.9)
d. Unsure 2 (3.9)

87. Take responsibility for your physical health. You will proud when you make positive changes.

a. Autonomy 21 (41.2)
b. Competence 22 (43.1)
c. Relatedness 4 (7.8)
d. Unsure 4 (7.8)

88. Did you do your best today? There is still time left to make that answer "yes".

a. Autonomy 27 (52.9)
b. Competence 13 (25.5)
c. Relatedness 9 (17.6)
d. Unsure 2 (3.9)

89. Although it's tempting to park as close to the door as you can, pick a farther spot today. It will force you to walk a little more

a. Autonomy 26 (51.0)
b. Competence 20 (39.2)
c. Relatedness 5 (9.8)
d. Unsure 0

90. The hardest part is taking the first step.

a. Autonomy 11 (21.6)
b. Competence 26 (51.0)
c. Relatedness 12 (23.5)
d. Unsure 2 (3.9)

91. What is your goal for today? It is okay if it feels small.

a. Autonomy 27 (52.9)
b. Competence 15 (29.4)
c. Relatedness 9 (17.6)
d. Unsure 0

92. Some days will be harder than others. Hang in there! You can do this.

a. Autonomy 5 (9.8)
b. Competence 28 (54.9)
c. Relatedness 17 (33.3)
d. Unsure 1 (2.0)