A Psychophysiological Investigation of the Proposed Paradoxical Effects of Valuing Happiness

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A PSYCHOPHYSIOLOGICAL INVESTIGATION OF THE PROPOSED PARADOXICAL EFFECTS OF VALUING HAPPINESS

by

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ABSTRACT

Several researchers in happiness studies have called for an increased sociopolitical interest in indicators of societal happiness. However, recent evidence for the proposed paradoxical effects of valuing happiness suggest that an increase in society's perceived value of happiness may exert a detrimental, inverse influence on well-being. This notion is based on previous research demonstrating that manipulating participants to value happiness causes them to experience less positive emotions, compared to controls, when viewing positive film clips. Following the humanistic notion that the maximization of societal happiness is an advantageous sociopolitical endeavor, the proposed paradoxical effects of valuing happiness present a psychological barrier that researchers must strive to understand and, ideally, overcome.

Previous experimental research on the paradoxical effects of valuing happiness has focused on participants' emotionality as an operational definition of happiness. However, drawing from the Subjective Well-Being construct, emotionality is only one of several components of happiness. Building from this Subjective-Well Being framework, this study expands upon previous research by investigating whether a valuing happiness manipulation influences participants' emotionality while they contemplate their own happiness. To examine this, nineteen participants were divided into two groups, one which received a valuing happiness manipulation (n=9) and the others served as a control group (n=10), and instructed to contemplate their personal happiness for 45 seconds. To measure participants' emotions during this task, facial electromyography data were collected from the corrugator supercilii and the zygomaticus major facial muscles, a measure that previous research suggests is sensitive to the emotional value of thought.

Results indicated that participants manipulated to value happiness did not experience significant differences in facial electromyography activation compared to controls. However, although non-significant, the correlation between facial electromyography activation and participants' rating of happiness differed substantially for participants manipulated to value happiness (average r=.41 for corrugator, average r=-.09 for zygomaticus) and controls (average r=.-.29 for corrugator, average r=.14 for zygomaticus). The counterintuitive correlations for participants led to value happiness, despite not experiencing significant difference in the emotional value of the happiness contemplation task, provide preliminary evidence that these participants utilize the information retrieved from the contemplative stage in a qualitatively different way than controls when judging their own happiness. More specifically, the correlations for participants led to value happiness trend in the opposite direction of controls, demonstrating that increases in positive emotion during happiness contemplation actually are associated with lower scores on a self-report of happiness. This study suggests that the paradoxical effects of valuing happiness does not influence the retrieval of information when contemplating ones' happiness, but *may* influence (in an apparently detrimental fashion) how this information is utilized when judging one's happiness.

Although the between-condition differences in correlations failed to reach statistical significance (more specifically, p=.09 for corrugator), this study provides preliminary evidence for the existence of a new dynamic of the proposed paradoxical effects of valuing happiness that is novel to the happiness studies discourse. Limitations, implications, and future directions are discussed.

DEDICATION

To anybody who actually intends to read this thesis, for you are likely either one of my thesis committee members, part of my familial or friend group, or somebody who is very interested in this research topic.

Either way, you are awesome.

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CHAPTER 1: INTRODUCTION

The U.S community believes that higher levels of happiness are a critical factor in determining the desirability of a life (King & Napa, 1998). In addition to being highly valued on the personal level, reviews of the happiness studies literature suggest that happy people are more successful, more creative, possess better coping capabilities, and are better work and societal citizens (Diener & Ryan, 2009; Lyubomirsky, King & Diener, 2005). In response to its apparent benefits to society, some argue that nations should consider their citizen's happiness an ultimate public policy goal (Veenhoven, 2004) and a leading social indicator measure (Oishi & Diener, 2014); a philosophical utilitarian principle (Bentham, 1879) that is a stark contrast to the current international emphasis on GDP and GNP. Notably, the Eastern country of Bhutan has already adopted this emphasis on Gross National Happiness, and the apparent emerging interest in societal happiness at the international level is being paralleled by robust advancements in the scientific realm.

In response to its promising and intriguing nature, the empirical study of happiness has boomed over the past 50 years and a new science of positive psychology has emerged (Seligman & Csikszentimihalyi, 2000). Contrasting the historical "negativity bias of traditional psychology," researchers in positive psychology are interested in investigating human strengths, virtues, happiness, and potential in order to facilitate a more comprehensive understanding of human nature (Sheldon & King, 2001; p.216), as well as to foster the development of positive human characteristics. The advent of positive psychology has considerably contributed to growth of happiness studies, which now utilizes various multi- and interdisciplinary insights in order to

expand the scientific understanding of this topic. With these advancements, one can speculate that people may one day live in a world where the majority of its inhabitants are in a state of psychological flourishing. However, is this perhaps overoptimistic? Is our current emphasis on happiness nothing more than a "modern obsession" (Burnett, 2011)? These are difficult, enormously complex questions to tackle; ones that are much too large for an undergraduate thesis. Instead, this work will focus on one factor that may eventually play a large role in this debate: the proposed paradoxical effects of valuing happiness.

The Paradoxical Effects of Valuing Happiness

A desire to be happy is somewhat of a cultural universal. However, there is some evidence that valuing happiness too much can be detrimental and ironically counterproductive. Research conducted by Mauss, Tamir, Anderson, and Savino (2011) suggests that valuing happiness can be paradoxical; providing both correlational and experimental evidence that it can reduce the positivity of one's emotional reactions. Corroborating these findings, a separate study found that valuing happiness is inversely related to positive emotion and satisfaction with life, and positively associated with negative emotions and depression (Catalino, Algoe & Fredrickson, 2014). The causal and correlational evidence for the paradoxical effects of valuing happiness introduce important considerations for the field of positive psychology. For instance, these results suggest that there may be both effective and ineffective ways for one to pursue happiness (Catalino, Algoe & Fredrickson, 2014). More importantly, the evidence for the paradoxical effects of valuing happiness suggests that prospective utilitarian public policies may have unintended inverse effects on societal happiness if they additionally result in an increase in the perceived value of happiness. However, borrowing from the common idiomatic expression,

before we throw the baby out with the bath water, happiness studies should strive to further the understanding this phenomenon, and determine if and/or how this psychological barrier to increased societal happiness can be overcome.

In the experimental proceedings of Mauss and colleague's original work (2011), participants' emotional reactions to a positive film clip were measured through implicit and explicit post-hoc measures of emotionality. To investigate the effect of valuing happiness, half of these participants received a sham newspaper article that manipulated the perceived value of happiness by elaborating on the importance of and benefits of maximized happiness, and the other half received control articles containing no mention of happiness. Results from both measures of emotion suggest that the manipulated participants experienced less positive emotional reactions to a positive film clip. Subsequent questioning demonstrated that participants' disappointment at their own feelings mediated this effect.

The present study expands upon the paradoxical effects of valuing happiness by investigating whether manipulating participants to value happiness affects the way they think about their own personal happiness; a subjectivist approach that is intended to complement and expand upon the previous research. More specifically, this study analyzes whether the valuing happiness manipulation validated in Mauss and colleagues' original study causes participants to experience less positive emotion when contemplating their own happiness, which due to the relationship between emotion and cognition (reviewed later) would serve as an indicator that they are thinking less positive thoughts. In addition, this study analyzed whether the valuing

happiness manipulation causes participants to self-report that they are overall happier than controls.

Before elaborating on this study, some constructs of interest will first be briefly reviewed. More specifically, this paper will first: a) discuss what happiness is, elaborating on the theoretical perspective utilized in this work, b) deliberate on theoretical conceptualizations of emotions, c) examine the notion of an affective value of thought, and d) explore proposed ways to measure the affective value of thought.

What Is Happiness?

Before studying the paradoxical effects of valuing happiness, a working definition of happiness must first be established. This is perhaps easier said than done, as the complex construct of happiness has been contemplated and debated for centuries. To study happiness at the empirical level, a large and diverse set of measures has been created (see Veenhoven World Database of Happiness for an extensive list). Some of these measures focus solely on emotional, or hedonic, aspects of happiness (Kahneman, 1999), whereas others have included more eudemonic aspects, such as purpose and meaning in life (Crumbaugh & Maholick, 1964). However, some have suggested that neither of these perspectives is sufficient, and that happiness may be best conceived as a multidimensional phenomenon that includes aspects of both distinct categories (Ryan & Deci, 2001). Following this logic, some recent accounts of happiness have integrated these factors in order to formulate more comprehensive accounts of the construct (Seligman, 2002). In addition, others have maintained that maximum personal well-being is achieved through the pursuit of both eudemonic and hedonic factors (Huta & Ryan 2010;

Peterson, Park & Seligman, 2005). However, even with efforts to develop more comprehensive frameworks, the definition of happiness is still being debated and refined to this day (Delle Fave, Brdar, Freire, Vella-Brodrick & Wissing, 2011).

Subjective Well Being and Evaluative Judgments of Happiness

Considering the multifaceted, contested nature of the happiness construct, pragmatically, it makes sense for researchers to hone in on more specific aspects of happiness, while simultaneous maintaining an awareness of the limited scope of these focused perspectives. This is the approach employed in this current paper, where concentration is placed upon a specific aspect of a more hedonic conceptualization of happiness, Subjective Well Being. This framework maintains that happiness consists of life satisfaction, positive emotion, and low levels of negative emotion (Diener, 2000), and conceptualizes happiness as a subjective phenomenon.

While happiness researchers predominately utilize self-reports of global subjective well-being, the cognitive components of happiness are equally as fascinating. For instance, although much has been learned about happiness over the years, *how* people assess and think about their own happiness is still a major unanswered question (Veenhoven, 1991). As the name implies, subjective well-being places a strong emphasis on the subjective nature of happiness. Therefore, in order to more comprehensively understand this construct, it is advantageous to understand the underlying processes that create this subjective lens. The analysis of the mental processes that inform global reports of subjective well-being is a perspective I refer to as an *evaluative judgment of happiness*.

As discussed by Schwarz and Strack (1999; p.61), "reports of subjective well-being (SWB) do not reflect a stable inner state of well-being. Rather, they are judgments that individuals form on the spot, based on information that is chronically or temporarily available at that point in time…" This notion of contextual reconstruction has received attention across the psychology discipline, possibly most notably in Frederick Bartlett's discussions on memory (Bartlett & Bartlett, 1995). In this work, it is argued that memory cannot be replayed or retrieved, but only reconstructed at the time of remembering. Similarly, the notion of contextual reconstruction also has been elaborated upon in more general considerations of survey methodology (Groves et al., 2004). Here, it is argued that people do not constantly keep working representations of their beliefs, but rather are likely to base their answers on whatever considerations come to mind at the time. Adapted to the subjective happiness framework, the notion of contextual reconstruction suggests that people do not possess static representations of their global well-being, but rather utilize contextually-dependent cognitive processes to formulate conclusions and self-reports of their subjective happiness.

The mental process that informs one's answer to a survey question, such as "How happy are you?" has been conceptualized as a dynamic interplay between four discrete processes: 1) comprehension of the question, 2) retrieval of information, 3) judgment and estimation, and 4) reporting an answer (Groves et al., 2004). However, happiness researchers generally focus the majority of their energy on the last component of this model, with less emphasis on how participants retrieve information and make a judgment about their personal happiness (see Figure 1). The evaluative judgment perspective, which focuses on these two intermediary processes, retrieval of information and judgment, illuminates the cognitive elements that inform subjective

reports of happiness; a perspective that previous research on the paradoxical effects of valuing happiness has yet to investigate.

In the original work on the paradoxical effects of valuing happiness, happiness was operationalized as an emotion. However, while emotionality is certainly an important and necessary ingredient of subjective well-being (Myers & Diener, 1995), this research has thus far left the subjectivist component of subjective well-being unaddressed. This thesis investigates happiness from the evaluative judgment of happiness perspective; examining whether the paradoxical effects of happiness influence the mental processes that occur when people think about and evaluate whether they are happy. This was investigated by utilizing an objective, psychophysiological measure of the emotional value of thought: facial electromyography. In theory, if the paradoxical effects of valuing happiness influence participants' emotions while reflecting upon their own happiness, facial electromyography will be able to non-obtrusively measure this effect. Before elaborating upon this psychophysiological measure of emotion, however, it is important to briefly review the theoretical foundation of emotion.

Theoretical Accounts of Emotion

Research on the paradoxical effects of valuing happiness suggests that valuing happiness leads one to experience emotions that are less positive. Although this, at face value, seems rather straightforward, there is an ongoing debate within the affective sciences on exactly how to define an emotion. As stated by Fehr and Russell (1984; p.464), "Everyone knows what an emotion is, until asked to give a definition." The debate over how to conceptualize emotion has raged for the past century and has (perhaps a bit overly dramatically) been recently referred to as "The

Hundred-Year Emotion War" (Lindquist, Siegel, Quigley & Barrett, 2013). However, considering the importance of emotionality in more hedonic conceptualizations of happiness, this is an important development to follow.

Based on common perception, the average person conceptualizes and reports emotions as discrete entities. For instance, one may tell a friend that he/she is excited during a visit to Disneyworld, or suggest that he/she is sad about failure in a course. Many of these discrete emotions, commonly referred to as "basic emotions" (Ekman, 1992), have been identified, and subcortical neural networks for some of them have been located (Panksepp & Biven, 2012). However, factor analyses of self-reported emotion often reveal that these intuitively discrete emotions often yield two factor dimensional models (Larsen & Diener, 1992). Perhaps the most popular of these models, James Russell's Circumplex Model of Affect (1980), argues that emotions are represented on a two-dimensional circumplex affective structure. Russell's affective structure, visualized as a grid, possesses a horizontal *valence* (i.e: positive, negative) axis, and a vertical *arousal* axis. The circumplex theory posits that the human emotional experience can be conceptualized as fluctuations along an affective grid, and it has been added that the discrete emotions that we report are socially constructed phenomenon informed by certain combinations of these affective values (Barrett, 2006). For example, the discrete emotion of excitement would be characterized as our socially constructed label of a moderate degree of positive affect and a moderately high degree of arousal, or alertness. Although many have investigated emotions as discrete entities, the circumplex model is currently receiving more support by both psychophysiological and self-report data in the literature (Mauss & Robinson, 2009); although mixed-emotion research has pointed to some noteworthy flaws (Larsen &

McGraw, 2014) that support a less popular, alternative dimensional account of attitudes and emotion (Cacioppo & Berntson, 1994). While there are some flaws in the circumplex model of emotion, this conceptualization is still useful, popular in the affective sciences, and supported by the preponderance of evidence.

In the present study, the emotions that participants experience while contemplating their happiness are examined; integrating past research's sole focus on emotional components of happiness with the more subjective evaluative judgment perspective. However, before continuing there are a two underlying theoretical questions that deserve discussion: 1) Does cognition possess an affective value? 2) If so, it possible to quantify participants' affective experiences while they are participating in introspective thought?

The Affective Value of Thought

Although cognition has traditionally been researched in an emotional vacuum, more recent advances demonstrate that a dynamic interplay exists between higher order cognition and emotion (Blanchette & Richards, 2010; Storbeck & Clore, 2007). For instance, there is accumulating evidence that affective states can be projected onto higher-level judgments (Forgas, 1995; Lench, Flores & Bench, 2011), and influence memory and cognitive processing styles (Ceci & Ornstein, 2014; Clore & Palmer, 2009; Fredrickson, 2001; Lench, Flores & Bench, 2011). Furthermore, research on emotional regulation demonstrates that this interaction can be bidirectional, as various emotional regulation strategies (Gross, 1998), such as cognitive reappraisal, can be utilized to alter an emotional states.

In addition to its bidirectional relationship with emotion, I maintain that cognition also can be emotionally charged. In other words, cognition not only has the ability to regulate emotions; it also is capable of *eliciting* emotional reactions. Consider the following scenario: research participant Valerie comes into the lab for a study on how one's affective state can influence various cognitive processes. To put Valerie in a negative affective state, the experimenter asks her to simply ruminate on a particular negative thought for 45 seconds: her own funeral. As the IRB would almost certainly interject, it may be unethical to ask Valerie to perform this emotional elicitation task, as she will likely get upset, uncomfortable, and potentially depressed. Similar, less evocative emotional elicitation strategies have been utilized in the past (Gasper & Clore, 2002; Velten, 1968), and it appears that thinking about certain topics elicit powerful affective responses. For example, both self-reported and physiological indicators of anger reveal that thinking about an angering experience elicits negative emotions, and that emotional regulation strategies attenuate these responses in such a way that is consistent with theories of cognitive reappraisal (Ray, Wilhelm & Gross, 2008). In addition, it is argued that working memory and emotion are reciprocally connected, and that verbal working memory tasks are associated with the experience of positive affect, and spatial working memory tasks are associated with the experience negative affect (Storbeck & Watson, 2014). Based on this reciprocal connection, it has been shown that these tasks are not only facilitated by their respective affective charges, but that they also are capable of eliciting these affective reactions when employed. Collectively, these reviewed studies support the notion that cognitive processing is both associated with and charged by emotion; indicating that mental thought

possesses an untapped emotional or affective value. However, for this postulate to be useful beyond theoretical considerations, it is practical to quantify this value.

Borrowing from dimensional accounts of emotion, it would not be advantageous to search for indicators of "angry", "sad", or "excited" thinking. Instead, it is more feasible to investigate the emotional value of thought as varying along an affective structure. Based on this notion, researchers should focus their efforts on investigating and quantifying how positive vs. negative thought can be, or, in other words, the affective value of thought. Applied to the current study, this suggests that participants' evaluative judgments of happiness will possess an affective value, and that, if the paradoxical effects of valuing happiness are confirmed, those who are led to value happiness will possess a less positive affective value of thought than controls.

Measuring Affect

There are many ways to measure affectivity, including self-reports, autonomic nervous system (ANS) activation, startle response magnitudes, electroencephalography, functional imaging, positron emission tomography, vocal characteristics, facial behavior, and observer ratings. To measure valence or how positive vs. negative an affective experience is, self-reports, ANS measures, and facial behaviors have been determined to be appropriate (Mauss & Robinson, 2009). Despite several options, this study focuses on the psychophysiological measurement of facial electromyography, a methodology that is capable of objectively distinguishing between positive and negative affect (Cacioppo, Petty, Losch & Kim, 1986).

Since the present experiment included an introspective thought period that lasts 45 seconds, it was ideal to gather a continuous measure of valence; a measurement that self-reports

cannot necessarily facilitate without introducing potentially confounding cognitive processing. Facial electromyography is therefore an ideal measure for the present study because it is continuous, objective, and non-obtrusive (Cacioppo, Petty, Losch & Kim, 1986). While triangulating this measure with self-reports is certainly advantageous, these reports could interrupt streams of introspective thought, potentially affecting the cognitive processes of interest.

Facial Electromyography as a Measure of the Affective Value of Thought

In his writings on the expression of emotions in man and animals, Charles Darwin (1872) created an influential contribution to psychology that spurred an interest in how emotion is represented in the face. Following his assertion that human facial expressions reflexively communicate a message about one's emotional state of mind, researchers began developing methods to analyze this facial muscle movement in order to make inferences about a target's emotional experience. Facial electromyography, which objectively quantifies the activation of a facial muscle of interest, has emerged as one of these leading methodologies.

In their seminal article, Cacioppo, Petty, Losch, and Kim (1986) determined that facial electromyography can provide objective and continuous probes of affective valence. Notably, they demonstrated that this measure is sensitive to minor changes in facial activation that observer rating systems, such as the Facial Affect Coding System (Ekman & Rosenberg, 1997), often cannot identify. While people can exert a conscious and intentional control over many of these facial muscle movements (i.e: when intentionally smiling to be polite), this facial muscle activation, as originally discussed by Darwin (1872), often occurs as a reflexive reaction to an

affective reaction. For example, when viewing images of racial minorities, implicitly racist participants experience significant activation over frowning muscles, despite being unaware of this activation and explicitly denying racist attitudes (Vanman, Paul, Ito, & Miller, 1997). Facial electromyography, therefore, is a desirable methodology for the present study because it can objectively tap into participant's affective reactions even if they are unaware that these reactions are occurring and/or these reactions are below the visual threshold of observer ratings.

While there are several muscles of interest in facial electromyography, the ones most appropriate for determining affective valence are the corrugator supercilii and the zygomaticus major. The corrugator supercilii is a muscle located in the brow region that is responsible for pulling the brow inward to create what is often considered a frown. This muscle is inversely influenced by positive and negative affect, the former inhibiting and the later potentiating activity over the muscle in a linear fashion (Lang, Greenwald, Bradley & Hamm, 1993; Larsen, Norris & Cacioppo; 2003). In other words, positive affect decreases corrugator activation and negative affect increases corrugator activation.

The second muscle of interest, the zygomaticus major, is located in the cheek region and is responsible for pulling the lips towards the ear to create what is often considered a smile. This muscle has increased activation and a j-shaped quadratic relationship with the experience of positive affect (Lang, Greenwald, Bradley & Hamm, 1993; Larsen, Norris & Cacioppo, 2003). Although some have failed to replicate the quadratic relationship between zygomaticus major activation and affect (Robinson, Cinciripini, Carter, Lam & Wetter, 2007), the preponderance of evidence still supports this association.

Facial electromyography has been utilized in a large variety of experimental settings where self-reports cannot be relied upon. However, it is less extensively used to investigate the affective value of thought, despite results suggesting that it is certainly viable. For instance, in a study on depression, Teasdale and Bacroft (1977) tracked corrugator activity while six depressed participants thought 10 happy and 10 sad 30-second thoughts in randomized orders. Within-participant comparisons demonstrated that corrugator activity is generally higher when thinking negative, as opposed to positive, thoughts, although these differences did not always reach statistical significance. Given the small, six participant sample size utilized in this experiment, it seems that facial electromyography may be a fairly strong measure of the affective value of thought, but that relatively larger sample sizes are necessary in order to reliably reach statistical significance.

A similar study was conducted by Schwartz and colleagues (1996), in which both depressed and non-depressed participants were asked to mentally re-experience happy, sad, angry, and "typical day" situations while facial electromyography data were collected. For non-depressed participants, the corrugator experienced significant deactivation during the happy thoughts, but non-significant activation during sad, angry, and "typical day" thoughts. The depressed participants, on the other hand, did not experience significant corrugator deactivation during the happy thoughts, but did experience significant activation during the sad and angry thoughts. Combining the data from the non-depressed and depressed participants, the corrugator experienced significant activation/deactivation during happy, sad, and angry thoughts. These activation patterns are consistent with previous research on facial electromyography as well as

cognitive theories of depression, although these researchers seemed to focus on a discrete, as opposed to dimensional, conceptualization of emotion.

Finally, in an experiment investigating persuasion, Cacioppo and Petty (1979; p.2181) noted that "patterns of subtle facial muscle changes reflected the affective nature of the cognitive responding before and during the message" (also see Cacioppo & Petty, 1981). Taken together, these results confirm that mental thought can elicit affective responses, and that facial electromyography is sensitive, to a certain degree, to these changes. Although quantifying this affective value of thought is uncommon, these results suggest that, with respect to the current study, it is certainly feasible.

In the present study, facial electromyography was utilized to determine whether valuing happiness influences the affective value of thought of participants' evaluative judgments of happiness (Figure 1.) In line with previous research on the paradoxical effects of valuing happiness (Mauss et al., 2011) it was hypothesized that participants manipulated to value happiness would experiences less positive emotions, compared to controls, when contemplating their happiness. In addition, it was hypothesized that participants manipulated to value happiness, compared to controls, would self-report higher levels of overall happiness.

CHAPTER 2: METHODOLOGY

In this current study, facial electromyography was utilized to quantify the affective value of thought during a 45 second evaluative judgment of happiness. It was hypothesized that the valuing happiness manipulation utilized in Mauss and colleague's original study (2011) would create less positive thinking compared to controls. This manipulation is a sham article that appears to be discussing broadcasting companies' interest in viewer's emotionality, although it consistently makes statements about the importance of happiness such as "…as is well-known, people who report higher than normal levels of happiness experience benefits in their social relationships, professional success, and overall health and well-being." Unbeknownst to participants, this sham article is intended to increase participant's perceived value of happiness, and has been validated as effective in their original study.

Asking a participant to consider their happiness is a contextually dependent, multi-phased cognitive process. The evaluative judgment perspective adopted in the current study focuses on the intermediary processes of selecting information and integrating this information to make a judgment. If the valuing happiness manipulation negatively impacts participants, a negative bias in the information selection and judgment procedures would be expected. In this present study, facial electromyography data was collected while participants contemplated their happiness; a task that is most closely parallels the information-selection phase of an evaluative judgment of happiness (see Figure 1.) In accordance with the notion of an affective value of thought, a paradoxical effect of valuing happiness during this task would be characterized by increased corrugator and/or decreased zygomatic activation.

Participants

To be eligible for this study, students had to be over 18 and, due to the potential for facial hair to confound the electromyography signal, clean shaven. In total, twenty two undergraduates (19 female, 3 male, mean age=19.91, *SD*=3.37) participated in this study. Due to a combination of technical difficulties and incorrect setup procedures, three participants were excluded from analyses.

Materials and Procedure

Facial electromyography was utilized to determine whether a valuing happiness manipulation influenced the affective value of thought during an evaluative judgment of happiness. This facial muscular activation was sampled at 1,000 Hz via a Biopac system (Model MP35) and processed in its accompanying BSL Pro software. To enable the acquisition of facial electromyography data, two SS1LA lead adaptors were utilized. All hardware and software was purchased from BioPac Systems Inc. (BioPac Systems, Inc., Aero Camino Goleta, CA, US.)

All facial electromyography data acquisition was performed largely parallel to the guidelines set forth by Fridlund and Cacioppo (1986). Upon arriving to the study, participants first reviewed an informed consent document explaining that a male experimenter would be cleaning and attaching electrodes to various sites on their body. Afterwards to facilitate comfort, participants were introduced to the Biopac machine (BioPac Systems, Inc., Aero Camino Goleta, CA, US), which was explained to be a system that measures electrical currents in the body. Afterwards, participants underwent facial electromyography preparation procedures.

To ensure a clean signal with stabilized conductivity and limited artifacts, the electrode contact sites were first cleaned and abraded with an isopropyl alcohol skin-prep pad. Afterward, five 4 mm silver-silver chloride electrodes (four shielded EL254S and one unshielded EL254), were filled with electrode conductive gel (GEL100) and attached to the corrugator supercilii, zygomaticus major, and ground contact sites recommended in Fridlund & Cacioppo's guidelines (1986). At this point, participants were informed that the Biopac would be collecting data throughout the experiment, and that, in order to maintain a clean signal, they would have to try to minimize their head and body movement when not completing surveys or questionnaires.

After confirming participant comfort, participants were briefly trained to perform Maximum Voluntary Contractions, which establish the maximum muscular activation in each of the two muscles of interest. Afterward, they performed two maximum voluntary contractions for both the corrugator supercilii and zygomaticus major muscles, although some participants were asked to perform a few extra maximum voluntary contractions due to technological glitches in the acquisition file. After performing the maximum voluntary contractions, facial electromyography data were collected over a one minute baseline period. After establishing this baseline, participants were instructed to begin the experiment on a laptop in front of them.

In an online questionnaire format, basic demographic information was collected from the participants. Afterward, those in the "valuing happiness" condition received a sham article intended to increase the perceived value of happiness, whereas those in the control condition received no manipulation. This sham article can be found in Appendix D, and has been previously validated in Mauss and colleagues' (2011) original study.

Afterward, all participants were instructed to contemplate their own personal happiness for an experimenter-timed 45 seconds. This time period started only once participants acknowledged that they were ready. After this contemplation period, participants then filled out an 11-point overall happiness questionnaire. At the end of the experiment, participants were fully debriefed. (Appendix F)

CHAPTER THREE: RESULTS

Facial Electromyography Data Processing

In line with the proposed guidelines in Fridlund & Cacioppo (1986), the facial electromyography signals were first passed through a 10 Hz and 500 Hz bandpass filter. Afterward, the data points from the baseline, maximum voluntary contractions, and thought time periods were rectified (absolute value) and smoothed (moving average), a procedure that is in line with the guidelines of facial electromyography (Fridlund & Cacioppo, 1986).

While many researchers compare the difference between baseline and manipulation muscle activation, the use of standardization techniques based on maximum voluntary contractions is recommended in Fridlund and Cacioppo's (1986) guidelines. Teaching participants to perform maximum voluntary contractions of facial muscles allows researchers to determine and account for individual differences in facial muscle strength in their analyses (Halaki & Ginn, 2012). With this technique, a percentage of total maximum activation is rendered, and the differences between baseline activation and manipulation activation percentages are the unit of analysis.

In this experiment, participants contemplated their own happiness for 45 seconds. Previous research examining the affective value of thought over time has divided up these time period into smaller units of analysis (see Teasdale & Bacroft, 1977). The rationale for this procedure is based on the premise that some emotional reactions may occur quickly, and that a significant emotional reaction that happens within, for example, the first 5 seconds, may be rendered non-significant if no other reactions occur in the rest of the thought period. Therefore,

the 45 second thought period that participants underwent was separated into nine, 5 second intervals. Afterward, for each interval, the differences between the percentage of activation during the personal happiness-contemplation portion of the experiment and the percentage of activation during baseline were calculated.

Corrugator Supercilii Activation during Happiness Contemplation

A series of Shapiro-Wilk tests conducted on the processed differences in corrugator activation in the nine intervals determined that the majority of these distributions was non-normal. Coupled with the small sample sizes in each condition, this warranted the use of nonparametric statistical procedures. Therefore, a series of Independent Samples Mann-Whitney tests, the rough nonparametric equivalent of an independent sample t-test, was performed; comparing changes in corrugator activation during the happiness contemplation task between participants in the Valuing Happiness condition and those in the Control condition. As represented in Table 1, results suggested that no significant differences in corrugator activation existed between the valuing happiness and control conditions (average p =.32).

Although a visual inspection of standard deviations suggests that there may be an interesting between-condition difference, a series of Levene's Test for Equality of Variances suggest there were no significant difference between the variance of the control and manipulation condition in every time interval (average p= .70).

Considering that males are generally less facially reactive in emotional experiences than females (Thunberg & Dimberg, 2000), it is possible that the few male participants skewed the results. To examine this, the Independent Samples Mann-Whitney tests were re-rerun with the

exclusion of the male participants. Excluding the male participants did not substantially lower the p-value of these analyses, and all between-condition differences remained below statistical significance.

Zygomaticus Major Activation during Happiness Contemplation

A series of Shapiro-Wilk tests conducted on the processed differences of the nine intervals demonstrated that the majority of these distributions was normal, as opposed to the non-normal distributions of the corrugator data. Therefore, a series of independent samples t- tests was performed. As represented in Table 2, results suggested that no significant differences in zygomaticus activation existed between the valuing happiness and control conditions (average p=.33). These findings were also corroborated by a series of Independent Samples Mann-Whitney tests (average p=.35).

Once again, although a visual inspection of standard deviations suggests that there may be an interesting between-condition difference, a series of Levene's Test for Equality of Variances suggested there were no significant difference between the variance of the control and manipulation condition in every time interval (average p= .18).

Considering that males are generally less facially reactive in emotional experiences than females (Thunberg & Dimberg, 2000), it is possible that the few male participants skewed the results. To examine this, the Independent Samples Mann-Whitney tests were re-rerun with the exclusion of the male participants. Excluding these male participants did not substantially lower the p-value of these analyses, and all between-condition differences remained below statistical significance.

11-Point Happiness Rating and Corrugator Supercilii Activation

It was hypothesized that participants' facial electromyography activation during their evaluative judgment of happiness task would correlate with their reports of happiness on an 11-point scale. To test this, a series of Pearson Correlational analyses were conducted on the processed differences in corrugator supercilii activation and participant self-reports on the 11-point happiness scale. Since previous analyses suggested that no significant differences in between-condition activation existed during the contemplation task, these correlation analyses were first run with the data combined from both conditions; exploring whether each 5 second interval of processed activation correlated with participants' reports of happiness. Results suggested that no significant correlations existed between each 5 second interval of processed corrugator activation and participants' reports of happiness (average r=.07, average p=.74). These analyses also were separately re-run within each condition, with results for both the control (average r=.-.29, average p=.41) and the manipulation condition (average r=.41, average p=.29) failing to reach significance.

As a exploratory analysis, a one-sided comparison of Fisher r-to-z transformed correlation coefficients was utilized to assess whether the large difference between the two conditions' correlations was statistically significant. Results suggested that this difference trends towards significance (p=.09).

11-Point Happiness Rating and Zygomaticus Major Activation

A similar series of Pearson Correlational analyses was conducted on the processed differences in zygomaticus major activation and participant self-reports on the 11-point

happiness scale. Results from the combined-condition analyses suggested that no significant correlations existed (average r=.02, average p=.82) between the processed zygomaticus major activation and participants' reports of happiness. These analyses also were separately re-run with each condition, with results for both the control (average r=.14, average p=.69) and the manipulation (average r=-.09, average p=.64) condition failing to reach significance.

As an exploratory analysis, a one-sided comparison of Fisher r-to-z transformed correlation coefficients was utilized to assess whether the difference between the two conditions' correlations was statistically significant. Results suggested that this difference was not statistically significant (.34).

Analysis of Between-Condition Difference in 11-Point Happiness Ratings

It was hypothesized that participants who were manipulated to value happiness would report different scores on the happiness rating than controls. A Shapiro-Wilk test of normality demonstrated that one of these conditions (manipulation) was not normally distributed (p=.03). Coupled with the small sample size, this warranted the use of a nonparametric procedure. Therefore, an Independent Samples Mann-Whitney U Test was performed. Results suggest that there were no differences in the self-reported happiness of controls and those manipulated to value happiness (p=.53).

CHAPTER 4: DISCUSSION

It was hypothesized that the valuing happiness manipulation adopted from the original investigation on the paradoxical effects of valuing happiness (Mauss et al., 2011) would cause participants to experience less positive emotions, compared to controls, when contemplating their personal happiness. However, facial electromyography data collected from both the corrugator supercilii and zygomaticus major facial muscle sites failed to support this hypothesis. This finding suggests that valuing happiness does not influence how positive versus negative ones thoughts are when contemplating their happiness.

While there is no evidence for between-condition differences in the emotions experienced during the happiness-contemplation phase, there are notable between-condition differences in the associations between facial electromyography activation during this phase and later self-reports of happiness. For the control condition controls (average *r*=.-.29 for corrugator, average *r*=.14 for zygomaticus), both of these correlations trend in an intuitive way; with decreases in corrugator activation (negative affect) and increases in zygomaticus activation (positive affect) being positively associated with self-reported happiness. These associations make sense; if one experiences more positive affect when contemplating happiness, he or she likely is a happier person. However, for the participants manipulated to value happiness (average *r*=.41 for corrugator, average *r*=-.09 for zygomaticus), the associations trend in the opposite direction, wherein increases in positive affect during the contemplation stage are associated with *lower* ratings of overall happiness. Although the tested between-condition differences in these correlations do not meet the often accepted .05 p-value standard (.09 for corrugator supercilii, .34 for zygomaticus major), we should be careful to avoid the .05 "cliff effect" drop in confidence

when p-values exceed the accepted .05 threshold (Rosenthal & Gaito, 1963). Considering the extremely small sample size in the present study, it would be rash to dismiss the between-condition difference in corrugator activation and happiness self-report associations that trends towards significant despite a limited amount of data points. In short, although the valuing happiness does not significantly influence the emotional content generated during the retrieval phase of the evaluative judgment of happiness, it appears that this manipulation may impact how the generated information is utilized in the judgment of personal happiness.

Results from this study provide preliminary evidence that the paradoxical effects of valuing happiness manifest within the judgment, as opposed to retrieval, phase of an evaluative judgment of happiness. Although largely speculative, there are two feasible explanations for why the valuing happiness manipulation did not seemingly influence participants' emotionality while contemplating their happiness. The first speculation is that the lack of differences may derive from differences in the emotional regulation strategies afforded by the original study's film viewing paradigm and the current study's evaluative judgment of happiness paradigm, which may have resulted in ceiling effects in the emotionality experienced during the happiness contemplation task. The second explanation is that these lack of differences may be mediated by the differences in the cognitive load demanded by the two tasks.

Emotional Regulation

The lack of between-condition differences in the happiness contemplation task may be due to the emotional regulation strategies afforded by this task. Whereas the emotional film clip task utilized in the previous studies did not afford any emotional regulation tasks, there is a

myriad of emotional regulation strategies that participants in the current study could have employed while contemplating their happiness.

In theory, to increase how affectively pleasant an emotional response is, people can, and sometimes do, employ positive emotion up-regulation strategies (Parrott, 1993; Gross, Richards & John, 2006). Emotional up-regulation strategies are characterized by savoring, intentionally increasing the frequency of, or enhancing one's positive emotional experiences (Tugade & Fredrickson, 2007). In addition to these more established strategies, recent research has demonstrated that the up-regulation of positive emotions during the viewing of positive picture also is possible when participants intentionally increase their immersion in the image (Pavlov, Reva, Loktev, Tumyalis, Korenyok & Aftanas, 2014). However, this emotional up-regulation occurred only after participants practiced and were trained on how to perform this strategy. So far, though, there is no evidence that participants have the ability or the natural tendency to actively employ these up-regulation strategies during film or image viewing without experimenter training or prompt cues. Therefore, it is likely that the participants in the original study who reported feelings of disappointment towards their emotional reactions were unable to upregulate their affective experiences.

On the other hand, in the current study, participants were asked to contemplate their own happiness; a task over which they could exercise more cognitive control. In contrast to the emotional film clip paradigm, participants can presumably savor a particular thought, intentionally increase the frequency of positive thoughts, enhance the emotional experience of a thought by forcing smiling behavior, and/or utilize cognitive reappraisal strategies when

encountering negative thoughts during their mental contemplations of personal happiness (Lazarus & Alfert, 1964). In fact, intentional smiling behavior by a few participants was observed in this study. Therefore, the evaluative judgment of happiness paradigm utilized in the present study likely resulted in ceiling effects, as all participants likely intentionally chose to think positive thoughts and exercise positive up-regulation strategies when necessary. As opposed to the film clip participants who may have experienced disappointment at their partially uncontrollable affective experiences, participants in the current study could have feasibly employed positive up-regulation strategies to counteract any feelings of emotional inadequacy or disappointment.

Cognitive Load

Alternatively, the converging results may be attributed to differences in the extent of cognitive processing that each of these tasks demanded. Compared to an evaluation of one's subjective happiness, a film clip is a more passive experience that requires less mental effort from participants. Therefore, participants presumably have ample cognitive resources to assess and experience disappointment at their own affective experiences. However, working memory is not an infinite resource (Miller, 1956), and contemplating one's happiness is presumably a more demanding cognitive task than viewing a video. Therefore, while reflecting upon their happiness in the present study, it is possible that participants did not possess enough residual working memory to simultaneously consider the value of happiness, consciously reflect upon their affective experience, and/or experience disappointment at these reactions. Therefore, the current study's paradigm may not have allowed enough residual working memory to employ the cognitive process that is previously theorized to mediate the paradoxical effects of valuing

happiness: disappointment at one's own emotional reaction to the experimental task (Mauss et al., 2011). However, the fact that differences arose in the judgment task, which is presumable an equally as demanding cognitive task suggest that this alternative explanation is unlikely.

Limitations

While this study provides some preliminary insight into a novel aspect of the paradoxical effects of valuing happiness, there are some limitations associated with the present study. For instance, in the original study on the paradoxical effects of valuing happiness, the true nature of the study was not disclosed to participants during the informed consent proceedings. Instead, participants were led to believe that they were partaking in a study that was interested in television programming. Although both the original and present studies both utilized the same valuing happiness manipulation, the present study's informed consent procedure (Appendix E) did not contain the same degree of deception. Instead, the purpose of the study was explained in truthful, but ambiguous terms. It is therefore possible that the lack of a consistent deception allowed some participants to realize the sham nature of the manipulation article. Since the current study did not employ any manipulation checks, there is no way to address the validity of this potential limitation. However, considering that the paradoxical effects of valuing happiness seemingly manifested itself when participants' judges their own happiness, it appears that this lack of deception was permissible.

Another limitation of this study was that the valuing happiness manipulation, although previously validated, was not specifically geared towards the task utilized in the present study. Instead, the manipulation specifically emphasizes the importance of maximizing moment-to-moment emotionality, as opposed to one's overall sense of life satisfaction, perceived meaning in

life, or global happiness. Therefore, it was difficult to assess whether the manipulation truly was appropriate for this experiment. Furthermore, in the original study, participants in the control condition received a sham article that emphasized the importance of accurate judgments instead of happiness, whereas in the current study a pure, no control group article was utilized. While there is no reason to believe that this could have influenced results, the differences in control groups could be considered a potential limitation.

In addition, participants in the current study may have realized that the experimenter was interested in facial muscle movement, due to the fact that electrodes were clearly attached to the face. Previous experiments have tried to address this limitation by attaching electrodes to additional irrelevant contact sites, such as the head and neck, in order to disguise the experimenter's true variables of interest. However, this tactic was not utilized in this experiment, and there were no manipulation checks to assess whether participants knew that facial activity was the variable of interest. Notably, however, before participating, all participants acknowledged that they were unfamiliar with facial electromyography procedure. In addition, during debriefing procedures, some participants serendipitously stated that they were surprised that this procedure was capable, to some extent, of probing their emotional reactions.

Another limitation of the present study was the fact that participants performed maximum voluntary contractions (MVCs) prior to beginning the experiment, which may have introduced fatigue during the following baseline collection procedures. Future research interested in utilizing MVC standardization procedures should consider saving this procedure for the end of the experiment.

An additional potential criticism of this study is that participants in the manipulation condition had more time to habituate to the facial electromyography sensors than those in the control condition. This criticism is based off the fact that the sham article manipulation gave participants an extra 20-40 seconds to habituate to the sensors. Although there appears to be no work on how long it takes a participant to habituate to facial electromyography electrodes attachment, due to the time intensive nature of set-up , MVC recordings, and baseline readings, it is maintained that all participants, regardless of whether they received this short manipulation, had ample time to habituate to the electrodes placed on their face.

In addition to these methodological limitations, the current study utilized a small sample size; with approximately 10 participants in each condition. It is therefore very difficult to achieve statistical significance, and it is possible that Type II errors exist.

Future Directions

"Shoot for the moon. Even if you miss, you'll land among the stars" is a quote often attributed to motivational speaker Les Brown. Considering the fact that stars are actually further away from Earth than the moon, I propose a slight amendment that is more suiting for this thesis: "Shoot for the stars. Even if you come up short, you might land on the moon." At the University of Central Florida, where this thesis work was performed, "Reach for the Stars" is the official school slogan. In many ways, this undergraduate thesis was a reach for the stars; it utilized a unique perspective of happiness (evaluative judgments) in a novel paradigm (happiness contemplation) with difficult psychophysiological methodology (facial electromyography.) That being said, a review of the limitations of the thesis suggest that the execution of the study was far

from perfect. However, while the study's execution may have not made it to the metaphorical stars, I maintain that it certainly landed on our metaphorical moon, as the results of this study uncovered preliminary evidence for a novel manifestation of the paradoxical effects of valuing happiness. Due to the small sample size, this difference did not quite reach statistical significance. However, future research should strongly consider following up on this promising insight by running the experiment with a larger participant population.

In addition to a potentially novel insight, several lessons were learned from this execution of this study. For example, Maximum Voluntary Contractions (MVCs) were utilized to standardize participants' facial electromyography activation, which, in theory, should account for individual differences in facial muscle strength and reduce between-participant variation. Although the usage of MVC's is common in more general electromyography investigations (i.e.: ones concerned with muscles such as the bicep) and are discussed in Fridlund and Cacioppo's (1986) guidelines for facial electromyography, the use of this particular standardization technique still is uncommon in facial electromyography methodology. Future studies should examine whether this standardization procedure effectively reduces between-participant variation in facial electromyography activation, and if so, investigate the most effective way to include this procedure in an experiment. In the present study, participants performed MVC's in the beginning of the study. However, in hindsight, employing this procedure in the beginning of an experiment has some limitations. For starters, teaching participants to perform MVC's may inadvertently lead participants to understand that the experimenter is interested in facial expressions. Second, these MVC's can fatigue the facial muscles, potentially confounding any measure taken directly after the procedure. In the present study, participants' baseline measures were collected shortly

after they performed their MVCs, meaning that their baseline activation may have been lowered by muscle fatigue. Based on consideration of these two limitations, it may be advantageous to collect MVC's at the end of a study. Saving this procedure for the end of the experiment may ensure that participants are not aware of the experimenter's interest in facial expressions, and that the muscles of interest are not unnecessarily fatigued before the beginning of the experiment.

This study focused on facial electromyography activation during the retrieval component of the evaluative judgment of happiness. Results suggested that no significant difference in facial electromyography excited, although this activation correlated quite differently between the manipulation and control conditions. The difference between these correlations is interesting because it suggests that participants who are manipulated to value happiness may utilize the retrieved information in a different way than controls during the judgment phase of the evaluative judgment of happiness. While this finding is interesting, there is a lack of understanding on how exactly the paradoxical effects of valuing happiness influence participants' cognitive processes in these conditions, and how these can be potentially overcome. Future research may find it advantageous to collect facial electromyography during this judgment portion as well, as this will lead to greater insight into how this information is being utilized. In addition, future research should consider think-aloud techniques during evaluative judgments of happiness, which will provide a qualitatively rich insight into this cognitive process. Last, future research should focus on how the paradoxical effects of valuing happiness can be potentially overcome.

Considering the idea that happiness is a multifaceted construct, and that affectivity is only one of it factors, future researchers should continue to investigate the paradoxical effects of valuing happiness from varied conceptualizations of happiness, such as ones that emphasize eudemonic, as opposed to purely hedonic, aspects of the construct. For example, one may question whether the proposed paradoxical effects of valuing happiness influence participants' sense meaning in life, life satisfaction, or perception of "balance." In addition, future research may consider a more thorough degree of participant deception and a larger sample size.

Conclusion

The purpose of the study was to determine whether manipulating participants to value happiness causes them to experience less positive emotion when mentally contemplating their own happiness; a phenomenon referred to as "the paradoxical effects of valuing happiness" (Mauss et al., 2011). To nonobtrusively and continuously probe participant emotionality while they thought about their own happiness, facial electromyography was utilized. Results indicated that there were no significant differences in either corrugator or zygomaticus muscle activation between participants manipulated to value happiness and controls. Therefore, it is concluded that the valuing happiness manipulation did not influence the positivity or negativity of participants' emotions when they contemplated their happiness.

Although participants' did not significantly differ in the emotional content of their thought during the retrieval-based contemplation of happiness, results demonstrated that the correlations between corrugator supercilii activation and participants' ratings of happiness differed markedly between those who were manipulated to value happiness and those who

served as controls (p=.09). Although a small sample size inhibited this difference from reaching statistical significance, these results provide preliminary evidence that the paradoxical effects of valuing happiness may influence this judgment process in a negative way. This particular insight points to a unique, potentially novel dynamic of the paradoxical effects of valuing happiness, suggesting that it not only influence participants' emotionality, but also how they subjectively evaluative their overall happiness.

While increased personal happiness is related to a myriad of beneficial outcomes (Diener & Ryan 2009; Lyubomirsky, King & Diener, 2005), it is important for researchers to consider and systematically research whether a societal emphasis on happiness can be detrimental. While utilitarian principles and political interests in societal happiness intuitively seem like admirable endeavors that would likely garner significant public support, evidence for the paradoxical effects of valuing happiness warns that, under certain circumstances, these endeavors may be self-destructive. Happiness researchers should continue to take this notion seriously, and strive to understand the paradoxical effects of valuing happiness to a fuller extent. A deeper understanding of the paradoxical effects will not only shed light on this interesting psychological phenomenon, but also potentially uncover ways in which this psychological barrier to increased societal happiness can be overcome.

APPENDIX A: FIGURE 1

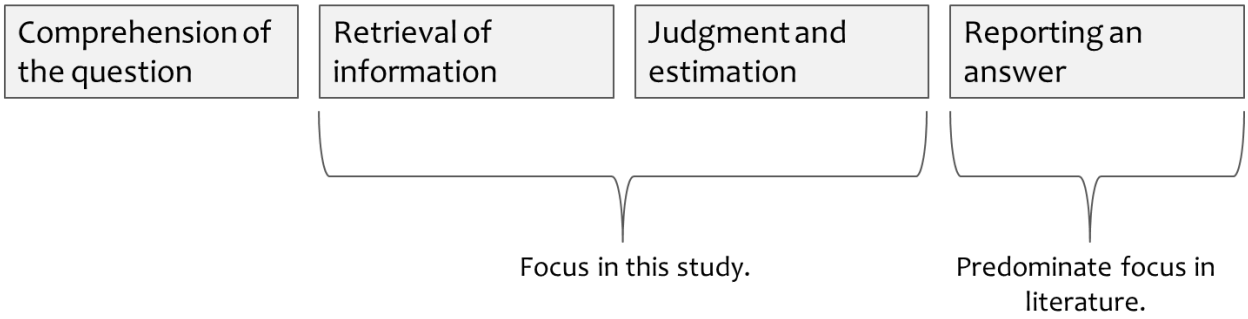

Figure 1
A simple model of the survey response process, with a distinction of the scope of the evaluative judgment of happiness perspective. Adapted from Groves et al., 2004.

APPENDIX B: TABLE 1

Table 1

Processed Corrugator Supercilii Activation during Happiness Contemplation Task

	Control		Manipulation		
	M	SD	M	SD	*p-value*
0-5 second	.005	.031	-.006	.046	.60
5-10 second	.007	.033	-.005	.033	.24
10-15 second	.007	.033	-.002	.033	.45
15-20 second	.011	.034	-.002	.032	.11
20-25 second	.010	.034	-.002	.03	.21
25-30 second	.009	.032	-.002	.026	.28
30-35 second	.01	.032	-.004	.028	.18
35-40 second	.008	.032	-.001	.03	.40
40-45 second	.011	.034	.003	.025	.36

Note. For each five second increment, the unit of analysis was calculating by finding the average difference between corrugator supercilii activation during the task and during the baseline. Before this calculation was performed, the raw signal was rectified, smoothed, and standardized based off the average of participants' Maximum Voluntary Contractions. To analyze the difference between conditions, independent sample t-tests were performed.

APPENDIX C: TABLE 2

Table 2

Processed Zygomaticus Major Activation during Happiness Contemplation Task

	Control		Manipulation		
	M	SD	M	SD	*p-value*
0-5 second	-.043	.095	-.013	.055	.42
5-10 second	-.049	.093	-.014	.054	.34
10-15 second	-.05	.094	-.015	.048	.32
15-20 second	-.05	.092	-.014	.049	.31
20-25 second	-.051	.091	-.016	.054	.34
25-30 second	-.049	.088	-.006	.061	.24
30-35 second	-.05	.086	-.002	.06	.18
35-40 second	-.05	.086	-.003	.06	.19
40-45 second	-.05	.081	.001	.059	.14

Note. For each five second increment, the unit of analysis was calculating by finding the average difference between zygomaticus major activation during the task and during the baseline. Before this calculation was performed, the raw signal was rectified, smoothed, and standardized based off the average of participants' Maximum Voluntary Contractions. To analyze the difference between conditions, independent sample t-tests were performed.

APPENDIX D: VALUING HAPPINESS MANIPULATION

"As a product of psychological research on well-being, broadcasting companies are trying to evaluate the programming they offer to the public. Historically, television programming has been evaluated with respect to decency or information content. As a result of hefty losses in revenue, there has been a push by television networks for empirical study of other effects that programming has on viewers. We are especially interested in the effects that programs have on emotions that viewers experience, because there is considerable evidence that certain emotions can have specific outcomes in viewers' daily lives.

For example, as is well-known, people who report higher than normal levels of happiness experience benefits in their social relationships, professional success, and overall health and well-being. That is, happiness not only feels good, it also carries important benefits: the happier people can make themselves feel from moment to moment, the more likely they are to be successful, healthy, and popular. Conversely, the less happy people feel from moment to moment, the less likely they are to be successful, healthy, and popular. In fact, recent research shows that people who are able to achieve the greatest amount of happiness in all kinds of circumstances, even momentarily, can experience long-term beneficial outcomes. In other words, people who experience high levels of happiness and other positive emotions during film clips such as the ones you are about to see are people who are generally happier and more successful in their lives. Our goal, therefore, is to examine how television programs influence a person's overall experience."

Figure 2
A copy of the sham article utilized in the Valuing Happiness condition. Manipulation created and graciously provided by Craig Anderson.
Mauss, I. B., Tamir, M., Anderson, C. L., & Savino, N. S. (2011). Can seeking happiness make people unhappy? Paradoxical effects of valuing happiness. Emotion, 11(4), 807.

APPENDIX E: IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Valerie K. Sims and Co-PI: Nicholas A. Coles**

Date: **September 08, 2014**

Dear Researcher:

On 9/8/2014, the IRB approved the following human participant research until 9/7/2015 inclusive:

Type of Review:	UCF Initial Review Submission Form
Project Title:	Evaluative Judgments of Happiness: A Psychophysiological Investigation
Investigator:	Valerie K. Sims
IRB Number:	SBE-14-10474
Funding Agency:	Office of Undergraduate Research(OUR)
Grant Title:	UCF Undergraduate Student Research Grant
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form cannot be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

If continuing review approval is not granted before the expiration date of 9/7/2015, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Kanielle Chap

IRB Coordinator

APPENDIX F: INFORMED CONSENT

Evaluative Judgments of Happiness: A Psychophysiological Investigation

Informed Consent

Principal Investigator(s): Valerie Sims, Ph.D

Co-Investigator: Nicholas Coles

Sponsor: UCF Office of Undergraduate Research

Investigational Site(s): University of Central Florida, Psychology Department, PSY 207C/D

Introduction: Researchers at the University of Central Florida (UCF) study many topics. To do this we need the help of people who agree to take part in a research study. You are being invited to take part in a research study which will include about 30 people from UCF. You have been asked to take part in this research study because you are a student in a psychology class. You must be 18 years of age or older to be included in the research study. In addition, because it interferes with the psychophysiological measurements used in this study, you must not have facial hair.

The person doing this research is Nicholas Coles of the University of Central Florida. Because the researcher is a thesis pursuing undergraduate, he is being guided by Dr. Valerie Sims, a UCF faculty supervisor in the Psychology Department.

What you should know about a research study:

- Someone will explain this research study to you.
- A research study is something you volunteer for.
- Whether or not you take part is up to you.
- You should take part in this study only because you want to.
- You can choose not to take part in the research study.

- You can agree to take part now and later change your mind.
- Whatever you decide it will not be held against you.
- Feel free to ask all the questions you want before you decide.

Purpose of the research study: The purpose of this study is to examine physiological measures during an evaluative judgment of happiness.

What you will be asked to do in the study: In this study, you will first be prepped by a male experimenter to be connected to our physiological equipment that records facial muscle activation and heart rate. This requires that we first clean five contact areas on your face, one contact area on each forearm, and one contact area on your ankle. These areas will be prepped with an abrasive skin prep pad that contains a small amount of disinfecting isopropyl alcohol. This ingredient is a very common content in a standard Band-Aid, however, a very small percentage of people report allergic reactions to this ingredient. If you have allergic reactions to Band-Aids, or believe you may be allergic to isopropyl alcohol, please notify the researcher.

Afterwards, a male researcher will be attaching five electrodes to your face, and one electrode to your ankle and each forearm.

In this experiment you will be asked to fill out a demographic questionnaire, perform maximum flexing of your facial muscles, contemplate your own happiness for 45 seconds, and fill out four brief questions.

Location: PSY 207C/D

Time required: We expect that you will be in this research study for 45 minutes

Funding for this study: This research study is being paid for, in part, by the Office of Undergraduate Researcher

Risks: Some people report an allergic reaction to the isopropyl alcohol contained in the electrode skin prep pad. Please notify the researcher immediately if you believe you may be experiencing, or at risk of experiencing, an allergic reaction.

In addition, some people become anxious or upset when answering questions about their behaviors, feelings, well-being or views. If you believe you need counseling, please contact the UCF Counseling Center; http://counseling.sdes.ucf.edu/ .To make an appointment: (407) 823-2811 or email coumcntr@mail.ucf.edu

Benefits:

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include gaining some understanding of the research process and the scientific study of subjective well-being.

Compensation or payment:

There is no direct compensation for taking part in this study besides the .75 credits provided through UCF's psychology SONA systems.

Confidentiality: We will limit your personal data collected in this study to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of UCF.

All of your data will be kept on a password protected, secure computer and deleted after two years. In addition, your identity will be kept confidential by assigning numeric values to your data.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints, or think the research caused you harm, please contact Nicholas Coles at ncoles@knights.ucf.edu or Dr. Valerie Sims at Valerie.Sims@ucf.edu

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901. You may also talk to them for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Withdrawing from the study:

There will be no penalty for deciding to withdraw from this study.

APPENDIX G: DEBRIEFING FORM

University of Central Florida

Debriefing Statement

For the study entitled:
"Evaluative Judgments of Happiness: A Psychophysiological Investigation"

Dear Participant;

During this study, you were asked to fill out demographic information, contemplate your personal happiness, and fill out a few surveys while physiological data was collected from your face and heart[1]. You were told that the purpose of the study was to examine physiological measures during evaluative judgments[2]. However, what we didn't tell you was that these measures were being used to test some recently proposed "paradoxical effects of valuing happiness"[3]. You were randomly assigned to one of two conditions and, depending on your assigned condition, you may have read a fake article that discretely suggested that happiness was very important. This article was supposed to increase how valuable you believed happiness was; a manipulation that some researchers have claimed actually lowers the intensity of the positive emotions one experiences. In addition, the fake article told you that you would be viewing a film clip. There were no film clips in this study, but the statement was left in the article to keep it consistent with its original format.

We did not tell you everything about the purpose of the study because your knowledge of the fake nature of the article could have nulled its effect on you or created unwanted compensatory responses.

You are reminded that your original consent document included the following information: you will fill out a demographic questionnaire, perform maximum flexing of your facial muscles, contemplate your own happiness for 45 seconds, and fill out four brief questions[4]. If you have any concerns about your participation or the data you provided in light of this disclosure, please discuss this with us. We will be happy to provide any information we can to help answer questions you have about this study.

Now that you know the true nature of the study, you have the option of having your data removed from the study. Please contact the PI if you do not want your data to be used in this research and it will be withdrawn.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints or think the research has hurt you in any way, please contact:

Dr. Valerie Sims, Associate Professor of Psychology Department,
valerie.sims@ucf.edu (407) 823-0343
-or-
Nicholas Coles, Undergraduate,
ncoles@knights.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

Please again accept our appreciation for your participation in this study.

UCF University of Central Florida IRB
IRB NUMBER: SBE-14-10474
IRB APPROVAL DATE: 9/8/2014
IRB EXPIRATION DATE: 9/7/2015

Some people become anxious or upset when answering questions about their behaviors, feelings, well-being or views. If you believe you need counseling, please contact the UCF Counseling Center; http://counseling.sdes.ucf.edu/. To make an appointment: (407) 823-2811 or email councntr@mail.ucf.edu

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