An Experimental study into the effects of Positive Subliminal Priming and its effect on peoples levels of Happiness

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TITLE

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ABSTRACT

This paper examines the area of subliminal priming and whether people can be subliminally primed for happiness. In the experiment a group of students were presented with an episode of The Simpsons television programme. Embedded in the programme presented below the participant's conscious awareness were 19 visual positive affirmations, with the word "Happiness" appearing 13 times and the word "Joy" appearing 8 times. The students were required to complete three self report questionnaires, a SHS to determine happiness levels prior to priming along with the LOT-R and SWLS to measure satisfaction with life after priming. The results suggested that happiness is an enduring trait, not susceptible to subliminal priming and not easy to measure in a one off experiment.

INTRODUCTION

Positive Psychology

Positive Psychology examines how ordinary people can become happier and more fulfilled in their lives, it seeks to move psychology toward the idea that it's not just about treating what is wrong its also about building on what is right (Gillham & Seligman, 1999, p. 163; Seligman & Csikszentmihalyi, 2000). While the actual discipline of positive psychology may be relatively new the theory of positive functioning and healthy development through positive outlook and self-growth has been around for a long time with its roots going back to William James the father of modern psychology and can be viewed and seen in many of the seminal psychological studies over the last hundred years. James (1902) articulated the idea of "belief creating its verification in fact" and provided for a vision of "healthy-mindedness" where these ideals worked in conjunction to bring fulfilment in life. Carl Jung (1933) who is known to have been very influential on the work of Mihaly Csikszentmihalyi (a co-founder of the present day positive psychology movement) wrote about the concepts of individuation and self-realisation (Hayman, 2002, p.150).

This theory was explored in greater detail by Maslow (1968) who forwarded his concept of the "Hierarchy of Needs" and provided detailed descriptions of how self-realisation is achieved although he used the term self-actualisation (Passer & Smith, 2008, p.366). Other important studies have provided evidence to support this view of human development and growth, McClelland and Atkinson (1953) offered achievement goal theory and the positive desire to accomplish tasks and compete successfully with standards of excellence (Passer & Smith, 2008, p. 383), while Karl and Charlotte Buhler (1935) discussed the basic life tendencies that work towards the fulfilment of life, Rogers (1959) had a slightly different take and offered a theory of the self and the internal forces that direct us towards self-actualisation, the highest realisation of human potential (Passer & Smith, 2008, p. 465).

Seminal works on feelings and mood by both Burns (1980) and Thayer (1996) have also been influential on the whole positive psychology movement. Burns (1980) who popularised cognitive

behavioural therapy provided theories on how feelings are not facts and you change your feelings by changing your thinking, our thoughts affect our emotions and mood. Thayer (1996) viewed it a little differently seeing emotions as phenomena that are tied to what goes on in the brain and moods result from processes taking place in both the body and mind, with each affecting the other and by being self-aware about our moods we can understand our emotions better. In a bad mood none of our achievements seem to matter as much but when in a positive mood even the worst circumstances seem manageable (Thayer, 1997, p. 240). William James and Carl Lange offered the James Lange Theory of emotion proposing that witnessing an external stimulus leads to a physiological reaction, the emotional reaction depends upon how the physical reactions are interpreted, if someone see's something funny they laugh therefore they are happy (Lang, 1994). Cannon & Bard challenged the James-Lange theory suggesting instead that our physiological reactions such as laughing are caused by our emotions. (Plutchik, 1962)

Positive Psychology utilises the very essence of some of these concepts taking a holistic view of human emotions, these core building blocks e.g. the idea that human development is goal centred, innate, and not static but moving on a trajectory to ultimate self-actualisation. Positive Psychology offers various approaches to empower an individual to attain their ultimate goal some of which will be looked at in greater detail during the course of the paper. Most people never truly attain self-actualisation (Passer & Smith, 2008, p.366) in the Jung or Rodgers sense but what positive psychology is concerned with, is offering people the tools to build on the best things in their life as it is with in repairing the worst. It seeks to make the lives of normal people fulfilled through nurturing their best attributes whilst still trying to heal pathology using exercises to reframe negative circumstances (Snyder, C.R. and Lopez, S.J., 2005, pp. 65-70). Seligman (2011, p.10) puts forward his five building blocks for a life of profound fulfilment, Positive Emotion, Engagement, Relationships, Meaning and Accomplishment (PERMA), PERMA is the process of taking the things that your good at and enjoy doing and re-crafting them into your life. There are twenty-four strengths that underpin all five elements and by deploying your highest strengths it leads to more positive emotion, to more meaning, to more accomplishment and to better relationships. The goal of positive

psychology in PEMRA is to increase the amount of flourishing in your own life and on the plant, flourishing as defined by positive psychology is "to live within an optimal range of human functioning, one that connotes goodness, generativity, growth and resilience" (Seligman, 2011, p. 26)

Positive Psychology has its critics notably Barbara Ehrenreich (2007) who examined positive psychology and criticises the notion that positive thinking and optimism are the source of longevity and fulfilment. She also calls optimism a "cognitive stance a conscious expectation which presumably anyone can develop through practice requiring a deliberate self-deception, including a constant effort to repress unpleasant thoughts" (Ehrenreich, 2009, p189). Ehrenreich seems to be confusing positive psychology with pseudo-science and notion's like the law of attraction, positive psychology is a science concerned with the idea that positive mental health is not just the absence of mental illness (Seligman, 2011, p. 202). To understand it more it is important to understand happiness and positive emotions and their effects on the human psyche.

Happiness is complex difficult to define and very subjective but has been defined as people's emotional responses and their degree of satisfaction with various aspects of their life (Passer & Smith, 2008, p. 403). Happy people have meaning in their life as witness by PERMA, Baumeister (1991) reviewed the area extensively and in particular evidence suggested that having children reduces the happiness and life satisfaction of parents, but that loss of happiness may be compensated by an increase in meaningfulness (Snyder & Lopez, 2005, p. 612). Happiness is a subjective state at a given time when various life aspects are pieced together. In terms of positive psychology happiness is defined by the theory of Authentic Happiness (Seligman, 2011) and analysed through three different elements. The first is positive emotion; what we feel: pleasure, rapture, ecstasy, warmth and comfort etc. The second is engagement and primarily is concerned with flow the loss of self-consciousness during an absorbing activity in flow we merge with the object, often referred to as being in the zone it uses up all the cognitive and emotional resources that make up thought and feeling. Finally there is the third element of happiness meaning, which consists in belonging to and serving something which is bigger than the self (Seligman, 2011, p. 10). Happiness is complex and cannot really be fully understood in isolation so to offer a clearer picture of happiness it's necessary to understand

attributional style or outlook on life, taken in terms of dispositional optimism and pessimism or explanatory style which is the means by which people habitually explain life events that occur to them. Research has also suggested that happiness is a situation dependent evaluation of hedonic experiences, specifically the valence and activation of current mood as well as being related to cognitive judgements of life satisfaction (Gamble & Garling, 2012)

Research on dispositional optimism as assessed by Scheier and Carver (1985) by the Life Orientation Test defined dispositional optimism as an enduring and stable difference in an individual's tendency to hold positive generalised outcome expectancies for future events. Optimists will continue to pursue their goals in the face of negative information due to the fact that they belief that good things will happen to them in the future, while pessimists will do the opposite and disengage when faced with negative information due to the belief that good things will not happen to them in the future (Scheier, Carver & Bridges, 1994, pp. 1063-1078). Research had suggested that optimistic people are happier and process information in a way that will reinforce their positive mood (Johnson & Camille, 2011), studies have suggested that an optimistic outlook correlates with life satisfaction (Niekludow, 2000). Optimism has been linked to positive mood and good morale, to perseverance and problem solving, to achievement in a variety of domains, to popularity, to good health and even to a long life and freedom from trauma (Snyder & Lopez 2005, p. 245). Research supports the view that optimistic people are at lowered risk for anxiety and depression when they confront stressful events and were found to feel less helpless in the face of stress and adjusted better to negative life events then pessimists did (Passer & Smith, 2008, p. 509). In one yearlong study it was suggested that optimists had about half as many infectious illnesses and visits to the doctor as pessimists did (Peterson & Seligman, 1984, p. 370). Research has suggested that on average people with positive attitudes lived 7.6 years longer than their counterparts with negative attitudes; this survival advantage existed whether positive attitude people were in the fifties, sixties, seventies or eighties when the study began (Passer & Smith, 2008, p. 509). Explanatory style and outlook clearly have an important bearing on people's life and can often have a significant impact on physical and mental health as well as life and death in many cases. Positive psychology may be able help to nurture these traits and if it can its

benefits will be incalculable to society. There is already a significant amount of research conducted in the field of positive psychology and the paper will now look at the impact that it has had thus far.

Real World Application of Positive Psychology

In 2011 Seligman in conjunction with the US army developed the Comprehensive Solider Fitness (CSF) program testing 1.1 million soldiers the idea was to develop a holistic fitness program for soldiers, families and army civilians to enhance performance and build resilience. First a Global Assessment Tool (GAT) was designed, a self-report questionnaire to measure the psycho-social well-being of soldiers based on four areas, emotional fitness, social fitness, family fitness and spiritual fitness. The CSF focuses on the soldier's assets and all soldiers receive feedback phrased in terms of their strengths and the GAT is then used to refer soldiers to online courses tailored to their own profile of psychological fitness. Findings have demonstrated that as emotional fitness goes up post-traumatic stress disorder symptoms decline and as rank and experience go up, so does psychological fitness, results also suggest that it can used as a suicide predictor with the bottom 1% scores being 50% more likely to kill themselves within a year, the majority of suicide in soldiers involves a failed relationship with a spouse or partner (Seligman, 2011, pp. 212-242). This is the largest study of its kind to have ever taken place, the results and findings of which will spurn on research in a many different of field's. It is the first study to actually accurately predict suicides.

There is also evidence to suggest that positive psychology could be effective in the treatment of major and minor depressive disorders, by cultivating positive thoughts, feelings and experiences rather than aiming solely to ameliorate depressive symptoms, this type of treatment may appeal to patients who are not best served by traditional therapies or patients who are already taking antidepressant medication and in need additional support. With its self-administered nature it empowers the patient and offers a cost-effective distribution of treatment (Layous et al, 2011, p. 683). Positive psychology has also proven to help people learn skills for building up personal resources such as psychological resilience and social support with recent research findings on a fifteen month

patient follow suggesting that positive psychology interventions are effective and can add significant value to participants lives (Cohn & Fredrickson, 2010, p. 366). One exercise that has demonstrated positive results is the; What went well exercise or aptly called “Three Blessing’s”, every night before going to sleep the participant writes down “three things that went well today and why they went well” (Seligman, 2011, p. 15) similar to what people do when they pray, they thank God for the gifts he has bestowed upon them. This exercise helps people focus on what’s going right in their life taking the form of positive self- priming, studies significantly extent to the view that there is an intimate relationship between life satisfaction and the mental organisation of positive versus negative concepts in memory (Robinson & Hippel, 2006, p. 187). Seligman (2005) found that 94% of severely depressed individuals less depressed and 92% became happier, with an average symptom relief of 50% over a fifteen day trial (Seligman, 2011, p.15).

This exercise has a basis in neuroscience and neuroplasticity more specifically the notion that neurons that fire together wire together, the more times these neurons fire together the stronger the connection becomes. The brain is not a static organ but changes throughout live and plasticity is the mechanism for development and learning, the difficultly is to understand the processes and the outcomes to achieve the best behavioural result for a given subject (Pascual, Amedi, Fregni & Merabet, 2005, p400) and this type of positive priming might actually be an exercise to help people wire themselves for happiness. It is suggested that positive emotions may exert a counteractive force on the dysphonic, fearful or hedonic states (Garland, Fredrickson, Johnson, Meyer & Penn, 2010, p. 864) so thinking positively and self-priming for what is going right in a person’s life may really have benefits.

A similar process can be seen in the placebo and nocebo effect, research supports the effect of placebo responses and its likely affect on pain, symptoms and quality of life. A nocebo is a negative reaction experienced by a patient to a harmless substance. Both reactions are a physiological response and as a result of a subject’s expectation about how a substance will affect them rather than the substance itself (Olshansky, 2007). Further evidence has suggested that the mechanism responsible for the placebo and nocebo effects process happens without conscious awareness (Jensen et al, 2012).

Jensen et al (2012) conducted two experiments on forty volunteers, in the first experiment they assessed whether a conditioning paradigm, using clearly visible cues for high and low pain, could induce placebo and nocebo responses. The second experiment, in a separate group of subjects, assessed whether conditioned placebo and nocebo responses could be triggered in response to unconscious (masked) exposures to the same cues and verified the influence of unconscious conditioned stimuli on placebo and nocebo effects.

Priming

Priming or semantic priming is the tendency for people to respond faster to an item if it was preceded by an item with similar meaning (McNamara, 2005, p. 3) it's a cognitive process and has been identified as a separate memory system in implicit memory (Magnussen & Helstrup, 2007, p.8). Memory is the process by which information is encoded stored and retrieved and is supported by various constellations of neural networks meditating different forms of learning. It can be declarative and non-declarative. Declarative memory is reflected by performance on tasks that require conscious effort to recollect the past, such as facts and knowledge, it's also flexible and applicable to novel situations. While non-declarative memory is used when performance on a task is improved by past experiences but in the absence conscious recollection and it supports behavioural phenomena such as priming and conditioning (Magnussen & Helstrup, 2007, p.94). This process is quite likely to work in conjunction with the self-priming that seems to be happening during the three blessings exercise, people are conditioning themselves to focus on what is going right in their life. There is also evidence of learning without consciously remembering, after a successful operation to reduce epileptic seizures a patient (H.M.) was left with amnesia and an inability to make new memories even his sense of identity was frozen in time, yet on a complex skilled movement task his performance improved rapidly over time while stating that each time he encountered the task he had never seen it before (Milner, Corkin & Teuber, 1968, pp. 215-235). He was learning the task subconsciously; evidence of another process at work in the brain and that is the interaction between the conscious and the unconscious mind.

William James (1879) offered a theory of consciousness whereby it worked in conjunction with the selectivity of attention, he suggested that consciousness consists of the selection of some and the suppression of the rest by the agency of attention (James, 1879, p.13). While consciousness is closely related to attention the processes are not identical and is better associated with the kind of controlled focused attention that is not automatic (Matlin, 2009, p. 85). In essence our consciousness is our moment to moment awareness of ourselves, our thoughts, emotions, and our environment. The unconscious mind is a little more complex, Freud held the view that it lies beneath our conscious awareness and is made of feelings thoughts, urges and memories most of which are unacceptable or unpleasant. It influences our behaviour even though we are unaware of its underlying influence (Maltby & Macaskill, 2010, p. 54), thoughts in our unconscious influence our on-going conscious experience, so during the three blessings exercise the subconscious mind is being primed to focus on what is going right in life and then influence behaviour and perception accordingly (Seligman, 2011).

Subliminal Priming

Subconscious or subliminal priming has been used previously in order to put forward a concept or idea to an unwitting participant, and works on the basis of subliminal messages being passed through various media channels, television, internet etc and previous research has demonstrated that it can affect behaviour. It's the process by which perception occurs without awareness (Merikle, 1992), one theory that has been forwarded states that information by passes sensory receptors and permits direct stimulation of the brain unconsciously (Merikle, Joordens & Stolz, 1995). It has been suggested that any activity in receptors or sensory fibres can stimulate the sensory cortex once the activity is on the absolute threshold which is the minimum amount of stimulation required for a person's sense organs to detect a stimulus. The absolute threshold is best defined as the amount of stimulation needed to produce an action potential in a neuron, the absolute threshold varies between people and even when on the threshold its only effective 50% of the time in detecting a stimulus (McNamara, 2005, pp.107-115). Recent neuroscientific findings have shown that the prefrontal cortex can be activated unconsciously and is associated with behavioural effects of cognitive control, such as response inhibition, task switching, conflict monitoring and error detection

(Gaal Van & Lamme, 2012, p. 287). This is significant as it opens up an important area of discussion and provides for high level unconscious information processing which has previously been an area of much debate.

Subliminal priming has a chequered past going back Vicary's (1957) study on subliminal advertising. He claimed that he conducted an experiment on cinema goers, who were repeatedly shown a 0.03 second subliminal advertisement for Coca-Cola and popcorn resulting in a significant increase in sales, the results of the experiment have been proven to be fraudulent (Karrenmans, Stroebe & Claus, 2007). Karrenmans et al (2007) replicated Vicary's hoax study conducting two experiments, which assessed whether subliminal priming for a brand name of a drink can affect people's choice's for a primed brand and whether this effect is moderated by individuals feelings if thirst. Both studies supported the view that subliminal priming of a brand name of a drink positively affected participant's choice for, and their intention to drink the primed brand, but only for participants who were thirsty. Bermeitinger et al (2009) conducted further research on the impact of subliminal priming when a subliminal presentation was embedding into a computer game. Their research supported Karrenmans et al findings that subjects can be influenced by subliminally presented stimuli, also finding that participants who were tired were more susceptible and only if the stimuli were need related.

During the 2000 Bush/Gore presidential election campaign the Republican Party used subliminal messaging in an advertising campaign, as the voice over utters the words "The Gore Prescription Plan" the word "Rats" appears on the screen on the threshold of perception before being replaced by the word "Bureaucrats Decide". Research has subsequently been conducted to understand the effectiveness of this form of subliminal priming. It has shown that subliminally flashing the word "rats" on a screen as opposed to a word like "star" or symbols like "XXX" before showing volunteers a picture of a fictional political candidate caused them to report a more negative impression of the candidate, results also showed subliminal stimuli can affect ratings of well-known as well as unknown politicians (Weinberger & Westen, 2008, pp.631-651). Research conducted with fMRI scans taken of volunteers would suggest that subliminal priming and overt images produced the same responses in

the brain with one consistent difference, subliminal images prompted more activity in the volunteers primary visual cortex then might have been expected given the more complex visual task of processing those images (Lindstrom, 2008, p. 83). In essence the flashing of a subliminal image might actually have a bigger impact on the unconscious mind and subsequent behaviour or attitudes then it does when it's witnessed by the conscious mind.

Research has shown that when people are subliminally presented with images of Coke cans and the word "thirsty" they rated themselves as thirstier then those not exposed to any subliminal priming (Cooper & Cooper, 2002), while people presented with either "drink" or "cola" consume more liquid to those who did not receive any subliminal imagines (Dijksterhuis, Aarts & Smith, 2005). Cooper & Cooper 2002 conducted two experiments using a Simpson's episode, in the first experiment they presented subliminal both verbal and visual presentations to forty participants relating to thirst. In the second experiment again to forty students they presented just visual presentations research suggested that in both cases the primed students were thirsty when compared to their pre-exposure ratings and compared to the control group. The second experiment showed that the result was related to the visual priming and not the linguistic priming (Cooper & Cooper, 2002). In both studies subliminal priming increased people motivations of thirst consistent with previous research (Beatty & Hawkins, 1989 p. 4). Studies have also shown that trying to persuade by subliminal information doesn't work if the participant is aware of it (Carey, 2007, p. 5).

There is also a body of evidence to suggest that activation of achievement goals is possible through subliminal exposure to words such as succeed and win, exerting an unconscious influence on effort of mobilisation in a subsequent word search task (Bragh et al, 2001, p.1014). Recent studies have looked at subliminal priming on non-conscious goal pursuit and found evidence that subliminal priming can induce a greater cardiovascular reactivity suggesting effortful behaviour and perseverance when pursuing a simple goal typical of daily life (Capa et al, 2011, p. 330). Radel, Sarrazin, Legrain & Gobance (2009) offered evidence on whether motivational priming influences students' academic performance and whether this effect is moderated by students' degree of mindfulness. Two randomly assigned groups of students received an identical lesson. However, the

teacher's slideshow contained different subliminal words according to the condition (autonomous vs. controlled motivation). Results indicated a correlation between students' dispositional mindfulness and priming conditions. The more mindful students were immune to the manipulation whereas the less mindful students were affected by the priming: those primed with autonomous motivation obtained better results than those primed with controlled motivation. This would suggest individual differences in priming responsiveness. Studies have also suggested that primed participants may react differently depending on their self-esteem (Tao, Zhang, Li & Geng, 2012).

Soussignan et al (2010) have provided evidence of priming for an emotion, fear. Anorexia nervosa suffers and healthy women were exposed to palatable food pictures just after a subliminal exposure to facial expressions (happy, disgust, fear and neutral faces), either while fasting or after a standardised meal (hunger versus satiety). Both implicit (facial electromyographuc (EMG) activity, skin conductance, heart rate and videotaped facial behaviour) and explicit (self-reported pleasure and desire) measures of affective processes were recorded. Their research suggested that subliminal fear faces increased corrugator muscle reactivity (fear response) to food stimuli in fasting anorexia patients. Mayer and Merckelbach (1999) conducted research on the effects subliminal priming on emotion. The experiment was conducted on thirty one undergraduate students reporting a high or low fear of spiders viewed images of spiders and snakes, preceded by 8-msec subliminal prime of either smiling faces, scowling faces or neutral configurations. The students then evaluated the negativity and fearfulness of each image and completed questionnaires concerning snakes and spiders. Results show that students who were not arachnophobes reported more fear following negative priming with no effects of primes being observed for arachnophobes.

Li, Huang, Xiao and Zhou (2008) conducted research on the use of words and pictures in subliminal priming. Concluding that as emotional stimuli both pictures and words can produce affective priming effect, especially when it comes to priming for positive emotions. Further research conducted on priming for positive and negative emotions by Skandrani-Marzouki & Marzouki (2010) used subliminal priming presenting two levels of emotion; positive emotion (happiness) and negative emotion (anger). The primes were presented 50 milliseconds and followed by emotionally neutral

target faces, the participants were asked to indicate as rapidly as possible whether they were "favourable or unfavourable toward the selection of the candidate (target face). Results suggested that a strong effect of emotional priming, participants tended to choose more target faces that were preceded by positive prime faces that by negative prime faces. Research suggests that subliminal priming is possible to persuade people in a achieving a goal-relevant cognition like thirst or sadness and has also been shown to influence behaviour but only when certain conditions were met such as a person being motivated to pursue a particular goal (Strahan, Spencer & Zanna, 2002). Further studies on priming behaviour would suggest that self-consistent primes are more likely to influence choice via semantic activation, whereas self-discrepant primes are more likely to influence choice via goal activation (Sela & Shiv, 2009).

The Current Study

Looking at the benefit gained from the "Three Blessings Exercise" and the evidence from both cognitive psychology and neuropsychology it's seems that people may be able to prime themselves for happiness. There is a lot of current research on priming for both positive and negative behaviours as discussed so far, but to date there is a dearth of research on priming people for happiness. The current investigate this area and look for evidence to support the theory of positive priming and that people can be primed for happiness. The experiment will follow the same lines of Cooper and Cooper (2002) as discussed previously who managed to prime people for thirst a physiological reaction.

This study will replicate the subliminal priming methods', format and editing that Cooper and Cooper followed. Self-report questionnaires will be used to gather the data from the respondent's, self-reporting questionnaires are easy to administer especially is a group setting and show good test and re-test reliability (Lajunen & Summala, 2003). Research studies have suggested that self-report questionnaires can be susceptible to low to moderate validity, mainly due to inaccuracies in recalling activity (Ridley, Old & Hill, 2006). Further studies have suggested good validity when assessing

emotional experience and as well as the regulation of emotion (Benecke et al, 2008) which will be more appropriate for the current experiment.

Two groups will be used both will be given the Life Orientation Test (LOT-R) as used by Scheier and Carver (1985) to understand the participants general outlook on life and both groups will be provided with the subjective happiness scale to measure participants level of happiness and the satisfaction with life scale to measure life satisfaction. Happiness is a hedonic experience brought about by evaluations of what is good or bad in life (Kahneman, 1999). Research has shown the subjective happiness scale to be reliable and has correlated positively with the satisfaction with life scale (Spangnoli, Caetano & Silva, 2012). The Satisfaction with life scale is an established measure of life satisfaction and the most commonly administered scale when measuring life satisfaction. It is a clear, simple, and brief scale that is very easy to apply and demonstrates good psychometric properties (Pavot & Diener 2008) and measurement invariance across gender (Atienza, Balaguer, & Garcia-Merita, 2003).

One group will be primed for happiness the other will not, both groups will be asked to complete a self-report questionnaire a satisfaction with life scale and when the scores between the groups are compared it his hypothesised that the primed group will have higher satisfaction with life scores then the un-primed group while those with an optimistic outlook with have higher scores when measure against those of the same primed group.

Main Hypothesis

It is hypothesized that there will be a significant difference between students who have been subliminally primed with positive affirmations and they will score higher on a satisfaction with life scale than those who have not. It is also hypothesized that there will also be a significant difference between primed students who's general outlook on life is optimistic then students who's general outlook on life is pessimistic.

METHOD

Participants

The priming experiment was conducted twice over three different classes using thirty nine DBS psychology students, the same quantity of students used Cooper and Cooper's (2002) whose subliminal priming experiment and conditions are being replicated. The average age of the group was twenty two years old containing twenty eight females and eleven males. The first experiment contained twenty two students; fifteen females and seven males. Fourteen students were subjected to the priming, split nine females and five males with balance of eight; six females and two males watching the unedited version. The population was randomly allocated to one of two groups using a coin toss, every student was afforded an equal opportunity to be allocated to either group, group one or group two. Once the groups were split a coin was tossed again to see which group would be primed; heads group one would be primed and tails for group two. Group two containing fourteen students was selected as the group that would receive the priming.

The second experiment was conducted on two classes containing seventeen students who were split into groups again using a random allocation; twelve females and five males. This time the groups were pre-defined to balance up the weight of students who received priming in the overall experiment; five students, four females and one male were subjected to priming with the remainder eight females and four males watching the unedited version. The students wrote their names on a piece of paper and placed it in a paper bag the names were randomly drawn and allocated to either the primed or un-primed group. This was done until the required quota for the primed group was filled, the rest then being drawn and allocated into the up-primed group.

Design

A true experimental design was used as discussed there was random assignment to groups. The dependent variable was exposure to priming which was the variable that was influenced during the experiment and the independent variable's being general happiness, general outlook on life and

satisfaction with life the variables that were being manipulated in the experiment. Research suggests that subliminal priming won't work if the participants are aware that they are going to be primed (Carey, 2007). So the experiment was introduced to the students as an experiment that was designed to measure the role that television plays in our lives and its effect on our moods and to that end three questionnaires were going to be administered. The Subjective Happiness Scale and Life Orientation test both of which were to be completed prior to watching the television show and the Satisfaction with life scale which was to be completed afterwards.

Materials

The subjective happiness scale (SHS) (Lyubomirsky and Lepper, 1999) is a 4-item seven point likert-scale, two items ask the respondent to characterise themselves using absolute ratings and ratings relative to their peers, while two items offer brief descriptions of happy and unhappy people and ask participants the extent that which each characterisation describes them. The SHS was used as research has indicated that it has high internal consistency and was found to be stable across samples. The Life Orientation Test-Revised (LOTR) (Scheier, Carver and Bridges, 1994) is a ten item measure of optimism versus pessimism, where participants rate each item on a four point scale; three items measure optimism, three items measure pessimism and four items serve as fillers. Research would support LOT-R as a reliable predictor of trait optimism and trait pessimism (Herzberg, Glasmer, and Hoyer, 2006). The Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen and Griffin, 1985) is a 5-item seven point likert-scale and is designed to measure cognitive judgements of satisfaction with a participant's life and has shown to be a reliable indicator of a participants satisfaction with life (Bayani, Koocheky and Goodarzi, 2007). Research has indicated that the subjective happiness scale has correlated positively when used in conjunction with the satisfaction with life scale (Spangnoli, Caetano & Silva, 2012).

Procedure

The groups were split into primed and un-primed as discussed in the participants sector. Each group was then escorted to the lab by either the experiment administer or thesis supervisor. The

primed and non-primed episodes were uploaded onto two USB memory stick in the same format, in the first experiment the experiment administrator supervised the primed group in the second experiment the thesis supervisor supervised the primed group. The students were asked to complete the first two questionnaires and they then watched a full episode of The Simpsons (season 22 episode 11, running time 21 minutes and 41 seconds) using a NEC HDMI M300W projector. Both episodes were the same except the primed group were subjected to positive subliminal affirmations.

Fig 1 – Primed Frame from the opening credits of The Simpsons

For the subliminal condition the source material was taken from a DVD box set using the get media function in adobe premier elements 10, it held its DVD format and frame size of 720 x 576 pixels. A Simpson's episode is made up of 32,675 frames running at 25 frames per second, 21 frames were primed into the piece 13 happiness and 8 joy. Research has suggested that emotionally positive words are found to have more of an impact on the memory recall processes used in a subliminal priming (Colombel, 2000) and word's with higher emotional content like "happiness" and "joy" give higher amplitude response (Brandeis,1984). The first primed frame occurs 19 seconds into the piece (as seen in Fig 1) with a primed frame appearing on average once a minute thereafter with the longest gap being 1 minute and 20 seconds between primes, a single primed frame was visible for 33 milliseconds right in the subliminal threshold. Research has suggested that a frame hanging for 33 milliseconds will be seen by fifty per cent of the participants (McNamara, 2005), this is also the same

frame hang time that Cooper and Cooper (2002) used when they subliminally primed people for thirst a physiological response elicited from subliminally presented information.

The current experiment was conducted to replicate Cooper and Coopers (2002) seminal experiment on priming. Scene selection is important in any subliminal priming experiment, research support's the view of dropping in the subliminal frames at scene changes for optimum unconscious processing (Libet, Wright, Feinstein & Pearl, 1979). A problem was encountered in attempting to replicate Coopers and Coopers experiment fully. In their experiment they used a full white frame with text on the conditioned group and a full white frame for the un-conditioned group. However a full white frame proved to be quite jarring and in many cases quite obvious even when the frame hang-time was reduced the white box regularly appeared visible, several pilot screenings were used in the different formats to unsuspecting participants. A number of different outputs was tested to lessen the impact of the white box using HD1080p 30 frames per second and HD 729 29 frames per second but none worked the white box was consistently visible when viewed by unsuspecting participants. In the end the opacity and position of the text was adjusted to make it less obvious to the viewer, the white box was used in scenes that it wasn't as visible which was only two scenes. It is quite likely that Cooper and Cooper used film stock for their experiment running it through a projector may assist in lessening the impact of the full white box, in their paper they did not provide information on the format or method of editing they used.

When the students had completed the SWLS questionnaire they were fully debriefed as to the nature of the experiment and all of their questions were answered, over both experiments only one participant had reporting seeing a subliminal message and that was the word "Happiness" in one of the frames in which a white box was used.

RESULTS

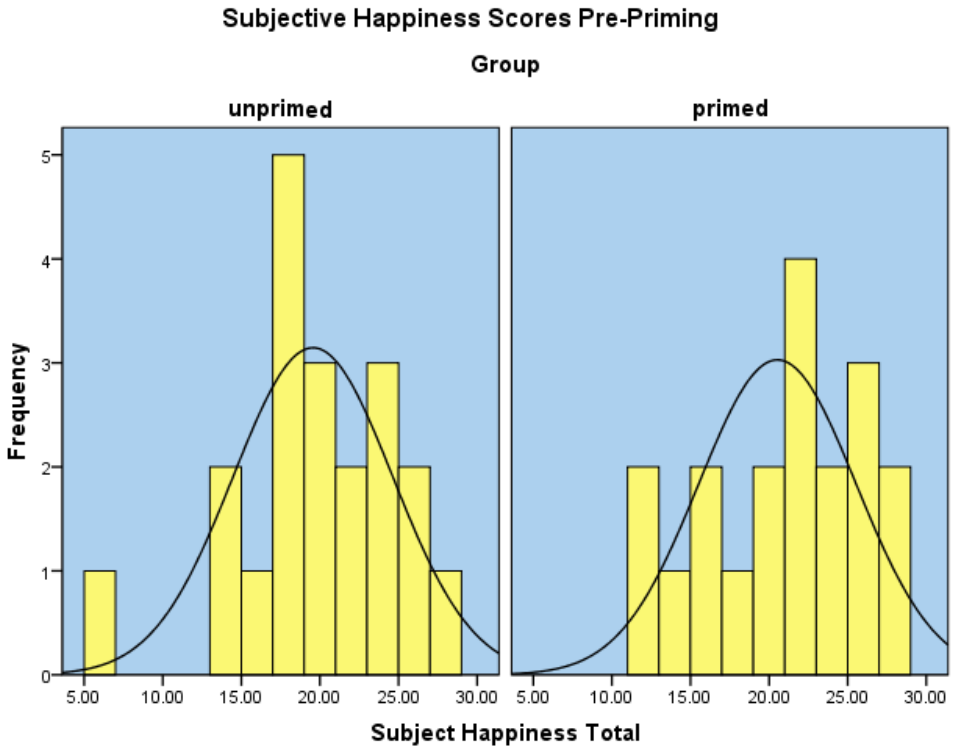

Fig: 2

The sample consisted of 39 participants, with more females (*n*=28) than males (*n*=11), the mean (*m*=1.72) and the standard deviation (*SB*=.46). Prior to priming the subjective happiness scores for the participants were mean (*m=5.00)* and the standard deviation being (*SB*=1.25). Tests were conducted on the data to establish if it was evenly distributed, Q-Q plots were normally distributed, histograms were bell shaped (Fig 2) and variance of groups were within acceptable levels. A Cronbach's *xs* was also run on the questionnaires to test for reliability, which indicated internal consistency of the data.

An independent-T test was run on the groups to compare subjective happiness scores and satisfaction with life scores, as can be seen in Fig.2 there was little difference in the data between the primed and the un-primed groups prior to running the experiment with both groups fitting on a normal bell shaped curve. There were slightly higher scores in primed group but not significant enough to have impacted on the experiment this can be seen in the histogram in Fig 2 and Subjective Happiness Scores. The results from the independent t-test indicated that satisfaction with life scores were not

higher in the primed group (M=4.8, SD=1.5) when compared to the un-primed group (M=4.68, SD1.12). The 95% confidence limits show that the population mean difference of the variables lies somewhere between -.99 and .73. An independent sample t-test found that there was not a statistically significant difference between the primed and the un-primed groups (t(37)=-.31, p=.76), the data is displayed in table 1, the null was accepted.

Table 1: An Independent Samples T-test table displaying the differences between the primed and un-primed groups for the Subjective Happiness Scales and Satisfaction with Life Scale

Variables	**Groups**	**Mean**	**SD**	***T***	***Df***	***P***
Subjective Happiness	Un-primed	4.89	1.27	-.605	37	.549
Scale (SHS)	Primed	5.13	1.25			
Satisfaction With Life	Un-primed	4.68	1.12	-.308	37	.760
Scales (SWLS)	Primed	4.81	1.50			

Note: p significant at .05 level.

As mentioned to test the reliability of the data a Cronbach's *xs* was run on the SHS and SWLS and found based on standardised items a score of 0.81 which indicates that the data is consistent and of reliable quality. Further analysis was conducted on the individual items that make up the SWLS (table 2) and while the t value (.019) for the question "So far I have gotten the important things in life that I want" is less than 0.05 and is significant but because its two tailed and zero is contained within the range -1.14 lower end and 1.17 upper end it represents the null so there cannot be a significant result.

Table 2: *An Independent Samples T-test table displaying the differences between the Primed and non-primed groups for the 5 items in the SWLS*

Variables	Groups	Mean	SD	*t*	*Df*	*P*
Item (1) – Ideal Life	Un-primed	4.75	1.33	-.590	37	.588
	Primed	5.05	1.84			
Item (2) – Excellent	Un-primed	4.90	1.29	-.515	37	.609
Life Conditions	Primed	5.16	1.80			
Item (3) – Satisfied	Un-primed	5.00	1.34	.107	37	.915
With life	Primed	4.95	1.71			
Item (4) – Gotten	Un-primed	4.80	1.47	.019	32.87	.985
Important things	Primed	4.79	2.02			
Item (5) – Change	Un-primed	3.95	1.70	-.252	37	.802
Nothing	Primed	4.11	2.13			

Note: p significant at .05 level

A pearson's correlation was run, the result of which can be seen in table, looking for a correlation between participants who scored higher on the LOT-R scale, post priming would they score higher on the SWLS. A score .280 highlighted a weak relationship. In the un-primed group a score .498 highlighted a moderate to strong correlation between higher scores in LOTR and SWL, as optimism scores increase so do does satisfaction with life scores. This is not a surprising result as there is a significant body of research on optimism positively correlating with higher satisfaction with life scores previous research has indicated that there should have been a positive correlation on both groups (Lounsbury, Saudargas, Gibson & Leong, 2005). To show a negative correlation within the primed group was unexpected, as the hypothesis forwarded the view that after priming optimistic participants would have more significant correlations not less.

Table 3: *Correlation table – Optimism and Satisfaction with Life*

Group	LOTR Mean	SWL Mean
Un-primed		
LOTR Mean		.498*
SWL Mean	.498*	
Primed		
LOTR Mean		.280
SWL Mean	.280	

* *p* significant at .05 level.

DISCUSSION

The aim of this research was too understand the effects of a subliminal priming experiment on a student sample. It was hypothesized that a student sample who had been subliminally primed with positive affirmations such as “Happiness” and “Joy” would show higher life satisfaction scores then those who had not. It was also hypothesized that the primed students who scored higher on trait optimism would score higher on life satisfaction then those who were not primed. The research suggested that there no significant relationship between subjective happiness scores and satisfaction with life scores, it also found that the student sample who had been primed for happiness did not score higher on the satisfaction with life scale than those who had not been primed. When measuring attribution scores the research findings did not support the hypothesis of a difference in primed students and un-primed student, whose general outlook on life is optimistic when compared to students whose general outlook on life is pessimistic. The research actually suggested the reverse and highlighted a higher positive correlation between attributional scores and satisfaction with life score for the un-primed group when compared to the primed group.

Research has suggested that personality traits are enduring (Augustine & Larsen, 2011), stable and not susceptible to priming. (Moeller, Robinson & Breslin, 2010). Further research has also suggested that happiness is a situation dependent evaluation of hedonic experiences, specifically the valence and activation of current mood as well as being related to cognitive judgements of life satisfaction (Gamble & Garling, 2012). This would suggest that if people are being primed for happiness and they are already happy they should be more susceptible to priming then people who are less happy. Studies have also supported this view that self-consistent primes are more likely to influence sematic activation (Sela & Shiva, 2009) so positive affirmation’s like “happiness” and “joy” should have a greater subliminal impact on participants who score higher on the subjective happiness scale this was not the case in the research findings.

In analysing the data it seems that a self-reporting questionnaire should have not been the only apparatus used to measure happiness as previous research suggests they can be susceptible to low

to moderate validity (Ridley, Old & Hill, 2006). Self-reporting questionnaire's used in conjunction with videotaped facial behaviour recognition, could potentially have offered more insightful contribution to the results. Videotaped facial behaviour has been used in previous subliminal priming experiments when priming for an emotional response and has shown to be effective in detecting facial emotional reaction to subliminal priming (Soussignan et al, 2010). The Satisfaction with Life scale measure's life satisfaction and has shown to be a reliable indicator of life satisfaction, research has also indicated a positive correlation when used with the subjective happiness scale (Spangnoli, Caetano & Silva, 2012). Happiness is only one component of satisfaction with life (Bayani, Koocheky and Goodarzi, 2007), studies suggest that the Oxford Happiness Scales is a more reliable predictor of happiness when compared to the satisfaction with life scale (Bayani, 2012).

The results of the second experiment where contrary to what was hypothesised. The results suggesting that the un-primed group had a moderate to strong positive correlation when predicting life attribution scores against satisfaction with life scores while the primed group had weak correlation scores when correlating the two scales. This is significant in itself as it would contradict previous studies in the area suggesting that higher satisfaction with life scores positively correlate with an optimistic outlook on life (Scheier, Carver & Bridges, 1994. Niekludow, 2000). Further research on trait optimism and life satisfaction has suggested that optimists tend to have a self-serving bias in how they interpret events, using neutral events as a reason to increase their positive mood (Johnson & Stapel, 2011). This would suggest that optimistic people who subconsciously engaged with the subliminal affirmation would be more likely to use it as a reason to increase their life satisfaction but the findings of this study would suggest that this is not the case, further research is required to understand this result more fully.

Strengths

This study support's the view that personality traits are enduring (Augustine & Larsen, 2011) and not susceptible to subliminal priming (Moeller, Robinson & Breslin (2010) and this in itself is significant. A large body of research has been conducted on subliminal priming in relation to

physiological responses suggesting that it is possible to prime for thirst (Cooper and Cooper, 2002), Karrenmans et al (2006) also managed to prime for thirst and suggested that people could be primed to drink a particular brand but only if there were already thirty. Olshansky (2007) provided further evidence as to the unconscious physiological process that takes place during the placebo and nocebo effect. Radel et al (2009) offered evidence that subliminal priming could have a positive effect on a students' academic performance but only if certain conditions were met. Capa et al (2011) suggested that subliminal priming can induce higher motivational levels in participants when undertaking exercise. Both Radel and Capa in their studies used repeated exposure to the subliminal primes in several subliminal experiments to achieve their significant results. Soussignan et al (2010) have suggesting the possibility of priming for an emotion, in their study they managed to subliminally prime for fear. Skandrani-Marzouki & Marzouki (2010) offered further evidence on subliminal priming for two levels of emotion happiness and anger, both used other apparatus to measure the emotional responses which focused less on the ambiguity of self –report questionnaire instead focusing on the active process that were taking place as the priming was occurring.

There is no ambiguity in the data, there is no significant relationship between groups primed for subjective happiness and satisfaction with life, the Kronbach *x*s suggested the reliability of the data used in there experiment. Lack of ambiguity is a standard that can be approached but not always attained. The frame work to re-test the hypothesis is simple straight forward and the experiment can be easily replicated again using a student cohort. All that is required is a new approach to measuring happiness levels by using videotape facial recording to analyse facial expression this would highlight emotional responses. If the subliminally primed group laugh more than the un-primed group, working on the basis of the James Lange Theory of Emotion (Lang, 1994) "an external stimulus leads to a physiological reaction", they have been subliminally primed for happiness. Also repeat exposure to the primes over a longer set period of time as was the case with Radel (2009) and Capa (2011) is likely to have a greater impact on a students' happiness levels than 19 subliminal positive affirmations shown once over a twenty minute period. Very slight changes to measure apparatus used in the experiment would make a significant result much more likely.

Weakness

An emotion like happiness is complex difficult to define and very subjective, it has been defined as people's emotional responses and their degree of satisfaction with various aspects of their life (Passer & Smith, 2008). In a single once off experiment a subtle and transient emotion like happiness is going to be difficult to re-create and measure accurately. Therefore it is likely the self-reporting questionnaires are not the optimum measure of such an emotion. Research has indicated a positive correlation between the subjective happiness scale and the satisfaction with life scale happiness is only one component of the satisfaction with life scale (Spangnoli, Caetano & Silva, 2012).

The gender imbalance in the groups is also a weakness in this particular study. While research has supported the view that there is no difference on the absolute threshold limits between males and females (Sonnby-Borgstrom, Jonsson & Svensson, 2008). A heavily weighted sample either way is not conducive to quality research. There was also a weakness in fully replicating the Cooper & Cooper (2002) experiment they successfully primed for thirst using a similar student sample. In their experiment they used a blank white box containing the priming which could have made it more visible on the linen threshold. Research suggests that on any given time only 50% of the participants will detect a subliminal message. In the current experiment the opacity and position of the subliminal message was altered to ensure only unconscious detection, this potentially reduced the impact of the subliminal message on the participants and further reducing the amount of participants who are likely to have subconsciously detected it.

Future Research

There is potential for initial, short term and long term future research on the area of subliminal priming for positive emotions. Initially the experiment can be replicate, it is applicable to a group or student cohort and using other instruments for testing emotional responses, like the Oxford Happiness Questionnaire and facial video analysis it is likely to produce significant results. Following that there is scope to develop it further in the short term using longitudinal studies, over a pre-

determined period of time a student sample is played a subliminally primed Simpson's episode, with using self-report questionnaire to track outcomes. Priming has shown to have a greater impact when repeated several times. In the long term after longitudinal studies implicit measures like EMG's, skin conductance and heart rate monitoring can be used in conjunction with explicit measures like self-report questionnaire's measure response rates to emotional priming. Previous research has found them to be an effective instrument when measuring emotional response to subliminal priming. Future research should also be conducted on attributional style and satisfaction because this study did throw up some unusual findings.

CONCLUSION

While the findings of the research have not proved to be significant it has proven to be a worthy exercise. The study has made tentative steps into the emerging field of positive psychology, providing an alternative view of happiness and how people interpret their positive emotions. It provides the basic building blocks that can be developed for future research highlighting that happiness is subjective and is only one component of a happy and satisfied life. Any study that follows this will have to determine the most appropriate apparatus for measure. As discussed self-report questionnaires are effective and useful in many studies and situations, but when measuring a subtle and transient emotion like happiness they should only be one of the instruments that the psychologists use to get the clearest results.

REFERENCES

Atienza, F. L., Balaguer, I., & Garcia-Merita, M.L. (2003). Satisfaction with Life Scale: Analysis of factorial invariance across sexes. *Personality and Individual Differences, 35*, 1255–1260.

Augustine, A. A., & Larsen, R. J. (2011). Affect regulation and temporal discounting: Interactions between primed, state, and trait affect. *Emotion*, *11*(2), 403-412. doi:10.1037/a0021777

Bayani, A. (2008). TEST-RETEST RELIABILITY, INTERNAL CONSISTENCY, AND CONSTRUCT VALIDITY OF THE FARSI VERSION OF THE OXFORD HAPPINESS INVENTORY. *Psychological Reports*, *103*(1), 139-144.

Bayani, A., Koocheky, A., & Goodarzi, H. (2007). The reliability and validity of the Satisfaction with Life Scale. *Journal Of Iranian Psychologists*, *3*(11), 259-265.

Bermeitinger, C., Goelz, R., Johr, N., Neumann, M., Ecker, U. H., & Doerr, R. (2009). The hidden persuaders break into the tired brain. *Journal Of Experimental Social Psychology*, *45*(2), 320-326. doi:10.1016/j.jesp.2008.10.001 doi:10.2466/PRO.103.1.139-144

Burns, D.D. (1980). *Feeling good: the new mood therapy*. USA: Avon Books.

Bush, G., and Gore, A. (2000) – Rats https://www.youtube.com/watch?v=2NPKxhfFQMs

Bragh, J. A., Chen, M., and Burrows, L. (1996). *Automaticity of social behaviour: Direct effects of trait construct and stereotype activation.* Journal of Personality and Social Psychology, 71, pp. 230-244

Bragh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., and Trotschel, R. (2001). The Automated will: Nonconscious activation and pursuit of behavioural goals. *Journal of Personality and Social Psychology,* 81, pp.1014 1027.

Brandeis , D. (1984). 'An electrocortical investigation of word recognition in a backward masking paradigm'. *Biological Psychology*, 18 , 294-5.

Carey, B. (2007). *Who's minding the mind?* New York Times, 156(54022), p.2

Capa, R.L., Cleeremans, A., Bustin, G.M., Bouquet, C.A., Hansenne, M. (2011) Effects of subliminal priming on non-conscious goal pursuit. Social Cognition, 29 (4), pp. 430-444.

Colombel, F. (2000). Traitement de concepts à connotation émotionnelle positive selon la quantité d'indices de récupération accessibles. *International Journal Of Psychology*, *35*(6), 279-286. doi:10.1080/002075900750047996

Cooper, J., and Cooper, G. (2002) *Subliminal Motivation: A Story Revisited.* Journal of Applied Social Psychology, 32 (11), pp 2213-2227

Djksterhuis, A.P., Aarts, H., Smith, P.K., (2005). *The New Unconscious, Hasso, R. R., Uleman, J.S., Bragh, J,A., (Eds),New York, Oxford University Pres. pp. 77-106*

Ehrenreich, B., (2007). Pathologies of Hope. Harper's Magazine; Feb2007, Vol. 314 Issue 1881, p9-11

Gaal, Van., Lamme, V.A.F., (2012). Unconscious high-level information processing. 18(3), pp. 287-301

Garland, Eric L., Fredrickson, Barbara., Kring. Ann M., Johnson, David P., Meyer, Piper S., Penn, David L., (2010, Nov). *Upward spirals of positive emotions counter downward spirals of negativity*, Clinical Psychology Review, Vol. 30 Issue 7, p860

Gamble, A., & Gärling, T. (2012). The Relationships Between Life Satisfaction, Happiness, and Current Mood. *Journal Of Happiness Studies*, *13*(1), 31-45. doi:10.1007/s10902-011-9248-8

Gillham, J.E., & Seligman, M.E.P. (1999). Footsteps on the road to positive psychology. Behaviour Research and Thearapy, 37, PP. 163-173

Hayman, R. (2002) *A life of Jung*. London: Bloomsbury Publishing7

Herzberg, P., Glaesmer, H., & Hoyer, J. (2006). Separating optimism and pessimism: A robust psychometric analysis of the Revised Life Orientation Test (LOT-R). *Psychological Assessment*, *18*(4), 433-438. doi:10.1037/1040-

James, W. (2000) *Pragmatism and other writings*. London: Penguin Books.

Jensen, K. B., Kaptchuk, T. J., Kirsch, I., Raicek, J., Lindstrom, K. M., Berna, C., & Kong, J. (2012). Nonconscious activation of placebo and nocebo pain responses. *PNAS Proceedings Of The National Academy Of Sciences Of The United States Of America*, *109*(39), 15959-15964.

Johnson, C., & Stapel, D. (2011). Happiness as alchemy: Positive mood leads to self-serving responses to social comparisons. *Motivation & Emotion*, *35*(2), 165-180.doi:10.1007/s11031-011-9216-y

Kahneman, D. (1999). Objective happiness. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), Well-being:The foundations of hedonic psychology (pp. 3–25). New York: Russell Sage Foundation.

Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal Of Experimental Social Psychology*, *42*(6), 792-798. doi:10.1016/j.jesp.2005.12.002

Layous, K. Chancellor, J. Lyubomirsky, S. Lihong, W. Doraiswamy, M, P. (2011), *Journal of Alternative & Complementary Medicine*, 17 (8), p.683

Lajunen, T., & Summala, H. (2003). Can we trust self-reports of driving? Effects of impression management on driver behaviour questionnaire responses. *Transportation Research: Part F*, *6*(2), 97. doi:10.1016/S1369-8478(03)00008-1

Lang, P. J. (1994). The varieties of emotional experience: A meditation on James-Lange theory. *Psychological Review*, *101*(2), 211-221. doi:10.1037/0033-295X.101.2.211

Libet , B. , Wright , E. W. Jr. , Feinstein , B. & Pearl , D. K. (1979). 'Subjective referral of the timing for a conscious sensory experience'. *Brain*, 102 , 193-224.

Li, L., Huang, L., Xiao, L., & Zhou, P. (2008). A comparative study of pictures and words in subliminal affective priming effect. *Chinese Journal Of Clinical Psychology*, *16*(5), 495-497.

Lounsbury, J. W., Saudargas, R. A., Gibson, L. W., & Leong, F. T. (2005). An Investigation of Broad and Narrow Personality Traits in Relation to General and Domain-Specific Life Satisfaction of College Students. *Research In Higher Education*, *46*(6), 707-729. doi:10.1007/s11162-004-4140

Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, *46*(2), 137-155. doi:10.1023/A:1006824100041

Magnussen, S. and Helstrup, T. (eds.) (2007) *Everyday memory*. Hove: Psychology Press.

Maltby, J., Day, L. and Macaskill, A. (2010) *Personality, individual differences and intelligence*. (2nd ed.). Harlow: Pearson Education.

Matlin, M.W. (2009) *Cognitive psychology*. (7th ed.). Hoboken: John Wiley & Sons, Ltd.

Mayer, B., & Merckelbach, H. (1999). Do subliminal priming effects on emotion have clinical potential?. *Anxiety, Stress & Coping: An International Journal*, *12*(2), 217-229. doi:10.1080/10615809908248330

McNamara, T.P. (2004) *Semantic priming: perspectives from memory and word recognition*. New York: Psychology Press. (Essays in Cognitive Psychology).

Merikle, P. M. (1992). Perception without awareness: Critical issues. American Psychologist, 47,792±795.

Merikle, P. M., Joordens, S., & Stolz, J. A. (1995). Measuring the relative magnitude of unconscious influences. Consciousness and Cognition, 4, 422±439.

Milner, B., Corkin, S., and Teuber, H. L. (1968). Further analysis of the hippocampal amnesic syndrome: 14-year follow-up study of H. M. Neuropsychologia, 6(3). pp 215-234

Moeller, S. K., Robinson, M. D., & Bresin, K. (2010). Integrating trait and social-cognitive views of personality: Neuroticism, implicit stress priming, and neuroticism-outcome relationships. *Personality And Social Psychology Bulletin*, *36*(5), 677-689. doi:10.1177/0146167210367487

Niekludow, K. (2000). Pogląd na świat a poczucie sensu i zadowolenia z życia. *Psychologia Wychowawcza*, *43*(2-3), 157-171.

Niekludow, K. (2000). World outlook and feeling of sense and satisfaction with life.*Psychologia Wychowawcza*, *43*(2-3), 157-171.

Olshansky, B. (2007). Placebo and Nocebo in Cardiovascular Health: Implications for Healthcare, Research, and the Doctor-Patient Relationship. *Journal Of The American College Of Cardiology (JACC)*, *49*(4), 415-421. doi:10.1016/j.jacc.2006.09.036

Pascual-Leone, A., Amedi, A., Fregni, F., & Merabet, L.B. (2005, Nov), The plastic human brain cortex. Annual Review of Neuroscience, Vol. 28, p.400

Passer, M.W. and Smith, R.E. (2008) *Psychology : the science of mind and behavior*. (4th ed.). London: McGraw-Hill

Pavot, W., & Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. *Journal of Positive Psychology, 3*, 137–152.

Plutchik, R. (1962). *The emotions: Facts, theories and a new model*. New York, NY US: Crown Publishing Group/Random House.

Radel, R., Sarrazin, P., Legrain, P., & Gobancé, L. (2009). Subliminal priming of motivational orientation in educational settings: Effect on academic performance moderated by mindfulness. *Journal Of Research In Personality*, *43*(4), 695-698. doi:10.1016/j.jrp.2009.02.011

Radlett, Marty., (2011, Jan) Review Ehrenreich, Barbara. (2009). Smile or Die: How positive thinking fooled America and the world, Existential Analysis, Vol22, p.189

Peterson, C., & Seligman, M.E.P. (1984). *Causal Explanation as a risk factor for depression: The Theory and evidence*. Psychological Review, 91, pp. 347-348

Robinson, M.D. Hippel, W.V. (2006), *Journal of Positive Psychology*, 1(4), pp. 187-197

Ridley, K., Olds, T. S., & Hill, A. (2006). The Multimedia activity recall for children and adolescents (MARCA): development and evaluation. *International Journal Of Behavioral Nutrition & Physical Activity*, *3*10-11. doi:10.1186/1479-5868-3-10

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063-1078.

Scheier, M.F., Carver, C.S., Bridges, M.W. (1994). *Distinguishing optimism from neuroticism: A re-evaluation of the Life Orientation Test*, Journal of Personality and Social Psychology, 67(6), pp. 1063-1078

Sela, A., & Shiv, B. (2009). Unraveling priming: When does the same prime activate a goal versus a trait?. *Journal Of Consumer Research*, *36*(3), 418-433. doi:10.1086/598612

Seligman, M., & Csikszentmihalyi, M. (2000). Positive Psychology: An introduction. American Psychologist, 55, PP. 5-14.

Seligman, M., (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York, NY, US: Free Press, 2011. xii, p.349

Skandrani-Marzouki, I., & Marzouki, Y. (2010). Subliminal emotional priming and decision making in a simulated hiring situation. *Swiss Journal Of Psychology/Schweizerische Zeitschrift Für Psychologie/Revue Suisse De Psychologie*, *69*(4), 213-219. doi:10.1024/1421-0185/a000025

Snyder, C.R. and Lopez, S.J. (2005) *Handbook of positive psychology*. Oxford: Oxford University Press.

Sohlberg, S. and Birgegard. A. (2003). Persistent Complex subliminal activation effects: First experimental observations. Journal of Personality and Social Psychology, 85, pp. 302-316.

SONNBY-BORGSTRÖM, M., JÖNSSON, P., & SVENSSON, O. (2008). Gender differences in facial imitation and verbally reported emotional contagion from spontaneous to emotionally regulated processing levels. *Scandinavian Journal Of Psychology*, *49*(2), 111-122. doi:10.1111/j.1467-

Spagnoli, P., Caetano, A., & Silva, A. (2012). Psychometric Properties of a Portuguese Version of the Subjective Happiness Scale. *Social Indicators Research*, *105*(1), 137-143. doi:10.1007/s11205-010-9769-2

Strahan, E. J., Spencer, S. J., & Zanna, M. P. (2002). Subliminal priming and persuasion: Striking while the iron is hot. *Journal Of Experimental Social Psychology*, *38*(6), 556-568. doi:10.1016/S0022-1031(02)00502-4

Soussignan, R. R., Jiang, T. T., Rigaud, D. D., Royet, J. P., & Schaal, B. B. (2010). Subliminal fear priming potentiates negative facial reactions to food pictures in women with anorexia nervosa. *Psychological Medicine*, *40*(3), 503-514. doi:10.1017/S0033291709990377

Tao, R., Zhang, S. Li, Q., and Geng, H. (2012) Modulation of Self-esteem, *PLoS ONE*, 7 (10): e47103.

Thayer, R.E. (1997). *The origin of everyday moods*. Oxford University Press.

Visser, T. W., Merikle, P. M., & Di Lollo, V. (2005). Priming in the attentional blink: Perception without awareness?. *Visual Cognition*, *12*(7), 1362-1372. doi:10.1080/13506280444000733

APPENDICES