Exploring the Correlation Between Theory of Mind and Drive for Thinness

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EXPLORING THE CORRELATION BETWEEN THEORY OF MIND AND DRIVE FOR THINNESS

by

SARAH M. HUDAK

A thesis submitted in partial fulfillment of the requirements for the Honors in the Major Program in Psychology in the College of Sciences and in The Burnett Honors College at the University of Central Florida Orlando, Florida

Spring Term 2014

Thesis Chair: Dr. Stacey Tantleff Dunn
Abstract

Research suggests that, similar to individuals with an Autism Spectrum Disorder, people with Anorexia Nervosa demonstrate an inability to utilize Theory of Mind concepts. Theory of Mind allows healthy control populations to attribute mental states to others by accurately predicting and understanding the behavior of others. This study’s intent was to further explore the relationship between eating disorders and Theory of Mind. Using an online survey management system (Qualtrics), 210 female students from a large metropolitan southeastern university completed the Drive for Thinness subscale of the Eating Disorder Inventory and the Reading the Mind in the Eyes task. It was predicted that higher Drive for Thinness would be associated with a diminished capacity for Theory of Mind concepts. Using a bivariate correlation, the findings were not found to be statistically significant in support of the hypothesis, but provide strong implications for future research.

Keywords: Eating disorders, Drive for Thinness, Theory of Mind, Eating Disorder Inventory (EDI), Reading the Mind in the Eyes task (RME), Anorexia Nervosa
Dedication

This study is dedicated to Project HEAL and to all of the amazing recovery warriors I’ve met over the past few years.

We will end the stigma. We will break the silence.
Acknowledgements

There is a lot of gratitude that I need to dish out in regards to the completion of this program but I especially want to say thank you to my committee for being a part of this journey.

A huge thank you goes to my thesis chair for taking on more than she bargained for and believing in me through it all.

I’d also like to thank T.W. and E.L. for helping me flesh out my idea for this study and for their integral help throughout the process.

Endless thanks to D.C. for listening, helping, and encouraging me when the light at the end of the tunnel seemed too far away.

And finally, thank you so much to my friends and family who continuously supported and encouraged me from the beginning.
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**Introduction**

Anorexia Nervosa is an eating disorder characterized by an obsession with gaining weight, dissatisfaction with one’s body, and behaviors focused on weight loss. The drive to be thinner also has major psychological, biological, and social effects (Bulik, Reba, Siega-Riz, & Reichborn-Kjennerud, 2005). Recent research has shown a link between the traits present in both Anorexia Nervosa and Autism Spectrum Disorder, such as the diminished capacity for Theory of Mind. Theory of Mind refers to the ability to attribute mental states to another person in a social situation (Baron-Cohen, Jaffa, Davies, Aeyeung, Allison & Wheelwright, 2013). There also appears to be an overlap between these two disorders in other areas, which is evident in traits such as an intense focus on interests that cause rigid behaviors, a preoccupation with the self, deficits in emotional intelligence, an inability to reflect on their own emotions or the emotions of others, and abnormal functioning in the areas of the brain responsible for social behaviors (Baron-Cohen et al., 2013).

When examined together, the similarities in deficits of Theory of Mind between Anorexia Nervosa and Autism Spectrum Disorder may open up new avenues for both research and treatment for individuals suffering from Anorexia Nervosa by using approaches that have proven successful in treating mental disorders that effect social cognition.
Literature Review

Much of the current literature about eating disorders explores the social dimensions that it affects, with Theory of Mind being one of the prevalent topics. Many studies examine the impairments based on the concept of malnutrition attributing to the deficits, but the following studies provide support for a third variable affecting the onset of the social deficits.

Tchanturia, Happé, Godley, Treasure, Bara-Carril and Schmidt (2004), found that people with Anorexia Nervosa had impaired performances on tasks related to the comprehension of a story and a cartoon that required Theory of Mind. The preliminary findings of the aforementioned study are supported by the findings of Baron-Cohen et al. (2013) that verified the presence of autistic traits in a sample of those with Anorexia Nervosa by using the Autism Spectrum Quotient, the Empathy Quotient, and the Systemizing Quotient.

The altered mentality of an eating disorder patient can also be verified when examining the results of the “Alien-Hand” experiment. In 2005, Sorenson used this classic experiment to compare people with Bulimia Nervosa and control participants by testing their sense of agency, body schema, and body image. In the experiment, participants were asked to place their hand inside of a box and to draw a straight line on a piece of paper; during some of the trials, simultaneously and unbeknownst to the participants, the experimenter would also place their hand in the box and draw the line at an incorrect angle. Because of the design of the box, participants believed that they were observing their own hand incorrectly drawing the line. The control participants assumed that external factors such as the material or the pencil were causing their drawing issues whereas participants with Bulimia Nervosa remarked that they felt disassociated from their own hand as if they were not in control of its actions. This difference in
perception is related to the role that Theory of Mind abilities have in the progression of Bulimia Nervosa (Sorenson, 2005). Based on the results of the aforementioned study, and based on the comorbidity of cognitive changes in people with eating disorders, it is likely that the different abilities in perception observed in Bulimia Nervosa can also be observed in Anorexia Nervosa which shares many of the same characteristics.

While it is evident that typical cognitive processes are altered, it has also been shown that social cognition becomes impaired, which is shown through the diminished capacity for Theory of Mind. Theory of Mind is vital in successful social interactions. Social phobia has been found to be the most common comorbid disorder with eating disorders, which may be due to an inability to properly utilize Theory of Mind. In a study conducted by Harrison, Tchanturia and Treasure (2010), participants struggled with emotional attribution and had attentional biases when they were shown angry facial stimuli. These weaknesses were more prevalent when the participants were in the beginning phases of their eating disorder and when they were in the beginning phases of the recovery process rather than during more acute phases of the disorder.

The affective dimensions of cognition are also shown to be impaired in people with eating disorders. Strong emotional intelligence is a characteristic of those with fully developed Theory of Mind capabilities and has been equated with more successful recovery from mental disorders, therefore those with less emotional intelligence have a poor recovery outcome (Oldershaw, Hambbrook, Tchanturia, Treasure & Schmidt, 2010). These findings are supported by Schulte-Rüther, Mainz, Fink, Herpertz-Dahlmann and Konrad, (2008) who found that patients who showed signs of impaired Theory of Mind were less likely to have recovered from their eating disorder after a year. In this study, the presence of more severe deficits was a predictor of
poor recovery outcome. Similarly, lower levels of emotional intelligence that are found in other disorders such as Autism Spectrum Disorder, schizophrenia, depression, and brain injury also lead to impairments in emotion recognition and biases about emotional facial stimuli (Harrison, Tchanturia & Treasure, 2005). Directionality of cause and effect cannot yet be determined.

A possible explanation for the apparent deficits in Theory of Mind tasks, demonstrated by a low Emotional Intelligence score, is that patients with Anorexia Nervosa tend to show fear and avoidance of intense emotions, and that keeping a low body mass index helps curb these emotions (Russell et al., 2009). According to a recent study conducted by Hambrook, Brown and Tchanturia (2012) using the Mayer-Salovey-Caruso Emotional Intelligence Test, high anxiety levels, which are generally associated with Drive for Thinness as it relates to Anorexia Nervosa, are a likely cause for the aforementioned deficits seen in people with this diagnosis because of the neurotic level of their perfectionism. This anxiety also changes their thought processes concerning their physical appearance.

Unterhalter, Farrell and Moore (2007) demonstrated the differences in weight-related thoughts between controlled samples and samples with eating disorders. The authors found that women were more likely to recall words related to body weight, which offers support for a cognitive marker indicative of women more prone to restrained eating and body dissatisfaction. This recall bias illustrates that women are more likely to remember information that is congruent with their existing body image and with their existing aspirations for the body that they would like to have. In a recent study by Adenzato, Todisco and Ardito (2012), a similar form of this word bias was found. Women had better memory for both positive and negative weight related words while men only had a better memory for positive muscle words. The men’s performance
seems to reflect a cognitive protection from negative self-processing, making the absence of this processing style in women indicative of vulnerability to negative self-evaluations, self-other comparisons, body dissatisfaction, and disordered eating behavior that leaves them unable to accurately attribute mental states to others. Kalbe et al. theorized that this bias towards certain words is related to differences in processing social dimensions and affective dimensions (2010). Based on the results from these two studies, it was concluded that women with a greater Drive for Thinness looked more often and longer at images of the waist, hips, legs, and arms (Hewig, Cooper, Trippe, Hecht, Straube & Miltner, 2008).

Much of the current literature concerning eating disorders verifies the prevalence of Drive for Thinness as a precursor of Anorexia Nervosa and as a recurring trait in the disorder. Grigg, Bowman and Redman (1996) found that over half of females surveyed had used at least one unhealthy weight reduction method in the past month. This presence of Drive for Thinness, even in nonclinical populations, is directly applicable to the justification for observing this trait in the present study.
The Present Study

The aim of this study was to examine the correlation between females’ Drive for Thinness and their Theory of Mind abilities. Given the prevalence of Drive for Thinness in eating disorders (Ramacciotti et al., 2002) as well as the cultural emphasis on thinness in nonclinical populations, Drive for Thinness and Theory of Mind abilities were examined in a nonclinical sample of college-aged female with the hope of leading toward greater insight into the role that addressing disordered thinking may play in prevention and recovery techniques for those who suffer from eating disorders.

Based on a review of the existing literature on Drive for Thinness in eating disorders and findings related to Theory of Mind in eating disorders, it was hypothesized that Drive for Thinness would be negatively correlated with scores on a measure of Theory of Mind. Greater Drive for Thinness is associated with an increase in behaviors and desires centered on becoming thin, and lower Theory of Mind performance is associated with less ability to infer others’ mental states.
Methods

Participants

The results of this study were obtained from 210 female participants from a large Southeastern university in the United States. The average age was 22.97 years (SD=6.29) and race varied (White/Caucasian: 69.5%, Black/African American: 6.7%, Hispanic/Latino: 17.1%, Other: 6.7%). Participants were compensated with extra credit in their psychology courses.

Materials

*Eating Disorder Inventory, Drive for Thinness Subscale* (Garner, Olmstead & Polivy, 1983): This 7-item scale measures disordered thoughts related to the desire to be thin. The questionnaire required the participants to rank statements about disordered eating behaviors and thoughts on a scale of 1 to 6, with 1 corresponding to a response of “Always” and 6 corresponding to a response of “Never”. The first question is reverse coded (See Appendix B). Garner et al. found that the test-retest reliability for this scale was 0.85 in nonclinical adult female samples. Internal consistency (Cronbach’s alpha) for the present study was 0.92.

*Reading the Mind in the Eyes Task* (Baron-Cohen, Wheelwright, Hill, Raste & Plumb, 2001): This 36-item task measures an adult’s Theory of Mind ability by asking participants to label images of pairs of eyes. Participants were shown an image of a pair of eyes that were expressing a certain affective state and were given a choice of four words that could be used to describe the emotion that the eyes seem to be conveying. Only one answer choice was correct. (See Appendix C). Test-retest reliability for this measure was 0.61 in adult samples (Vellante, Baron-Cohen, Melis, Marrone, Petretto, Masala, & Preti, 2013). Internal consistency (Cronbach’s alpha) for the present study was 0.65
Procedure

Participants were recruited through the university’s research participant pool system (Sona). Participants were asked to participate in an online survey via Qualtrics, an online secure survey website. First, participants completed the Reading the Mind in the Eyes task, which required the participants to choose from a selection of four words to label an image of a pair of eyes. Next, participants were asked to complete the Drive for Thinness Subscale of the Eating Disorder Inventory. Finally, participants were asked to complete a general demographics questionnaire.

Analysis

The data were analyzed from 210 participants using a bivariate correlation.
Results

The 210 participants were representative of the student population at their university for race (White/Caucasian: 69.5%, Black/African American: 6.7%, Hispanic/Latino: 17.1%, Other: 6.7%) and class rank (Freshmen: 13.3%, Sophomore: 10.5%, Junior: 38.1%, Senior: 28.6%, Graduate: 7.6%, Other: 1.9%) with an average age of 22.97 years (SD=6.29).

For the Reading the Mind in the Eyes task, each participant had the potential to score between 0 and 36 points, with a higher score equating to a greater capacity for Theory of Mind (M=26.61, SD=4.17). For the Drive for Thinness Subscale, the participants had the potential to score between 7 and 42, with a lower score equating to an increase in the desire to be thin (M=26.52, SD=9.07).

A two-tailed test for significance was used to examine the bivariate correlation between the Reading the Mind in the Eyes scores and the Drive for Thinness scores. The results were not statistically significant \((p = 0.498, r(215)= 0.047)\). The scatterplot is shown in Appendix A.
Discussion

The findings were not statistically significant in support of the hypothesis. There was no meaningful relationship between Drive for Thinness and Theory of Mind capacities as measured by the Reading the Mind in the Eyes Task.

Limitations

The non-significant results could have been due to a number of limitations in this study. First, since participants completed the measures online and for extra credit, it is possible that the data analyzed included random responses. Validity check items (e.g., “Answer ‘2’ for this item”) and time requirements (i.e., monitoring for participants who complete measures too quickly to provide legitimate responses) could have made the participant data more reliable.

Second, previous and/or current mental health issues (including presence of an eating disorder) of the participants were not assessed and may have had an effect on the results. Prior diagnosis of an eating disorder or another mental health disorder potentially could have affected the observed Theory of Mind abilities, particularly since extremely low body weight, as seen in anorexia, contributes to decreased cognitive functioning.

A third limitation of the present study relates to psychometrics of the instruments used to measure the two main variables. The Drive for Thinness Subscale of the Eating Disorder Inventory may have limited validity with nonclinical populations. Also of concern, there are limitations in the psychometrics used to assess Theory of Mind. The Reading the Mind in the Eyes task does not accurately represent real world social situations because the images are static and in black and white. Also, participants were not given time restrictions and were not supervised in a laboratory setting making it hard to mimic the instantaneous processing required.
in a social situation. Another potential problem with the task is that the eyes were of both males and females, but they were not equally balanced for the type of emotion expressed. Sex of the eye model could have impacted the responses of the female participants. These limitations need to be taken into consideration for future studies.

**Implications**

This study drew participants from a population of college females because the literature has suggested that going to college is a particularly vulnerable time for the development of disordered eating, and eating disorders are more prevalent among females. Striegel-Moore, Silberstein, Frensch, and Rodin, (1989) found that college students were likely to begin dieting practices by the end of their freshman when compared to their pre-college behaviors. Allison and Park (2004) also found that college women, particularly those in sororities, were showed an increase in disordered eating behaviors from their first year to their final year. Thus, there is sufficient evidence to suggest that Drive for Thinness, apart from the onset of an eating disorder, is frequent among college females. What is unclear, however, is whether subclinical levels of drive for thinness are associated with cognitive traits and performance in patients with diagnosed eating disorders. The lack of findings in this study may reflect important differences related to the clinical threshold. It is feasible that poor performance on Theory of Mind tasks among eating disordered individuals is due to severe weight loss, electrolyte imbalance, or other factors generally uncharacteristic of a nonclinical college sample. It also is unclear whether deficits in Theory of Mind are the cause. The present study focused on how Drive for Thinness relates to Theory of Mind abilities because of the studies conducted by Ramacciotti et al., (2002) and by Keski-Rahkonen, Bulik, Neale, Rose, Rissanen and Kaprio, (2005) that suggested the impact of
westernized society on females’ desire to be thin and how this can manifest into an eating disorder.

The findings did not support the hypothesis, providing no additional insight into the role that Theory of Mind may play in Anorexia Nervosa and how it may be related to Drive for Thinness. However, this study was an important first step toward understanding the relationship between Drive for Thinness and social cognition deficits seen in individuals with a variety of mental health disorders such as Autism Spectrum Disorder, Bipolar Disorder, or Schizophrenia and in individuals with Anorexia Nervosa. Identifying meaningful similarities in social cognitive deficits could lead to promising applications of prevention and treatment techniques for eating disorders.
Appendix A: Scatterplot Illustrating the Correlation between scores for Reading the Mind in the Eyes and the Drive for Thinness
Appendix B: Eating Disorder Inventory, Drive for Thinness Subscale
Eating Disorder Inventory – 3 Drive for Thinness Scale

For each item, decide if the item is true about you ALWAYS, USUALLY, OFTEN, SOMETIMES, RARELY, or NEVER.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Always</td>
<td>Usually</td>
<td>Often</td>
<td>Sometimes</td>
<td>Rarely</td>
<td>Never</td>
</tr>
</tbody>
</table>

1. I eat sweets and carbohydrates without feeling nervous. 1 2 3 4 5 6
2. I think about dieting. 1 2 3 4 5 6
3. I feel extremely guilty after overeating. 1 2 3 4 5 6
4. I am terrified of gaining weight. 1 2 3 4 5 6
5. I exaggerate or magnify the importance of weight. 1 2 3 4 5 6
6. I am preoccupied with the desire to be thinner. 1 2 3 4 5 6
7. If I gain a pound, I worry that I will keep gaining. 1 2 3 4 5 6
Appendix C: Reading the Mind in the Eyes Task
For all users of the revised version of the Adult “Reading the Mind in the Eyes” Test.

Enclosed you will find

- the adult version of the above test
- the word definition handout,
- the correct answers.
- A copy of the paper describing the test in full

As you know, publication details of the original version appeared in the *Journal of Child Psychology and Psychiatry*, 38, 813-822 (1997). The revised version which we have sent you was published in the *Journal of Child Psychiatry and Psychiatry*, 42, 241-252 (2001).

A child version of this test has also been developed and is available upon request. It was published in the *Journal of Developmental and Learning Disorders*, 5, 47-78 (2001).

We would, of course, appreciate hearing of any results you obtain with this test.

Thank you.

Best wishes

Simon Baron-Cohen

**Adult Eyes Instructions**

For each set of eyes, choose and circle which word best describes what the person in the picture is thinking or feeling. You may feel that more than one word is applicable but please choose just one word, the word which you consider to be most suitable. Before making your choice, make sure that you have read all 4 words. You should try to do the task as quickly as possible but you will not be timed. If you really don’t know what a word means you can look it up in the definition handout.
WORD DEFINITIONS

ACCUSING  blaming
The policeman was accusing the man of stealing a wallet.

AFFECTIONATE  showing fondness towards someone
Most mothers are affectionate to their babies by giving them lots of kisses and cuddles.

AGHAST  terrified, astonished, alarmed
Jane was agghast when she discovered her house had been burgled.

ALARMED  fearful, worried, filled with anxiety
Claire was alarmed when she thought she was being followed home.

AMUSED  finding something funny
I was amused by a funny joke someone told me.

ANNOYED  irritated, displeased
Jack was annoyed when he found out he had missed the last bus home.

ANTICIPATING  expecting
At the start of the football match, the fans were anticipating a quick goal.

ANXIOUS  worried, tense, uneasy
The student was feeling anxious before taking her final exams.

APOLOGETIC  feeling sorry
The waiter was very apologetic when he spilt soup all over the customer.

ARROGANT  conceited, self-important, having a big opinion of oneself
The arrogant man thought he knew more about politics than everyone else in the room.

ASHAMED  overcome with shame or guilt
The boy felt ashamed when his mother discovered him stealing money from her purse.
<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSERTIVE</td>
<td>confident, dominant, sure of oneself</td>
<td>The assertive woman demanded that the shop give her a refund.</td>
</tr>
<tr>
<td>BAFFLED</td>
<td>confused, puzzled, dumbfounded</td>
<td>The detectives were completely baffled by the murder case.</td>
</tr>
<tr>
<td>BEWILDERED</td>
<td>utterly confused, puzzled, dazed</td>
<td>The child was bewildered when visiting the big city for the first time.</td>
</tr>
<tr>
<td>CAUTIOUS</td>
<td>careful, wary</td>
<td>Sarah was always a bit cautious when talking to someone she did not know.</td>
</tr>
<tr>
<td>COMFORTING</td>
<td>consoling, compassionate</td>
<td>The nurse was comforting the wounded soldier.</td>
</tr>
<tr>
<td>CONCERNED</td>
<td>worried, troubled</td>
<td>The doctor was concerned when his patient took a turn for the worse.</td>
</tr>
<tr>
<td>CONFIDENT</td>
<td>self-assured, believing in oneself</td>
<td>The tennis player was feeling very confident about winning his match.</td>
</tr>
<tr>
<td>CONFUSED</td>
<td>puzzled, perplexed</td>
<td>Lizzie was so confused by the directions given to her, she got lost.</td>
</tr>
<tr>
<td>CONTEMPLATIVE</td>
<td>reflective, thoughtful, considering</td>
<td>John was in a contemplative mood on the eve of his 60th birthday.</td>
</tr>
<tr>
<td>CONTENTED</td>
<td>satisfied</td>
<td>After a nice walk and a good meal, David felt very contented.</td>
</tr>
<tr>
<td>CONVINCED</td>
<td>certain, absolutely positive</td>
<td>Richard was convinced he had come to the right decision.</td>
</tr>
<tr>
<td>CURIOUS</td>
<td>inquisitive, inquiring, prying</td>
<td>Louise was curious about the strange shaped parcel.</td>
</tr>
<tr>
<td>DECIDING</td>
<td>making your mind up</td>
<td>The man was deciding whom to vote for in the election.</td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
<td></td>
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<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>DECISIVE</td>
<td>already made your mind up</td>
<td></td>
</tr>
<tr>
<td>DEFINITIVE</td>
<td>Jani looked very definitive as she walked into the polling station.</td>
<td></td>
</tr>
<tr>
<td>DEFIANT</td>
<td>insolent, bold, don't care what anyone else thinks</td>
<td></td>
</tr>
<tr>
<td>DEPRESSED</td>
<td>The animal protester remained defiant even after being sent to prison.</td>
<td></td>
</tr>
<tr>
<td>DEPRESSED</td>
<td>miserable</td>
<td></td>
</tr>
<tr>
<td>DEPRESSED</td>
<td>George was depressed when he didn't receive any birthday cards.</td>
<td></td>
</tr>
<tr>
<td>DESIRE</td>
<td>passion, lust, longing for</td>
<td></td>
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<tr>
<td>DESIRE</td>
<td>Kate had a strong desire for chocolate.</td>
<td></td>
</tr>
<tr>
<td>DESPONDENT</td>
<td>gloomy, despairing, without hope</td>
<td></td>
</tr>
<tr>
<td>DESPONDENT</td>
<td>Gary was despondent when he did not get the job he wanted.</td>
<td></td>
</tr>
<tr>
<td>DISAPPOINTED</td>
<td>displeased, disgruntled</td>
<td></td>
</tr>
<tr>
<td>DISAPPOINTED</td>
<td>Manchester United fans were disappointed not to win the Championship.</td>
<td></td>
</tr>
<tr>
<td>DISSPIRITED</td>
<td>glum, miserable, low</td>
<td></td>
</tr>
<tr>
<td>DISSPIRITED</td>
<td>Adam was dispirited when he failed his exams.</td>
<td></td>
</tr>
<tr>
<td>DISTRUSTFUL</td>
<td>suspicious, doubtful, wary</td>
<td></td>
</tr>
<tr>
<td>DISTRUSTFUL</td>
<td>The old woman was distrustful of the stranger at her door.</td>
<td></td>
</tr>
<tr>
<td>DOMINANT</td>
<td>commanding, bossy</td>
<td></td>
</tr>
<tr>
<td>DOMINANT</td>
<td>The sergeant major looked dominant as he inspected the new recruits.</td>
<td></td>
</tr>
<tr>
<td>DOUBTFUL</td>
<td>dubious, suspicious, not really believing</td>
<td></td>
</tr>
<tr>
<td>DOUBTFUL</td>
<td>Mary was doubtful that her son was telling the truth.</td>
<td></td>
</tr>
<tr>
<td>DUBIOUS</td>
<td>doubtful, suspicious</td>
<td></td>
</tr>
<tr>
<td>DUBIOUS</td>
<td>Maxine was dubious when offered a surprising cheap television in a pub.</td>
<td></td>
</tr>
<tr>
<td>EAGER</td>
<td>keen</td>
<td></td>
</tr>
<tr>
<td>EAGER</td>
<td>On Christmas morning, the children were eager to open their presents.</td>
<td></td>
</tr>
<tr>
<td>EARNEST</td>
<td>having a serious intention</td>
<td></td>
</tr>
<tr>
<td>EARNEST</td>
<td>Harry was very earnest about his religious beliefs.</td>
<td></td>
</tr>
</tbody>
</table>
EMBARRASSED  ashamed
          After forgetting a colleague's name, Jenny felt very embarrassed.

ENCOURAGING  hopeful, heartening, supporting
          All the parents were encouraging their children in the school sports day.

ENTERTAINED  absorbed and amused or pleased by something
          I was very entertained by the magician.

ENTHUSIASTIC  very eager, keen
          Susan felt very enthusiastic about her new fitness plan.

FANTASIZING  daydreaming
          Emma was fantasizing about being a film star.

FASCINATED  captivated, really interested
          At the seaside, the children were fascinated by the creatures in the rock pools.

FEARFUL  terrified, worried
          In the dark streets, the women felt fearful.

FLIRTATIOUS  brazen, saucy, teasing, playful
          Connie was accused of being flirtatious when she winked at a stranger at a party.

FLUSTERED  confused, nervous and upset
          Sarah felt a bit flustered when she realised how late she was for the meeting and that she had forgotten an important document.

FRIENDLY  sociable, amiable
          The friendly girl showed the tourists the way to the town centre.

GRATEFUL  thankful
          Kelly was very grateful for the kindness shown by the stranger.

GUILTY  feeling sorry for doing something wrong
          Charlie felt guilty about having an affair.

HATEFUL  showing intense dislike
          The two sisters were hateful to each other and always fighting.
HOPEFUL  optimistic
Larry was hopeful that the post would bring good news.

HORRIFIED  terrified, appalled
The man was horrified to discover that his new wife was already married.

HOSTILE  unduly hostile
The two neighbours were hostile towards each other because of an argument about loud music.

IMPATIENT  restless, wanting something to happen soon
Jane grew increasingly impatient as she waited for her friend who was already 20 minutes late.

IMPLORING  begging, pleading
Nicola looked imploringly at her dad to let her have his car.

INCREDULOUS  not believing
Simon was incredulous when he heard that he had won the lottery.

INDECISIVE  unsure, hesitant, unable to make your mind up
Tammy was so indecisive that she couldn’t even decide what to have for lunch.

INDIFFERENT  disinterested, unresponsive, don’t care
Gary was completely indifferent as to whether they went to the cinema or the pub.

INSISTING  demanding, persisting, maintaining
After a week of seeing, Frank was insisting he paid the bill for everyone.

INSULTING  rude, offensive
The football crowd was insulting the referee after he gave a penalty.

INTERESTED  inquiring, curious
After visiting Jurassic Park, Hugh grew very interested in dinosaurs.

INTRIGUED  very curious, very interested
A mystery phone call intrigued Zoe.

IRRITATED  evaporated, annoyed
Franco was irritated by all the junk mail he received.

JEALOUS  envious
Tony was jealous of all the taller, better-looking boys in his class.

JOKING  being funny, playful
Gary was always joking with his friends.

NERVOUS  apprehensive, tense, worried
Just before her job interview, Alice felt very nervous.

OFFENDED  insulted, wounded, having hurt feelings
When someone made a joke about her weight, Martha felt very offended.

PANICKED  distressed, feeling of terror or anxiety
On waking to find the house on fire, the whole family was panicked.

PENSIVE  thinking about something slightly worrying
Sonia looked pensively on the way to meeting her boyfriend’s parents for the first time.

PERPLEXED  bewildered, puzzled, confused
Frank was perplexed by the disappearance of his garden gnome.

PLAYFUL  full of high spirits and fun
Nell was feeling playful at his birthday party.

PREOCCUPIED  absorbed, engrossed in one’s own thoughts
Worrying about her mother’s illness made Debbie preoccupied at work.

PUZZLED  perplexed, bewildered, confused
After doing the crossword for an hour, June was still puzzled by one clue.

REASSURING  supporting, encouraging, giving someone confidence
Andy tried to look reassuring as he told his wife that her new dress did suit her.
<table>
<thead>
<tr>
<th>Affective State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFLECTIVE</td>
<td>contemplative, thoughtful</td>
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<tr>
<td>REGRETFUL</td>
<td>sorry</td>
</tr>
<tr>
<td>RELAXED</td>
<td>taking it easy, calm, carefree</td>
</tr>
<tr>
<td>RELIEVED</td>
<td>freed from worry or anxiety</td>
</tr>
<tr>
<td>RESENTFUL</td>
<td>bitter, hostile</td>
</tr>
<tr>
<td>SARCASTIC</td>
<td>cynical, mocking, scornful</td>
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<tr>
<td>SATISFIED</td>
<td>content, fulfilled</td>
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<tr>
<td>SCEPTICAL</td>
<td>doubtful, suspicious, mistrusting</td>
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<tr>
<td>SERIOUS</td>
<td>solemn, grave</td>
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<tr>
<td>STERN</td>
<td>severe, strict, firm</td>
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<tr>
<td>SUSPICIOUS</td>
<td>disbeliefing, suspecting, doubting</td>
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<tr>
<td>SYMPATHETIC</td>
<td>kind, compassionate</td>
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<tr>
<td>TENTATIVE</td>
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<tr>
<td>TERRIFIED</td>
<td>alarmed, fearful</td>
</tr>
<tr>
<td>THOUGHTFUL</td>
<td>thinking about something</td>
</tr>
<tr>
<td>THREATENING</td>
<td>menacing, intimidating</td>
</tr>
<tr>
<td>UNEASY</td>
<td>unsettled, apprehensive, troubled</td>
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<tr>
<td>UPSET</td>
<td>agitated, worried, uneasy</td>
</tr>
<tr>
<td>WORRIED</td>
<td>anxious, fretful, troubled</td>
</tr>
</tbody>
</table>

George was in a reflective mood as he thought about what he had done with his life.
Leo was always regretful that he had never travelled when he was younger.
On holiday, Pam felt happy and relaxed.
At the restaurant, Ray was relieved to find that he had not forgotten his wallet.
The businessman felt very resentful towards his younger colleague who had been promoted above him.
The comedian made a sarcastic comment when someone came into the theatre late.
Steve felt very satisfied after he had got his new flat just how he wanted it.
Patrick looked sceptical as someone read out his horoscope to him.
The bank manager looked serious as he refused Nigel an overdraft.
The teacher looked very stern as he told the class off.
After Sam had lost his wallet for the second time at work, he grew suspicious of one of his colleagues.
The nurse looked sympathetic as she told the patient the bad news.
Andrew felt a bit tentative as he went into the room full of strangers.
The boy was terrified when he thought he saw a ghost.
Phil looked thoughtful as he sat waiting for the girlfriend he was about to finish with.
The large, drunken man was acting in a very threatening way.
Karen felt slightly uneasy about accepting a lift from the man she had only met that day.
The man was very upset when his mother died.
When her cat went missing, the girl was very worried.
<table>
<thead>
<tr>
<th>Answers - Adults</th>
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<tbody>
<tr>
<td>1</td>
<td>playful</td>
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<td>2</td>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>joking</td>
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<td>caution</td>
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<td>serious</td>
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<td>33</td>
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<td>34</td>
<td>aghast</td>
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<td>35</td>
<td>panicked</td>
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<tr>
<td>36</td>
<td>ashamed</td>
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terrified

amused

indifferent

embarrassed

regretful

flirtatious

sceptical

dispirited

decisive

anticipating

irritated

disappointed

threatening

shy

depressed

accusing
contemplative  flustered  irritated  thoughtful

encouraging  amused  encouraging  sympathetic

doubtful  affectionate

playful  aghast  aghast  bored
contented  apologetic  pensive  irritated

defiant  curious  excited  hostile

panicked  incredulous  alarmed  shy

despondent  interested  hostile  anxious
ashamed    confident    serious    ashamed

joking    dispirited    bewildered    alarmed

embarrassed    guilty    aghast    baffled

fantasizing    concerned    distrustful    terrified
puzzled   nervous

ashamed    nervous

insisting  contemplative

suspicious  indecisive
Appendix D: Demographics Questionnaire
Demographics Questionnaire

1. What is your sex?
   a. Male
   b. Female

2. Which of the following best describes your ethnicity/race?
   a. American Indian/Alaskan Native
   b. Asian
   c. Black/African American
   d. Hispanic/Latino
   e. Native Hawaiian/Other Pacific Islander
   f. White/Caucasian
   g. Multiracial
   h. Other (please specify) ______

3. What is your class standing?
   a. Freshmen
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate
   f. Other (please specify) ______

4. What is your age? ______
References

e44414. doi:10.1371/journal.pone.0044414


