

Winter 2015

Excessive Tanning as a Presentation of Body Dysmorphic Disorder

Jennifer Headrick

Follow this and additional works at: <https://digitalcommons.georgiasouthern.edu/etd>



Part of the [Clinical Psychology Commons](#)

Recommended Citation

Headrick, Jennifer, "Excessive Tanning as a Presentation of Body Dysmorphic Disorder" (2015). *Electronic Theses and Dissertations*. 1334.

<https://digitalcommons.georgiasouthern.edu/etd/1334>

This dissertation (open access) is brought to you for free and open access by the Graduate Studies, Jack N. Averitt College of at Digital Commons@Georgia Southern. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of Digital Commons@Georgia Southern. For more information, please contact digitalcommons@georgiasouthern.edu.

EXCESSIVE TANNING AS A PRESENTATION OF
BODY DYSMORPHIC DISORDER

by

JENNIFER HEADRICK

(Under the Direction of Thresa Yancey)

ABSTRACT

Body dysmorphic disorder (BDD) involves a potentially debilitating preoccupation with an imagined or minor flaw in one's appearance (American Psychiatric Association, 2013; Phillips, 2005). Common body areas of preoccupation include the skin, face, hair, and muscles (Castle, Ross, & Kyrios, 2006; Mosley, 2009; Phillips, 2005; Veale, 2003). With the publication of the Diagnostic and Statistical Manual of Mental Disorders—5th edition (APA, 2013), BDD was moved from the Somatoform Disorder classification to the new diagnostic category of Obsessive-Compulsive and related disorders. A new example of preoccupation with skin tone and an associated behavior of excessive tanning were added to the BDD diagnostic criteria. The purpose of the current study is two-fold: (a) to add to the body of psychological literature regarding body dysmorphic disorder (BDD); and (b) to examine tanning behavior as a presentation of body dysmorphic disorder. It was hypothesized that participants who reported greater concern about skin tone and more tanning behaviors would score significantly higher on measures that have been empirically shown to correlate with BDD (namely anxiety, depression, body image concern, and addiction) than participants who reported less skin tone concern and fewer tanning behaviors. Tanning Behavior Frequency was significantly and positively related to Body Image Concerns, CAGE-T, and Physical Appearance Reasons for Tanning. Gender was significantly and positively related to Body Image Concerns and CAGE-T such that identifying

as female was related to higher levels of both constructs, yet identifying as female significantly predicted lower Depression. However, there was a significant interaction between Gender and Tanning Behavior Frequency, with the interaction of the two predicting significantly higher Body Image Concerns, CAGE-T, and Physical Appearance Reasons for Tanning, but lower Depression, for women. Analyses did not reveal a relationship between rurality and any of the other variables examined. Though this study examined only one potential presentation of BDD (i.e., problematic tanning behaviors), it also partly serves to increase the understanding of the disorder. It is possible that future research can be done to examine whether or not relationships found between variables in this current study could also be found in other presentations of body dysmorphic disorder.

INDEX WORDS: Body dysmorphic disorder, tanning, Thesis guidelines, College of Graduate Studies, Jennifer Headrick, Doctor of Psychology, Georgia Southern University

EXCESSIVE TANNING AS A POSSIBLE PRESENTATION OF
BODY DYSMORPHIC DISORDER

by

Jennifer Headrick

B.A., B.A., Georgia Regents University, 1998

M.S., Georgia Regents University, 2002

M.S., Georgia Southern University, 2012

A Dissertation Submitted to the Graduate Faculty of Georgia Southern University in

Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PSYCHOLOGY

STATESBORO, GEORGIA

© 2015

JENNIFER HEADRICK

All Rights Reserved

EXCESSIVE TANNING AS A POSSIBLE PRESENTATION OF
BODY DSYMORPHIC DISORDER

by

JENNIFER L. HEADRICK

Major Professor: Thresa Yancey
Committee: Lawrence Locker
Karen Naufel

Electronic Version Approved:
December 2015

DEDICATION

The road to my doctorate has been a long and winding one, to paraphrase The Beatles. So many people have supported me along the way, and I am not the only one who is earning this degree. My mother, Diane Warren, has been one of my most steadfast cheerleaders in this process, always encouraging me to “just take one bite of that elephant every day” (I’m tired of eating elephant, by the way). My father, Pete Warren, Sr., who passed away as I was preparing to apply to this program and whose spirit has walked every step with me telling me, “Give ‘em hell, sweetie!” whenever I doubted myself. My brother, Pete Warren, Jr., has also somehow found the energy to support me despite moving through his own doctoral program—at another university that Shall Not be Named. My brother from another mother, Tyler Rosier, who told me that if he could not quit his doctoral program, than neither could I! My wonderful husband, James Headrick, my Hamish who married me in the midst of this. You have celebrated my triumphs, and both enabled me and challenged me when I needed it. And my daughter, Hannah Wright—she was only five-years-old when I began this endeavor and she is now 13-years-old—who has shown love and maturity beyond her young years in urging me on to become “Dr. Mommy”. To all of them, I dedicate this written work.

TABLE OF CONTENTS

	Page
DEDICATION.....	6
LIST OF TABLES.....	8
LIST OF FIGURES.....	9
CHAPTER	
1 INTRODUCTION OF THE PROBLEM.....	10
Body Dysmorphic Disorder.....	10
Tanning.....	10
2 A REVIEW OF THE LITERATURE.....	12
Body Dysmorphic Disorder.....	12
BDD: Perceptions of Self and Others.....	13
BDD: Comorbidity.....	15
Tanning Behaviors.....	17
Tanning and Dependence.....	21
Tanning and BDD.....	24
Hypotheses.....	24
3 RESEARCH METHODOLOGY	
Participants and Procedures.....	26
Materials.....	27
4 RESULTS.....	30
Descriptive Statistics and Correlations.....	31
Hypotheses.....	32
5 DISCUSSION.....	40
Implications.....	42
Limitations.....	42
REFERENCES.....	44

LIST OF TABLES

	Page
TABLE 1: Means and Standard Deviations for Dependent Variables.....	31
TABLE 2: Pearson Correlations for Dependent Variables.....	31

LIST OF FIGURES

FIGURE 1: Complete Simultaneous Regression Results.....	34
FIGURE 2: Interaction Plot for Tanning Frequency and Gender on BAI.....	35
FIGURE 3: Interaction Plot for Tanning Frequency and Gender on BICI.....	36
FIGURE 4: Interaction Plot for Tanning Frequency and Gender on CAGE-T.....	37
FIGURE 5: Interaction Plot for Tanning Frequency and Gender on CES-D.....	38
FIGURE 6: Interaction Plot for Tanning Frequency and Gender on PARTS.....	39

CHAPTER 1

INTRODUCTION OF THE PROBLEM

Body dysmorphic disorder (BDD) involves a potentially debilitating preoccupation with an imagined or minor flaw in one's appearance (American Psychiatric Association, 2013; Phillips, 2005). Though prevalence rates vary, it is estimated that 1 to 2% of the general population suffers from some degree of body dysmorphic disorder (Phillips, Didie, Feusner, & Wilhelm, 2008). Common body areas of preoccupation include the skin, face, hair, and muscles (Castle, Ross, & Kyrios, 2006; Mosley, 2009; Phillips, 2005; Veale, 2003). Women tend to be diagnosed with BDD more often and have an earlier onset of symptoms than men (Sobanski & Schmidt, 2000). However, in clinical samples, gender differences seem to disappear and prevalence rates increase to a range of 7% to 13% (Bartsch, 2007; Phillips, 2005). No studies to date have been done in examining geographical influences regarding BDD prevalence.

With the publication of the Diagnostic and Statistical Manual of Mental Disorders—5th edition (APA, 2013), BDD was moved from the Somatoform Disorder classification to the new diagnostic category of Obsessive-Compulsive and related disorders. This new diagnostic class also includes excoriation (skin-picking) disorder, hoarding disorder, trichotillomania, substance/medication-induced obsessive-compulsive and related disorder, and obsessive-compulsive related disorder due to another medical condition. Along with the creation of this new grouping and the moving of BDD, a new example of preoccupation with skin tone and an associated behavior of excessive tanning were added to the BDD diagnostic criteria.

According to the Centers for Disease Control (CDC), approximately 61,000 people (almost 0.05% of the population) were diagnosed with melanoma in 2010. Deaths reported due to melanoma were close to 9,100 (roughly 0.03% of the population). While not all melanomas

are due to tanning (via both indoor and outdoor means), there is empirical support suggesting a link between the two. In a 2010 study, Lazovich et al. examined the potential relationship between cutaneous melanoma diagnosis (or, melanoma of the skin) and use of indoor tanning (i.e., use of sunlamps or tanning beds). For those who had used indoor tanning at some point, the diagnostic rate of melanoma of the skin increased close to 75% compared to those who had not used indoor tanning methods. As indoor tanning use increased, so did the rate of melanoma diagnosis. While this study was conducted with a limited fair-skinned population (participants were all from Minnesota), it does shed some light on a possible relationship between tanning and melanoma diagnosis. For individuals with BDD who utilize indoor tanning methods as a means to alter their skin tone, this relationship with melanoma diagnosis could lead to a significant change in both quality and quantity of life.

CHAPTER 2

A REVIEW OF THE LITERATURE

Body Dysmorphic Disorder

In the DSM-5 (APA, 2013), BDD is described as a preoccupation with perceived or minor flaws in physical appearance. This preoccupation eventually leads to significant distress or significantly impairs various areas of functioning, as well as the performance of repetitive behaviors. Some of what seems to differentiate BDD from obsessive compulsive disorder (OCD), is that the repetitive behaviors for those with BDD are solely related to appearance concerns while the same behaviors for those with OCD are to reduce anxiety. Gupta, Huynh, and Ginsburg (2013) described BDD compulsions as done in service to study or hide imperfections, while sometimes causing more noticeable defects (i.e., scabs/infections from skin picking). New diagnostic specifiers for level of insight in BDD have also been described ranging from good/fair (i.e., that the concerns probably are not true) to absent insight/delusional (i.e., that the beliefs are true).

Phillips et al. (2012) investigated potential similarities in insight between those with BDD and OCD. As noted in that article, there had been no previous research comparing global insight across these two disorders. Using the Brown Assessment of Beliefs Scale (BABS), both global insight (i.e., excellent, good, fair, poor, absent/delusional) and its individual components were assessed. Severity of both disorders was investigated through use of the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) and the Yale-Brown Obsessive Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS). Participants with BDD showed significantly more severe preoccupations than those with OCD. The majority of the BDD group (72%) also showed poor or absent global insight as compared with only 16% of the OCD group.

In addition, roughly one-third (32.4%) of the BDD sample demonstrated delusional beliefs while only 2.4% of the OCD group displayed such beliefs.

BDD: Perceptions of Self & Others

Given that individuals with BDD focus on perceived or minor flaws, some have explored whether or not they will also falsely perceive negative attributes of others. Buhlmann, McNally, Etcoff, Tuschen-Caffier, and Wilhelm (2004) examined facial and emotion recognition in individuals with BDD. Buhlmann et al. hypothesized that those with BDD would be less accurate in recognizing faces as well as examining whether or not they would negatively perceive facial expressions (i.e., perceiving expressions as threatening when they were not). All participants were assessed on facial recognition, emotion recognition (i.e., happy, sad, angry, neutral, disgust, scared, and surprised), depression, fear of negative evaluation, and the BDD-YBOCS. No differences were found between those with BDD, OCD, and the control group on facial recognition. Overall, those with BDD were significantly worse than controls on emotional recognition tasks, but no significant differences were found between the BDD and the OCD groups nor between the OCD group and the controls. However, some specific differences were found in regard to specific emotional recognition. BDD participants identified significantly fewer neutral emotional expressions than controls, but there was no difference between the BDD and OCD groups nor the OCD and controls. BDD participants were also significantly more likely to misperceive disgust expressions as angry when compared to controls.

Feusner, Bystritsky, Helleman, and Bookheimer (2010) investigated facial recognition abilities of individuals with BDD. Using a matched-subjects design, Feusner et al. presented participants with three different identification tasks: emotional expressions, neutral expression, and a control task. For the expression tasks, participants were asked to correctly identify which

of two images was the same person as the target picture, regardless of the displayed facial expression. For the control task, participants were asked to correctly identify which of two shapes matched the target shape. Reaction time was also measured for each identification task. Control participants were significantly faster on the emotional expressions task, and those with BDD took significantly longer to correctly identify the image that matched the target picture. Individuals with BDD also demonstrated a significantly higher error rate on the emotional expressions task compared to controls. However, there were no significant differences between the BDD and control groups when comparing error rates on the neutral expression and control tasks. Similar to the findings of Buhlmann et al. (2004) mentioned earlier, these results indicate that those individuals with BDD may be worse than those without BDD at accurately perceiving emotional expressions.

How the brain of someone with BDD processes faces has also been studied. In 2007, Feusner, Townsend, Bystritsky, and Bookheimer examined patterns of brain activation in those with BDD when presented with various facial stimuli. Using a matched-subjects design, participants received functional magnetic resonance imaging (fMRI) while matching pictures of others' faces. Each facial visual stimuli was of a person who demonstrated a neutral facial expression, but varied in spatial frequency. Images were presented in high spatial frequency (i.e., altered to show crisp individual details and sharp edges), low spatial frequency (i.e., altered with individual details blurred away), or normal spatial frequency (i.e., unaltered images). For all presentation conditions, participants with BDD showed higher levels of brain activation in the left hemisphere, especially in the lateral prefrontal cortex and the lateral temporal lobe regions. Control participants, however, only displayed increased activation in the left prefrontal and dorsal anterior cingulate when presented with images presented in a high spatial frequency.

These findings suggest a potential functional difference in how individuals with BDD perceive not only their own appearance but others' as well.

To further examine this potential difference, Feusner et al. (2010) conducted a similar study using a matched-subjects design which included not only another individual but also pictures of the participants. As in the previous study, facial expressions displayed in the photos were neutral. Images were again altered to either a high spatial frequency, a low spatial frequency, or were not altered, and were presented while participants received fMRI. With all presentation conditions, participants were also asked to rate on a Likert-type scale of 1 to 10 how disgusted/aversive they felt toward each picture (10 being the highest). Participants with BDD reported significantly higher aversive ratings toward their own pictures than controls did with their pictures. Compared to controls, individuals with BDD also showed less brain activation in primary and secondary visual processing regions of the occipital lobe with low frequency images and higher levels of activation in the frontostriatal systems including the caudate and left orbitofrontal cortex (OFC) when presented unaltered images. Feusner et al. noted that this area of hyperactivity is similar to the brain activation levels found in those with OCD, suggesting similar brain pathophysiology between the two disorders.

BDD: Comorbidity

Phillips, Siniscalchi, and McElroy (2004) examined non-BDD psychological symptoms in persons with BDD. Compared to a non-clinical control group, participants with BDD scored significantly higher on a symptom component on measures of depression, anxiety, somatization, and anger-hostility. A second component assessing well-being was also included in these measures, and those with BDD scored significantly lower on well-being than the control group. Further, Phillips et al. examined the efficacy of the anti-obsessional medication fluvoxamine,

marketed under the brand name Luvox, as a possible treatment option for those with BDD. Pre- and post-test comparisons were made on the aforementioned measures for participants who received a four-month trial of fluvoxamine, and there was significant improvement in all assessed domains including severity of BDD symptoms.

Suicidality also appears to be elevated in those with BDD (Phillips et al., 2005). Rief, Buhlmann, Wilhelm, Borkenhagen, and Brähler (2006) found that 7 to 19% of participants with BDD reported suicidal ideation or suicide attempts. Participants viewed these attempts and thoughts as the result of their preoccupation with some aspect of their appearance. These studies support earlier findings that individuals with varying degrees of BDD are at a higher risk for self-harm. Phillips et al. (2004) and Phillips (2005) found that approximately 80% of those with BDD experienced suicidal ideation at some point in their lives, with close to 25% attempting suicide. In an impressive effort to obtain a random and representative sample of the German population, Rief et al. (2006) obtained informed consent and the study questionnaires by going house-to-house of selected individual participants. In addition to increased suicidality, participants who met BDD criteria scored significantly higher on measures of somatic concern, were more likely to be unemployed and living alone, and had less income than those who did not meet BDD criteria.

Research has investigated comorbidity rates between BDD and other mental health problems. In Sobanski and Schmidt's review of the literature (2000), common comorbid diagnoses included depression and anxiety disorders, obsessive-compulsive disorder, and some personality disorders that have obsessive and schizoid features. Depression appeared to be the most common comorbid diagnosis with 90% to 95% of participants in individual studies reporting lifelong struggles with depression comorbid with a diagnosis of BDD. Comorbidity

rates were moderate for avoidant (38%), paranoid (38%), and obsessive-compulsive (28%) personality disorders and anxiety disorders (16% to 26%). Sobanski and Schmidt also discussed possible differential diagnoses for BDD, noting that there was no clear etiology for the disorder, and only scant case study research to suggest a neurobiological explanation of serotonin dysfunction. One surprising differential diagnosis was schizophrenia, presumably because of the almost delusional preoccupation with which some individuals with BDD present. However, a lack of hallucinations and disorganized or catatonic behavior precluded a schizophrenia diagnosis. Fang and Hofmann's (2010) review of the literature showed that 12%-33% of those with BDD also met diagnostic criteria for social anxiety disorder, of which fear of negative evaluation by others is key.

Though Sobanski and Schmidt (2000) dismissed comorbidity of BDD and anorexia as low, more recent research indicates moderate comorbidity rates between the two diagnoses. Grant, Kim, and Eckert (2002) assessed possible BDD in a clinical sample of persons presenting with anorexia nervosa. Participants who met criteria for BDD on a self-report screening measure then underwent a semi-structured clinical interview assessing additional variables such as history of suicidal behaviors and previous hospitalizations. A large portion (39%) of the participants with anorexia also met criteria for a comorbid diagnosis of BDD. Furthermore, a relationship between comorbid BDD and well-being was discovered, with those diagnosed with both anorexia and BDD displaying overall lower functioning and higher severity of symptoms than those participants with anorexia alone.

Tanning Behaviors

What is occurring psychologically for those individuals who feel compelled to excessively tan? There was no identifiable literature examining potential geographic influences

on tanning behavior. Hillhouse, Turrisi, Holwiski, and McVeigh (1999) attempted to identify factors related to an individual's tanning behaviors. Self-report measures assessing use of and attitudes toward tanning salon use, possible cognitive factors, and beliefs regarding other possible attractiveness behaviors were administered to a moderate-sized university sample. One-third of participants reported using tanning salons within the last year, with women using salons significantly more frequently than men. There was also a correlation between gender, beliefs of attractiveness and social factors, with women more likely than men to endorse favorable attitudes toward overall tanning behaviors and socially acceptable manners of dressing.

However, attitudinal factors are not the only possible significant factors regarding tanning behaviors. An early study from Leary, Saltzman, and Georgeson (1997) investigated obsessive-compulsive proclivities and levels of appearance motivation in persons, along with attitudinal systems. Participants were recruited from public parks and pools, and were asked to self-report their reasons for going to those venues. Likert-type questions were used in this measure and an item on tanning was included. Obsessive-compulsive behaviors were also assessed through surveys. For the initial self-report, Leary et al. found significance only in the question assessing agreement of being outside to tan which they coined as "appearance motivation" (p. 495). A positive correlation was also found between high appearance motivation and high obsessive-compulsive tendencies, with these participants significantly endorsing tanning behaviors during winter times as well. Hillhouse, Turrisi, and Kastner (2000) later found similar results while including potential effects of modeling related to tanning behaviors.

Similar to Leary et al. (1997), Koblenzer (1998) sought to explain psychological influences for tanning behaviors. In her review, she noted the general lack of literature and that most of the available literature originated from Australia, which at that time was "the site of

highest skin cancer incidence” (p. 421). Koblenzer discussed the findings of Vail-Smith and Felts where tanning and tanned skin were associated with higher perceptions of overall health and social attractiveness among the female participants. As with research discussed elsewhere in this paper (Hillhouse et al., 1999; Leary et al., 1997), Koblenzer detailed further evidence that higher levels of appearance motivation were related to more accepting attitudes toward tanning. Implications for her findings included a possible need to better educate parents and children toward the dangers of tanning in general, along with the possible consequences of tanning without sunscreen. However, this seemed to be a potentially fruitless intervention, as there is a noted lack of empirical evidence concerning education programs having success in reducing excessive or dangerous tanning behaviors.

O’Riordan et al. (2006) studied possible links between tanning bed use, weight/body image issues, health risk behaviors, and peer/media influence. Analyses were conducted using survey data from a large, all-girl adolescent (between the ages of 12 to 18) sample. Boys were excluded from data analyses, as a significantly small portion of boys in the sample (approximately 2%) reported using tanning beds. Participants were asked to self-report their own skin tone (classified as very fair/fair, olive, or dark/dark). In order to assess attitudes toward tanning, a similar reporting scale was used in asking what type of tan participants viewed as attractive, along with a Likert-type question on how much participants agreed with the statements, “People look attractive tanned” and “It is worth getting a little burnt to get a tan.” Binge-drinking, drug use, smoking, and purging behaviors were health risk behaviors that were assessed, and weight concerns (along with media influence) were examined by use of the McKnight Risk Factor Survey. Participants were also asked to report how many of their friends tanned during the summer in order to determine potential influence of peers. O’Riordan et al.

found that 14% of the sample reported using tanning beds within the last year, with girls ages 15-18 being more likely to use tanning beds than younger girls. Interestingly, girls who indicated having an olive complexion were more likely to report tanning bed use than those who reported having lighter skin tones. Girls who had more favorable attitudes toward tanning and who had friends who tanned were also more likely to be frequent tanning bed users themselves. All health risk behaviors studied and dieting to lose weight were also found to be positively correlated with tanning bed use.

Stapleton, Turrisi, and Hillhouse (2008) also examined a possible connection between tanning behaviors and peer influence, more specifically in relation to peer crowd identification. Using past research as a guide, the various peer crowds were labeled as popular (image conscious/high social status), “brains” (academics), athletes, partiers, and “regulars” (those who did not belong to any one peer group). It was hypothesized that students who identified with the popular peer crowd would be more likely to utilize indoor tanning in service of improving their physical appearance. The research sample consisted of a largely Caucasian (approximately 86%) population recruited from a university setting. Seasonal indoor tanning behaviors were measured by participants indicating how many times they engaged in indoor tanning during each season, with researchers also assessing attitudes toward tanning/normative beliefs and peer crowd identification. Most participants (26.9%) self-identified as part of the partier crowd, followed by the athletic crowd (16.6%), the popular crowd (10.9%), the brain crowd (9.7%), and the regular crowd (9.1%). Gender was a significant predictor of all tanning/UV risk variables, in that women in the study reported higher incidents of indoor tanning, higher intentions of future tanning bed use, more positive attitudes toward tanning, and reporting having more friends who tanned. Analyses revealed that those participants who self-identified as belonging to the popular peer

crowd were significantly more likely to have more positive attitudes toward tanning, have more friends who tanned, past tanning bed use, and more intentions for future tanning bed use.

Participants who self-identified as part of the brain crowd demonstrated fewer beliefs regarding friends' tanning behaviors, fewer positive attitudes toward tanning, less past tanning bed use, and lower intentions for future tanning bed use than participants who identified as one of the other peer groups. Self-identifying as belonging to either the athletic or the partier crowd showed no significant relationships to any of the outcome measures.

Tanning and Dependence

There is some research that suggests a possible relationship between problematic tanning behaviors and potential tanning dependence (Kouros, Harrington, & Adinoff, 2010; Mosher & Danoff-Burg, 2010a; Petit, Karila, Chalmin, & Lejoyeux, 2014). In 2010, Harrington et al. investigated potential relationships between tanning behaviors and possible tanning dependence. To assess for dependence, researchers modified DSM-IV substance abuse criteria for tanning. Problematic tanning behaviors were defined as answering affirmatively to at least two of four CAGE (Cut down-Annoyed-Guilty-Eye opener) questions, which had also been modified for tanning. Of the 100 participants, 74% met criteria for possible tanning dependence or endorsed problematic tanning behaviors (41% and 33%, respectively). These dependence-like behaviors may help to explain difficulty in reduce tanning behaviors, even when given information detailing the potential dangers is provided to those who tan.

Banerjee, Hay, and Greene (2014) also examined the usefulness of modifying the CAGE to assess potentially problematic tanning behaviors. Researchers assessed indoor tanning addiction tendencies using the modified CAGE, indoor tanning/sunbathing frequency and intention, positive tanning beliefs, perceived vulnerability to aging effects of tanning, and

tanning risk knowledge. It was hypothesized that women who engaged in more past indoor tanning behaviors, had higher intentions to indoor tan, and had lower tanning risk knowledge with more positive attitudes toward tanning would demonstrate a higher level of indoor tanning addiction tendencies. Analyses indicated no significant effect for gender, but did suggest a significant relationship for age where younger participants demonstrated more indoor tanning addiction tendencies. Banerjee et al. also found that participants with more positive attitudes toward tanning—as well as those who reported higher frequencies of past indoor tanning and greater future intention to indoor tan with lower future intention to outdoor sunbathe—showed greater indoor tanning addiction tendencies than other participants. Perceived vulnerability to tanning’s potential aging effects and tanning risk knowledge did not predict indoor tanning addiction tendencies.

Though Banerjee et al. did not find a significant effect for gender, earlier research (Poorsattar & Hornung, 2007) found that women (along with those used tanning beds, frequently tanned, and who had friends/family who tanned) were more likely to score positively on a measure of UV-light related substance disorder. Poorsatter and Hornung modified phrasing on the CAGE to reflect problematic tanning behaviors, and endorsing at least two of those items resulted in a positive screen for a potential UV-light related substance disorder for those participants. Mosher and Danoff-Burg (2010b) also examined a possible relationship between gender, indoor tanning, and related mental health issues. Participants completed self-report measures detailing their indoor tanning frequency for the previous year, their typical alcohol consumption and number of binge drinking episodes within the last two weeks, the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), and the revised Obsessive-Compulsive Inventory (OCI-R). Results revealed that significant psychological correlates varied

between men and women. Men who reported higher rates of tanning scored significantly higher on measures of OCD and anxiety than women. No gender effect was found on depression scores. Women who engaged in more tanning behaviors, however, scored higher on substance use variables (i.e., types of substances used, frequency) while no effect was found for men who tanned more frequently.

Ashrafioun and Bonar (2014) conducted a study examining problematic tanning behaviors and their correlates, along with possible similarities to addiction. For female participants, there was a significant association between meeting criteria for tanning dependence (i.e., endorsing three out of eight modified substance dependence items) and having symptoms of both BDD and obsessive-compulsive disorder. There was also an association between meeting tanning dependence criteria and having OCD symptoms. Overall, 31% of the sample met criteria for tanning dependence. These findings may suggest that for some individuals, their problematic or excessive tanning behaviors may be influenced by BDD concerns.

Kaur et al. (2006) investigated the potential reinforcement effect of endorphin release on tanning behavior. Within a small sample ($N = 16$), participants were divided into two equal groups: frequent tanners (those who tanned eight to 15 times per month) and infrequent tanners (those who had not tanned more than 12 times per year). Researchers then administered either the opioid antagonist naltrexone (which blocks both central and peripheral opioid receptors) or a placebo, after which participants were placed in both non-UV and UV tanning beds. Frequent tanners reported a preference for the UV tanning beds when given the placebo as well as a low dose of naltrexone. At moderate and higher doses of naltrexone, however, frequent tanners reported less preference for the UV tanning beds. Infrequent tanners consistently showed less preference for the UV tanning beds when compared to frequent tanners. At moderate and higher

doses of naltrexone, frequent tanners began to show opioid withdrawal symptoms (i.e., jitteriness, nausea) after tanning. This suggests there could be a reinforcing effect to the biological changes that occur while tanning in that the release of endorphins which occurs while tanning serves as a positive reinforcer to the tanning behavior. A later animal study (Fell, Robinson, Mao, Woolf, & Fisher, 2014) found similar results. Mice that were repeatedly exposed to UV rays showed an opioid receptor (β -endorphin) mediated addiction, as well as withdrawal symptoms when given an opioid antagonist which blocked opioid receptors.

Tanning and BDD

As mentioned earlier, the most common BDD preoccupations involve obsessions regarding skin quality, muscle mass and tone, along with concerns related to amount and quality of hair (Castle et al., 2006; Mosley, 2009; Phillips, 2005; Sobanski & Schmidt, 2000; Veale, 2003). However, Phillips et al. (2006) investigated a possible variation in the presentation of the skin preoccupation by examining the potential inclusion of tanning behaviors. Using several semi-structured interviews and self-report measures, BDD severity and preoccupations, as well as comorbid diagnoses and overall participant health were examined. Phillips et al. differentiated between typical and BDD-related tanning, in that typical tanning “was motivated by reasons unrelated to BDD” preoccupations or concerns (p. 132). Of the 200 participants, 25% reported tanning behaviors resulting from preoccupations related to skin tone (e.g., perceived paleness) and quality (e.g., acne).

Hypotheses

Given the research on both BDD and tanning behaviors, it is possible that some individuals who feel compelled to tan excessively (along with lack of proper sunscreen use) may meet diagnostic criteria for BDD with the area of preoccupation being skin tone. Approximately

1% to 2% of the population suffers from some degree of body dysmorphic disorder (Phillips, Didie, Feusner, & Wilhelm, 2008); however, much of the scientific literature on this disorder consists of clinical case studies and medical treatment research, whereas there is a considerable dearth in the psychological literature. Thus, the purpose of the current study is two-fold: (a) to add to the body of psychological literature regarding body dysmorphic disorder (BDD); and (b) to examine tanning behavior as a possible presentation of body dysmorphic disorder as suggested by Phillips et al. (2006). It is hypothesized that participants who report more frequent tanning behaviors will score significantly higher on measures that have been empirically shown to correlate with BDD (namely anxiety and depression, body image concern, and addiction). Additionally, given the existing literature regarding BDD symptoms and their relationship to gender, it is hypothesized that gender will be significantly related to the above factors. There is also little, if any, literature examining geographical location (e.g., rural vs. urban) as related to BDD with tanning. Therefore, demographic information (including geographical location) will be used to explore this potential relationship.

Specific Hypotheses

- 1) Reported Tanning Behavior will be positively associated with greater anxiety, body image concerns, tanning addiction, depression, and physical appearance reasons for tanning.
- 2) Participant Gender will be significantly related to anxiety, body image concerns, tanning addiction, depression, and physical appearance reasons for tanning.
- 3) Participant geographical location of origin will be significantly related (either positively or negatively) to anxiety, body image concerns, tanning addiction, depression, and physical appearance reasons for tanning.

CHAPTER 3

RESEARCH METHODOLOGY

Participants and Procedures

A sample of 240 college students (102 men, 132 women, 6 did not report) was recruited from available undergraduate classes at a large university in the southeastern United States. Participants ranged in age from 18 to 51 years old ($M = 20.3$ years, $SD = 3.6$ years). One hundred forty-three (59.6%) participants identified as White, 67 (27.9%) identified as African-American, and 30 (12.5%) were of another racial background, multi-racial, or did not report. Regarding participants' academic year, the sample consisted of 100 (41.7%) freshman, 58 (24.2%) sophomores, 44 (18.3%) juniors, 30 (12.5%) seniors, and 1 (0.4%) student who was non-degree seeking. Forty-nine (20.4%) participants stated they belonged to a fraternity or sorority, whereas 184 (76.7%) did not belong to a fraternity or sorority, and 7 (2.9%) did not report. Two-hundred nineteen (91.3%) identified as heterosexual, 14 (5.9%) identified as gay, lesbian, or bisexual, and 7 (2.9%) did not report. Ninety-seven (40.4%) participants reported being single but not dating, 44 (18.3%) were dating but not in a relationship, 83 (34.6%) were in a committed relationship, 6 (2.5%) were engaged, 2 (0.8%) were married, 1 (0.4%) was separated/divorced, and 7 (2.9%) did not report. One hundred seventy-five participants reported originating from urban areas, whereas 52 reported being from rural areas. Rural and urban designations were derived from 2010 Census data (U.S. Census Bureau, 2010).

Surveys were administered as an online survey using the Qualtrics online survey system. Students were recruited through a research participation pool, and were offered course credit for participation. Informed consent was obtained from all participants, and this study was approved

by the university's Institutional Review Board. Respondents were free at any time to discontinue their participation in the study with no penalty.

Materials

Center for Epidemiological Studies Depression Scale (CES-D).

In the limited studies available, BDD has shown comorbidity with depression and suicidal ideation (Phillips et al., 2008). Therefore, assessing for depressive symptoms would add to the body of literature. The CES-D (Radloff, 1977) is a free instrument consisting of 20 Likert-type questions assessing depressive symptoms. An example of a CES-D item is "I thought my life had been a failure." Individual responses for each item were summed to produce a total CES-D score for each participant. In previous studies, the measure had reported good internal consistency in both general and clinical populations (.85 and .90, respectively). Similarly, previous studies using the CES-D found convergent validity with the Hamilton's Clinician's Rating scale (.44), the Raskin Rating scale (.54), and the Symptom Checklist-90 (.83). In the present study, Cronbach's α was .90.

Beck Anxiety Inventory (BAI).

With the publication of the DSM-5 (APA, 2013), BDD was moved from the Somatoform Disorders group to the newly formed Obsessive-Compulsive and Related Disorders classifications. Examining possible comorbid anxiety would add credence to this re-classification. The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) measures various components of anxiety including physiological and cognitive facets. The BAI consists of 21 Likert-style items assessing the frequency with which a participant reported being bothered by a given symptom. Example symptoms from the BAI include: "Fear of the worst happening," "Hands trembling," and "Hot/Cold Sweats." Individual responses for each item

were summed to produce a total BAI score for each participant. Cronbach's alpha (.92) showed strong internal consistency in previous studies. Similarly, previous research has found the BAI to have convergent validity with the Hamilton Rating Scales for Anxiety (.83) and the Hamilton Rating Scale for Depression (.73). In the present study, Cronbach's α for the BAI was .91.

Body Image Concern Inventory (BICI).

Littleton, Axsom and Pury (2004) developed the Body Image Concern Inventory (BICI) to assess possible dysmorphic concern. The BICI consists of 19 Likert-type questions measuring various aspects of and behaviors related to self-image concerns. An example item from the BICI is "I am ashamed of some part of my body." Individual responses for each item were summed to produce a total BICI score for each participant. Previous reported internal consistency for this instrument was found to be good ($\alpha = .93$), and it has been found to be concurrently valid with the Body Dysmorphic Disorder Examination-Self-Report (.83), and the Eating Disorder Inventory ($\alpha = .89$). Littleton, Axsom, and Pury noted the BICI is also sensitive to discriminating between BDD and bulimia. In the present study, Cronbach's α for the BICI was .96.

Physical Appearance Reasons for Tanning Scale (PARTS).

Respondent attitudes regarding tanning and reasons for tanning were assessed using the Physical Appearance Reasons for Tanning Scale (PARTS; Cafri, Thompson, Roehrig, van den Berg, Jacobsen, & Stark, 2006). This instrument consists of 14 Likert-style items. An example item from the PARTS is "The tanner I am, the more attractive I feel." Individual responses for each item were summed to produce a total PARTS score for each participant. In the present study, Cronbach's α for the BICI was .95.

Indoor Tanning Frequency.

Frequency of tanning behaviors was assessed using four Likert-style items asking frequency with which the participant engaged in indoor tanning behaviors over their last Winter (December to February), Spring (March to May), Summer (June to August), and Fall (September to November). Individual responses for each item were summed to produce a total Tanning Frequency score for each participant, with higher scores representing higher frequency of indoor tanning behaviors over the last year.

Cut down-Annoyed-Guilty-Eye opener for Tanning (CAGE-T).

As some research suggests a similarity between certain tanning behaviors and addiction (Mosher & Danoff-Burg, 2010b; Nolan & Feldman, 2009; Poorsattar & Hornung, 2007), a modified version of the Cut down-Annoyed-Guilty-Eye opener (CAGE; Ewing, 1984) using yes/no responses was administered to examine tanning behavior rather than substance use (i.e., “Have you ever felt the need to cut down on your tanning?”, “Have people annoyed you by criticizing your tanning?”). For the purposes of the present study, individual responses for each item were summed to produce a total CAGE-Tanning score for each participant, with higher scores indicating more potential for tanning addiction.

CHAPTER 4

RESULTS

Descriptive Statistics and Correlations

See Table 1 for means and standard deviations for dependent variables. Pearson correlations among dependent variables are detailed in Table 2. Mean scores for Anxiety, Body Image Concern, Depression, Physical Appearance Reasons for Tanning, and CAGE-T were 32.04, 46.30, 36.95, 32.59, and 4.55, respectively. Anxiety was significantly correlated with Body Image Concern ($r = .40, p < .000$), Depression ($r = .59, p < .000$), and CAGE-T ($r = .25, p < .000$). Body Image Concern was significantly correlated with Anxiety ($r = .40, p < .000$), Depression ($r = .51, p < .000$), Physical Appearance Reasons for Tanning ($r = .42, p < .000$), and CAGE-T ($r = .18, p < .005$). Depression was significantly correlated with Anxiety ($r = .59, p < .000$), Body Image Concern ($r = .51, p < .000$), and CAGE-T ($r = .19, p < .006$). Physical Appearance Reasons for Tanning was significantly correlated with Body Image Concern ($r = .42, p < .000$) and Tanning Behavior ($r = .25, p < .000$). There was no significant relationship between racial/ethnic group and tanning behaviors. Rurality status for this sample is described in the Participants section above.

Table 1.

Means and Standard Deviations for Dependent Variables.

	N	Min	Max	Mean	SD
Beck Anxiety Inventory	222	21	76	32.04	9.75
Body Image Concerns	225	19	91	46.3	17.56
CES – Depression	216	20	77	36.95	10.25
Physical Appearance Reasons for Tanning	224	14	70	32.59	14.19
CAGE-Tanning	235	4	8	4.55	0.93

Table 2.

Pearson Correlations for Dependent Variables

	Beck Anxiety Inventory (BAI)	Body Image Concern Inventory (BICI)	Centers for Epidemiological Studies Depression Scale (CES-D)	Physical Appearance Reasons for Tanning Scale (PARTS)
BAI				
BICI	.40**			
CES-D	.59**	.51**		
PARTS	.10**	.42**	.13	
CAGE-T	.25**	.19**	.19**	.25**

** = $p < .01$

Mplus v.6.1 (Muthén & Muthén, 2010) was used to conduct simultaneous regression analyses to evaluate study hypotheses. *Mplus* software was employed to conduct study analyses due to the ability to evaluate relationships for all independent variables (i.e., gender and tanning behavior) with all dependent variables (i.e., anxiety, body image concern, depression, physical appearance reasons for tanning, and tanning addiction) simultaneously rather than one at a time. By conducting these analyses simultaneously, *Mplus* takes into account the influence of interrelationships among all variables as well any potential variance that may be the result of those relationships. The effect of age as a covariate was evaluated prior to conducting main analyses, and age was found to be significantly related only to BAI ($r = .16, p = .02$). As such, age was only included in the final simultaneous multiple regression model as a covariate to BAI. As *Mplus* uses full information maximum likelihood to estimate missing parameters, and missing data percentage for each study variable was under 10%, and therefore missing data were not a concern (Young, Weckman, & Holland, 2011). A model that is generally interpreted as providing a good fit for the data is one that has a root mean square of approximation (RMSEA) value $\leq .06$, and a Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) value $\geq .95$ (Hu & Bentler, 1999). Model fit was moderate with RMSEA = .15, CFI = .89, and TLI = .70, suggesting that while it is useful in describing the relationships represented, in these data there may be aspects of the phenomenon that are not accounted for beyond our control in these analysis. See Figure 1 for results of these simultaneous regression analyses.

Hypotheses

Hypothesis 1 was partially supported, in that there was positive relationship between Tanning Behavior and increased Body Image Concern, increased CAGE-T, and increased Physical Appearance Reasons for Tanning. However, Tanning Behavior was not related to BAI

or CES-D. Hypothesis 2 was also partially supported, in that there was a relationship between Gender and increased Body Image Concerns, increased CAGE-T, and lower CES-D for women. However, there was no relationship between Gender and BAI or Physical Appearance Reasons for Tanning. There was a significant interaction of Gender and Tanning Behavior for increased Body Image Concerns, increased CAGE-T, lower CES-D, and greater Physical Appearance Reasons for Tanning for women. There was no interaction of Gender and Tanning Behavior to BAI. Please refer to Figures 2 through 6 below for diagrams of the above interaction effects. Finally, Hypothesis 3 was not supported, with no significant interactions or relationships between any variable of interest with regard to rurality.

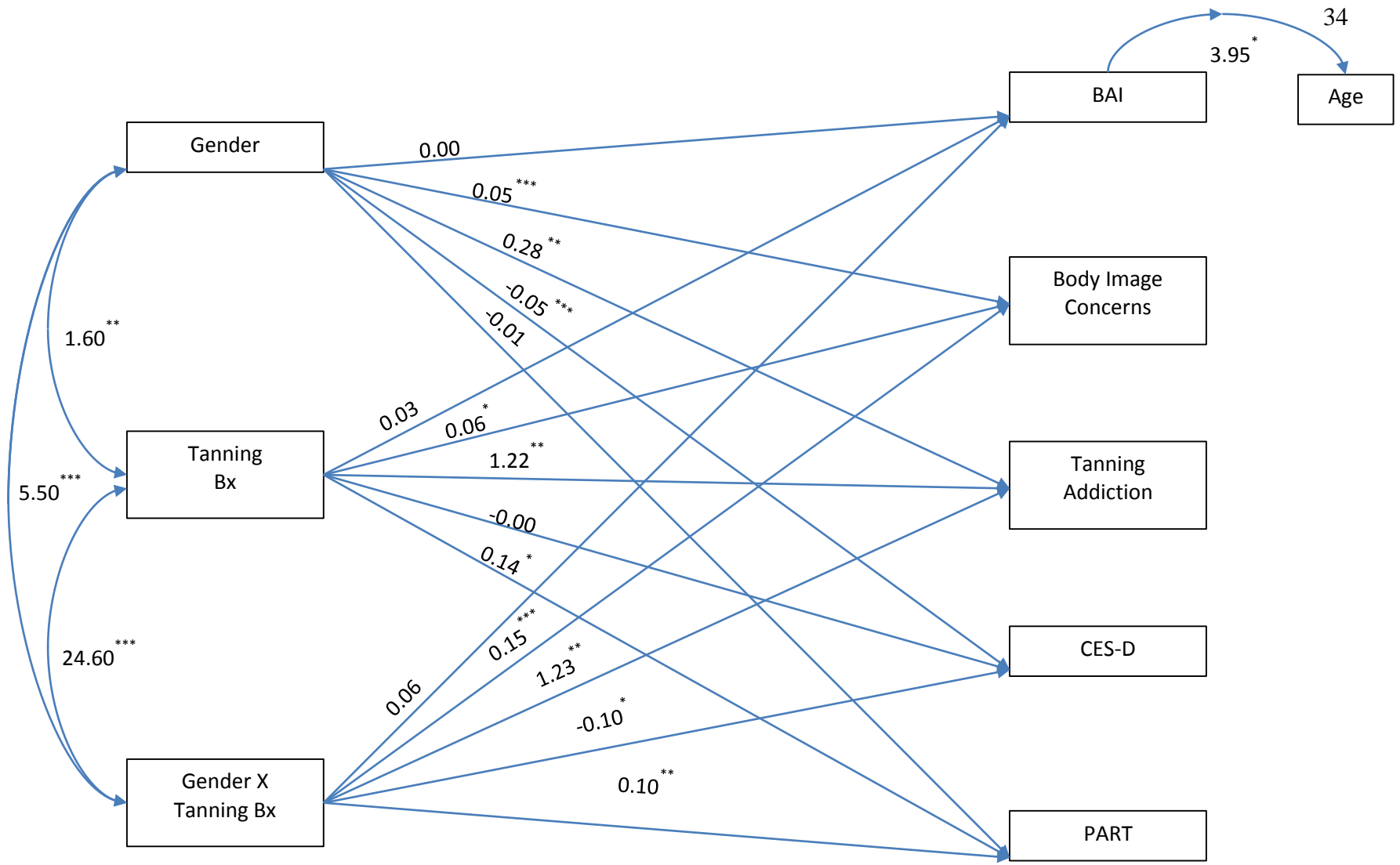


Figure 1. Complete simultaneous regression results

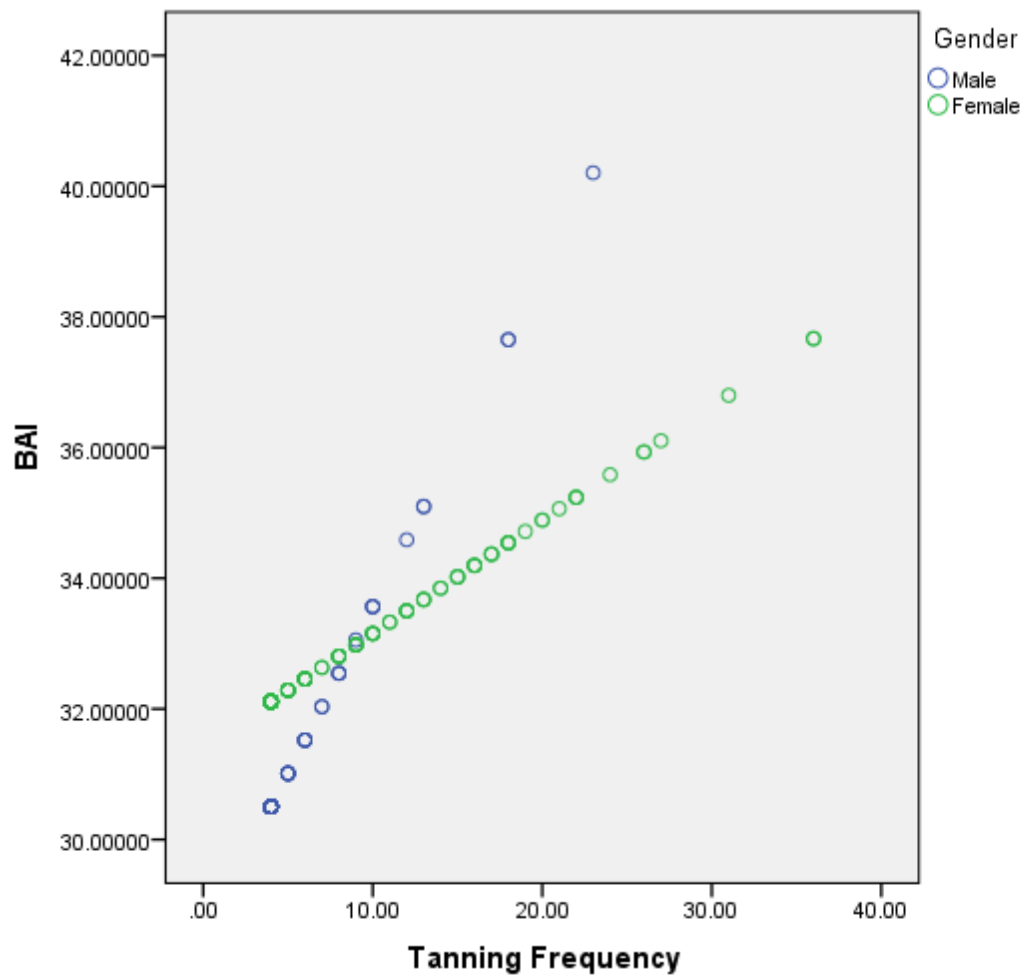


Figure 2. Interaction plot for Tanning Frequency and Gender on BAI

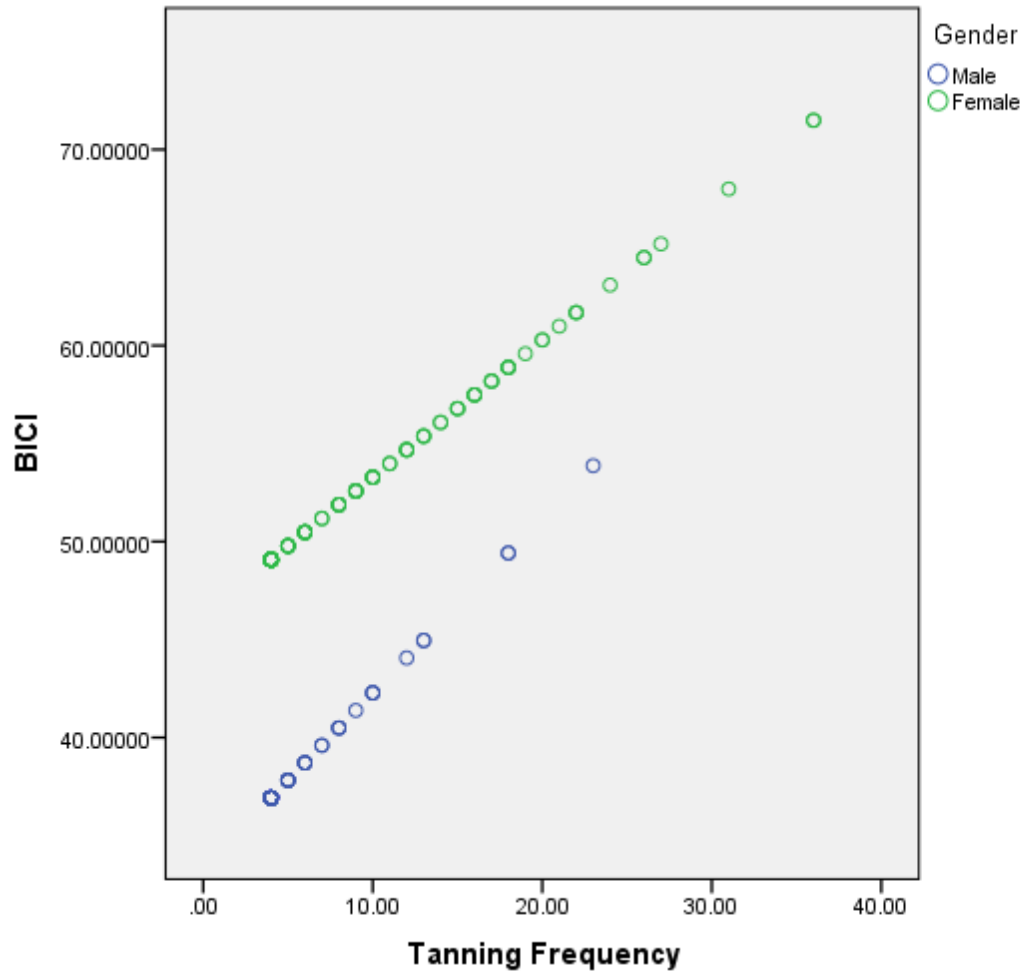


Figure 3. Interaction plot for Tanning Frequency and Gender on BICI

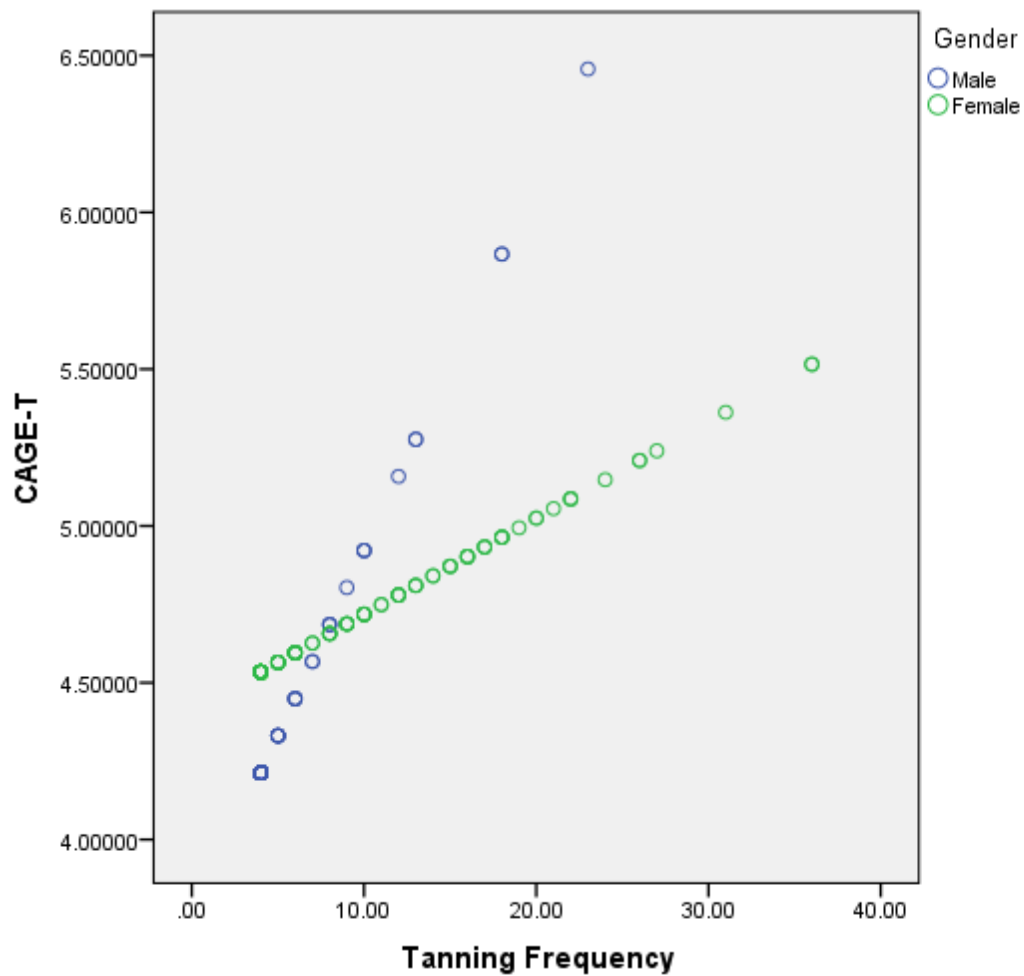


Figure 4. Interaction plot for Tanning Frequency and Gender on CAGE-T

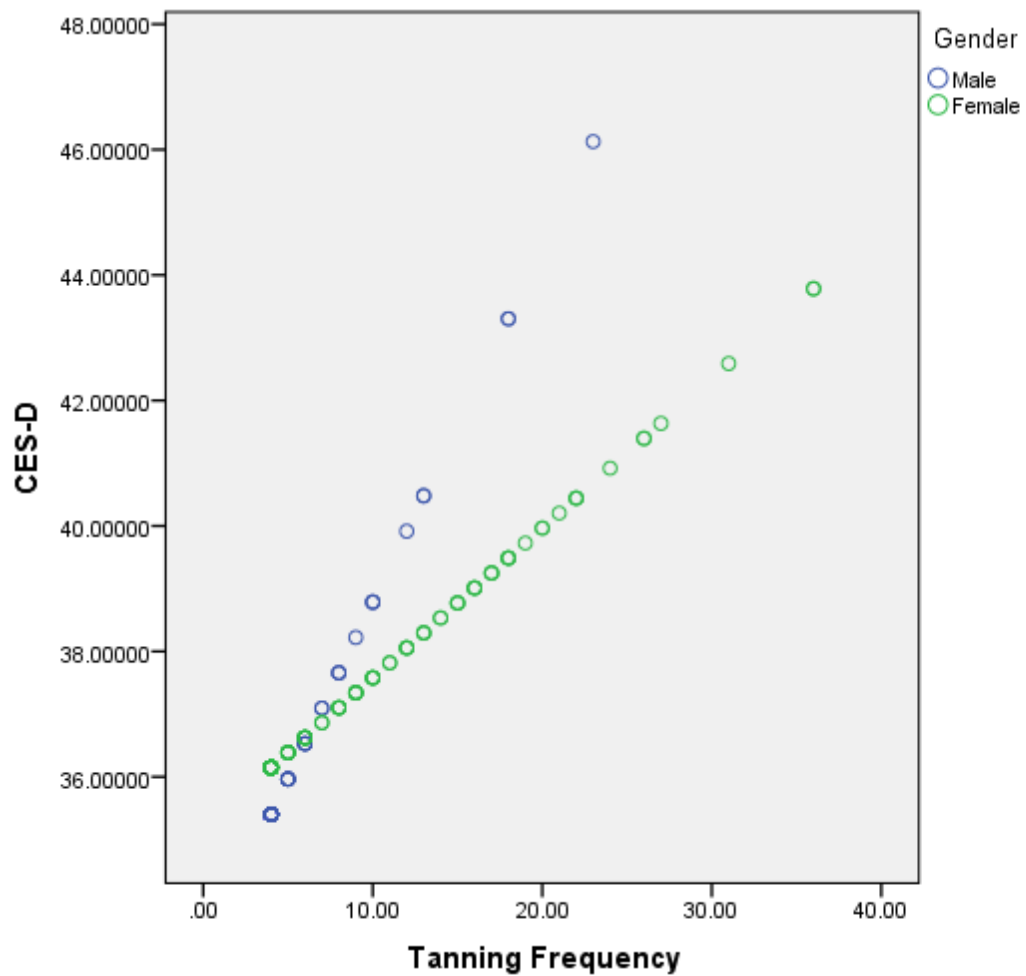


Figure 5. Interaction plot for Tanning Frequency and Gender on CES-D

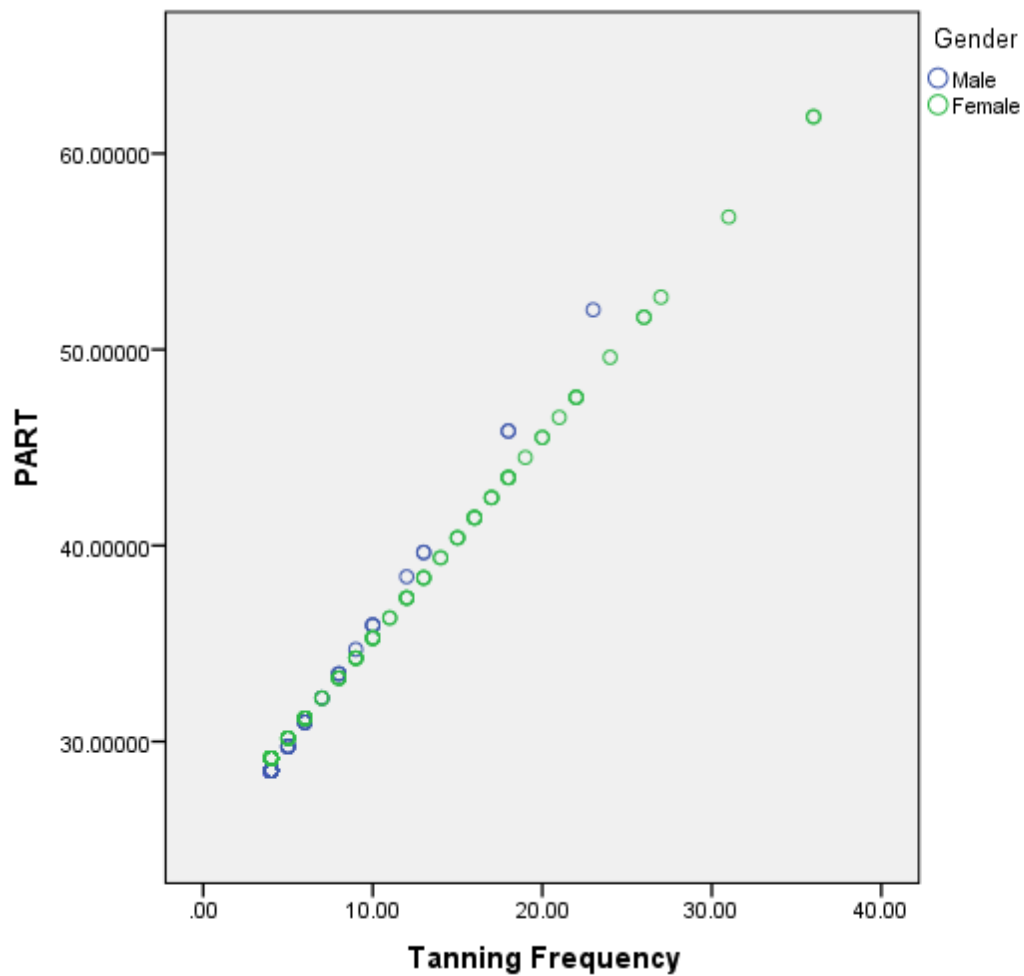


Figure 6. Interaction plot for Tanning Frequency and Gender on PARTS

CHAPTER 5

DISCUSSION

It was hypothesized that participants who reported more concern about skin tone and more tanning behaviors would score significantly higher on measures empirically shown to correlate with BDD (i.e., anxiety, depression, body image concern, and addiction), than those participants who report less skin tone concern and fewer tanning behaviors. Similar to past studies (Ashrafioun & Bonar, 2014; Banerjee et al., 2014; Kourosch et al., 2010; Phillips et al., 2006), Tanning Behavior Frequency was significantly and positively related to Body Image Concerns, CAGE-T, and Physical Appearance Reasons for Tanning. This finding suggests that those who engage in more frequent tanning behaviors are more likely to have physical appearance concerns (which may also influence their desire to tan) as well as be more likely to engage in dependence-like behavior in regard to their tanning behavior.

Gender was significantly and positively related to Body Image Concerns and CAGE-T (i.e., tanning addiction) such that identifying as a woman was related to higher levels of both constructs, yet identifying as a woman significantly predicted lower depression. It is unclear why identifying as a woman served as a predictor of lower depression, especially given that women tend to have a higher prevalence rate for depression than men (Bromet et al, 2011; Nolan-Hoeksema, 2000; Romanoski et al, 1992). If this lower depression was the result of endorphins released while tanning, one would expect to see the benefit in both men and women. Perhaps there is a biological protective factor in women that has yet to be identified. However, it should be noted that while statistically significant, this relationship was very small and as such may not represent a meaningful functional gender difference in depression. Additionally, the above findings are consistent with research studying tanning behavior and some of its psychological

correlates (Mosher & Danoff-Burg, 2010b). There were significant interactions between Gender and Tanning Behavior Frequency on several dependent variables, with the interaction of the two predicting significantly higher Body Image Concerns, CAGE-T, and Physical Appearance Reasons for Tanning, but lower depression. For men, as Tanning Behavior increased, Tanning Addiction, Depression, and Physical Appearance Reasons for Tanning tended to become stronger as compared to women. However, Body Image Concerns tended to be higher in women than in men. Analyses did not reveal a relationship between rurality and any of the other variables examined. Significant findings in this study are similar to past research on the phenomenon of problematic tanning behaviors as related to body dysmorphic disorder (Ashrafioun & Bonar, 2014; Banerjee et al., 2014; Harrington et al., 2010; Kourosh et al., 2010; Leary et al., 1997; Mosher & Danoff-Burg, 2010a; Mosher & Danoff-Burg, 2010b; Phillips et al., 2006).

This study suggests that problematic tanning behavior appears to be diagnostically similar to the presentation of Body Dysmorphic Disorder. Body dysmorphic disorder is a complicated mental health issue, for which potential causes and prognosis are not fully understood. Empirical studies of BDD are underrepresented in the psychological literature, with much of available literature consisting of clinical case studies or medical research. Increasing the depth and breadth of BDD literature can help to further not only the understanding of the causal influences and presentation of this disorder, but also to inform effective treatments. Though this current study examined only one potential presentation of BDD (i.e., problematic tanning behaviors), it also partly serves to increase the understanding of the disorder. It is possible that future research can examine whether or not relationships found between variables in this current

study (i.e., behavior frequency and body image concern) are also found in other presentations of body dysmorphic disorder.

Implications

Previous research shows links between excessive tanning and the development of melanoma (Colantonio, Bracken, & Beecker, 2014; Lazovich et al., 2010). Furthermore, college-aged students tend to engage in tanning behaviors more than other groups, and as such put themselves at higher risk for development of melanoma later in life (Wehner et al., 2014). The present study shows a clear association between tanning addiction and features of Body Dysmorphic Disorder, a disorder characterized by obsessions with bodily imperfections and compulsions to “correct” them. However, unlike BDD, tanning addiction involves behaviors that have been found to be clearly and directly related to increased risk for a life-threatening illness. As such, applying empirically supported BDD treatment modalities, such as fluvoxamine and cognitive-behavioral therapy, could be beneficial if applied to the context of tanning addiction (Phillips et al., 2004; Wilhelm, Buhlmann, Hayward, Greenberg, & Dimaite, 2010; Wilhelm, Phillips, Fama, Greenberg, & Steketee, 2011). These may not only prove useful in treating the distressing symptoms, but also help to reduce the individual’s risk for melanoma.

Limitations

This study was conducted with a convenience sample of college students with a mean age of 20.3 years. As such, these findings may not generalize to the overall adult population, older adults, or to a population with lower levels of education. Additionally, it should be noted that this study employed a cross-sectional design. Cross-sectional designs, while useful for descriptive studies such as this one, cannot be used to draw conclusions related to causality, as there is no implied temporal precedence among variables. Though this study did aim to establish convergent

validity between tanning behaviors and psychological correlates discussed in previous research, discriminant validity was not assessed. In future studies, it could be useful to examine whether those who use tanning for non-appearance or BDD-reasons (i.e., to treat acne or Seasonal Affective Disorder) demonstrate differences on these correlates as compared to persons who engage in problematic tanning behaviors. While this model attempted to evaluate the potential relationships among variables related to tanning behavior and clinical sequelae, model fit was only moderately good, suggesting that there may be other variables that factor into this overall phenomenon that were not accounted for in these analyses. Rather, these findings should be viewed as an overview of the potential relationships among tanning behaviors and variables related to Body Dysmorphic Disorder. Furthermore, though the study was conducted at a larger university in the southeast, the majority of participants reported home regions within the same southern state. This could limit some of the findings, particularly those regarding rurality. In future studies, it could be helpful to recruit participants via multiple avenues (e.g., social media, listserves) rather than one research pool in order to further examine influences of geographical region. As the mental health needs of those in rural areas are broad and can offer particular challenges (Kelly et al., 2011; Khoong, Gibbert, Garbutt, Sumner, & Brownson, 2014; Roberts, Battaglia, & Epstein, 1999), further evaluation of not only problematic tanning behaviors but also of other mental health concerns is sorely needed.

REFERENCES

- American Psychiatric Association. (2013). Obsessive-compulsive and related disorders. *Diagnostic and statistical manual for mental disorders* (5th ed.), (pp. 235-264). Washington, DC: Author.
- Ashrafioun, L., & Bonar, E. E. (2013). Tanning addiction and psychopathology: Further evaluation of anxiety disorders and substance abuse. *Journal of the American Academy of Dermatology*, *70*, 473-480. doi:10.1016/j.jaad.2013.10.057
- Banerjee, S. C., Hay, J. L., & Greene, K. (2014). Indoor tanning addiction tendencies: Role of positive tanning beliefs, perceived vulnerability, and tanning risk knowledge. *Addiction Research & Theory*, *23*, 156-162. doi:10.3109/16066359.2014.955479
- Bartsch, D. (2007). Prevalence of body dysmorphic disorder symptoms and associated clinical features among Australian university students. *Clinical Psychologist*, *11*, 16-23. doi:10.1080/13284200601178532
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*, 893-897. <http://dx.doi.org/10.1037/0022-006X.56.6.893>
- Bromet, E., Andrade, L. H., Hwang, I., Sampson, N. A., Alonso, J., De Girolamo, G., ... & Kessler, R. C. (2011). Cross-national epidemiology of DSM-IV major depressive episode. *BMC medicine*, *9*, 90. doi:10.1186/1741-7015-9-90
- Buhlmann, U., McNally, R., Etcoff, N., Tuschen-Caffier, B., & Wilhelm, S. (2004). Emotion recognition deficits in body dysmorphic disorder. *Journal of Psychiatric Research*, *38*, 201-206. doi:10.1016/S0022-3956(03)00107-9

- Cafri, G., Thompson, K., Roehrig, M., van den Berg, P., Jacobsen, P. B., & Stark, S. (2006). An investigation of appearance motives for tanning: The development of the Physical Appearance Reasons for Tanning Scale (PARTS) and its relation to sunbathing and indoor tanning intentions. *Body Image, 3*, 199-209. doi:10.1016/j.bodyim.2006.05.002
- Castle, D. J., Rossell, S., & Kyrios, M. (2006). Body dysmorphic disorder. *Psychiatric Clinics of North America, 29*, 521-538. doi:10.1016/j.psc.2006.02.001
- Colantonio, S., Bracken, M. B., & Beecker, J. (2014). The association of indoor tanning and melanoma in adults: systematic review and meta-analysis. *Journal of the American Academy of Dermatology, 70*, 847-857. doi:10.1016/j.jaad.2013.11.050
- Ewing, J. A. (1984). Detecting alcoholism: The CAGE questionnaire. *Journal of the American Medical Association, 252*, 1905-1907. doi:10.1001/jama.1984.03350140051025
- Fang, A., & Hofmann, S. G. (2010). Relationship between social anxiety disorder and body dysmorphic disorder. *Clinical Psychology Review, 30*, 1040-1048.
doi:10.1016/j.cpr.2010.08.001
- Fell, G. L., Robinson, K. C., Jianren, M., Woolf, C. J., & Fisher, D. E. (2014). Skin β -endorphin mediates addiction to UV light. *Cell, 157*, 1527-1534. doi:10.1016/j.cell.2014.04.032
- Feusner, J. D., Bystritsky, A., Helleman, G., & Bookheimer, S. (2009). Impaired identity recognition of faces with emotional expression in body dysmorphic disorder. *Psychiatry Research, 179*, 318-323. doi:10.1016/j.psychres.2009.01.016
- Feusner, J. D., Moody, T., Hembacher, E., Townsend, J., McKinley, M., Moller, H., & Bookheimer, S. (2010). Abnormalities of visual processing and frontostriatal systems in body dysmorphic disorder. *Archives of General Psychiatry, 67*, 197-205.
doi:10.1001/archgenpsychiatry.2009.190

- Feusner, J. D., Townsend, J., Bystritsky, A., & Bookheimer, S. (2007). Visual information processing of faces in body dysmorphic disorder. *Archives of General Psychiatry, 64*, 1417-1426. doi:10.1001/archpsyc.64.12.1417
- Grant, J. E., Kim, S. W., & Eckert, E. (2002). Body dysmorphic disorder in patients with anorexia nervosa: Prevalence, clinical features, and delusionality of body image. *International Journal of Eating Disorders, 32*, 291-300. doi:10.1002/eat.10091
- Gupta, R., Huynh, M., & Ginsburg, I. H. (2013). Body dysmorphic disorder. *Seminars in Cutaneous Medicine and Surgery, 32*, 78-82. doi:10.12788/j.sder.0005
- Harrington, C. R., Beswick, T. C., Leitenberger, J., Minhajuddin, A., Jacobe, H. T., & Adinoff, B. (2010). Addictive-like behaviors to ultraviolet light among frequent tanners. *Clinical and Experimental Dermatology, 36*, 33-38. doi:10.1111/j.1365-2230.2010.03882.x
- Heckman, C. J., Egleston, B. L., Wilson, D. B., & Ingersoll, K. S. (2008). A preliminary investigation of the predictors of tanning dependence. *American Journal of Health Behavior, 32*, 451-464. doi:10.5555/ajhb.2008.32.5.451
- Hillhouse, J. J., Turrisi, R., Holwiski, F., & McVeigh, S. (1999). An examination of psychological variables relevant to artificial tanning tendencies. *Journal of Health Psychology, 4*, 507-516. doi:10.1177/135910539900400405
- Hillhouse, J. J., Turrisi, R., & Kastner, M. (2000). Modeling tanning salon behavioral tendencies using appearance motivation, self-monitoring and the theory of planned behavior. *Health Education Research, 15*, 405-414. doi:10.1093/her/15.4.405
- Hu, L. & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55. doi:10.1080/10705519909540118

Kaur, M., Liguori, A., Lang, W., Rapp, S. R., Fleischer, A. B., & Feldman, S. R. (2006).

Induction of withdrawal-like symptoms in a small randomized, controlled trial of opioid blockade in frequent tanners. *Journal of American Dermatology*, *54*, 709-711.

doi:10.1016/j.jaad.2005.11.1059

Kelly, B. J., Lewin, T. J., Stain, H. J., Coleman, C., Fitzgerald, M., Perkins, D., ..., Beard, J. R.

(2011). Determinants of mental health and well-being within rural and remote communities. *Social Psychiatry and Psychiatric Epidemiology*, *46*, 1331-1342.

doi:10.1007/s00127-010-0305-0

Khoong, E. C., Gibbert, W. S., Garbutt, J. M., Sumner, W., & Brownson, R. C. (2014). Rural,

suburban, and urban differences in factors that impact physician adherence to clinical preventive service guidelines. *The Journal of Rural Health*, *30*, 7-16.

doi:10.1111/jrh.12025

Koblentz, C. S. (1998). The psychology of sun-exposure and tanning. *Clinics in Dermatology*,

16, 421-428. doi:10.1016/S0738-081X(98)00015-7

Kouros, A. S., Harrington, C. R., & Adinoff, B. (2010). Tanning as a behavioral addiction. *The*

American Journal of Drug and Alcohol Abuse, *36*, 284-290.

doi:10.3109/00952990.2010.491883

Lazovich, D., Vogel, R. I., Berwick, M., Weinstock, M. A., Anderson, K. E., & Warshaw, E. M.

(2010). Indoor tanning and risk of melanoma: A case-control study in a highly exposed population. *Cancer Epidemiology, Biomarkers & Prevention*, *19*, 1557-1568.

doi:10.1158/1055-9965.EPI-09-1249

- Leary, M. R., Saltzman, J. L., & Georgeson, J. C. (1997). Appearance motivation, obsessive-compulsive tendencies, and excessive suntanning in a community sample. *Journal of Health Psychology, 2*, 493-499. doi:10.1177/135910539700200406
- Littleton, H. L., Axsom, D., & Pury, C. L. S. (2005). Development of the Body Image Concern Inventory. *Behaviour Research and Therapy, 43*, 229-241.
doi:10.1016/j.brat.2003.12.006
- Mosher, C. E., & Danoff-Burg, S. (2010a). Addiction to indoor tanning: Relation to depression, anxiety, and substance abuse. *Archives of Dermatology, 146*, 412-417.
doi:10.1001/archdermatol.2009.385
- Mosher, C. E., & Danoff-Burg, S. (2010b). Indoor tanning, mental health, and substance use among college students: The significance of gender. *Journal of Health Psychology, 15*, 819-827. doi:10.1177/1359105309357091
- Mosley, P. E. (2009). Bigorexia: Bodybuilding and muscle dysmorphia. *European Eating Disorders Review, 17*, 191-198. doi:10.1002/erv.897
- Muthén, L. K., & Muthén, B. (2010). Mplus 6.0. Los Angeles, CA: Muthén & Muthén.
- Nolan, B. V., & Feldman, S. R. (2009). Ultraviolet tanning addiction. *Dermatologic Clinics, 27*, 109-112. doi:10.1016/j.det.2008.11.007
- Nolen-Hoeksema, S. (2001). Gender differences in depression. *Current Directions in Psychological Science, 10*, 173-176. doi: 10.1111/1467-8721.00142
- O’Riordan, D. L., Field, A. E., Geller, A. C., Brooks, D. R., Aweh, G., Colditz, G. A., & Frazier, A. L. (2006). Frequent tanning bed use, weight concerns, and other health risk behaviors in adolescent females (United States). *Cancer Causes and Control, 17*, 679-686.
doi:10.1007/s10552-005-0453-9

- Petit, A., Karila, L., Chalmin, F., & Lejoyeux, M. (2014). Phenomenology and psychopathology of excessive indoor tanning. *International Journal of Dermatology*, *53*, 664-672.
doi:10.1111/ijd.12336
- Phillips, K. A. (2005). Clinical features and treatment of body dysmorphic disorder. *Focus*, *3*, 179-183. doi:10.1176/foc.3.2.179
- Phillips, K. A., Coles, M. E., Menard, W., Yen, S., Fay, C., & Weisberg, R. B. (2005). Suicidal ideation and suicide attempts in body dysmorphic disorder. *Journal of Clinical Psychiatry*, *66*, 717-725.
- Phillips, K. A., Conroy, M., Dufresne, R. G., Menard, W., Didie, E. R., Hunter-Yates, J., Fay, C., & Pagano, M. (2006). Tanning in body dysmorphic disorder. *Psychiatric Quarterly*, *77*, 129-138. doi:10.1007/s11126-006-9002-2
- Phillips, K. A., Didie, E.R., Feusner, J., & Wilhelm, S. (2008). Body dysmorphic disorder: Treating an underrecognized disorder. *American Journal of Psychiatry*, *165*, 1111-1118.
doi:10.1176/appi.ajp.2008.08040500
- Phillips, K.A., Pinto, A., Hart, A.S., Coles, M.E., Eisen, J.L., Menard, W., & Rasmussen, S.A. (2012). A comparison of insight in body dysmorphic disorder and obsessive-compulsive disorder. *Journal of Psychiatric Research*, *46*, 1293-1299.
doi:10.1016/j.jpsychires.2012.05.016
- Phillips, K. A., Siniscalchi, J. M., & McElroy, S. L. (2004). Depression, anxiety, anger, and somatic symptoms in patients with body dysmorphic disorder. *Psychiatric Quarterly*, *75*, 309-320. doi:10.1023/B:PSAQ.0000043507.03596.0d

- Poorsattar, S. P., & Hornung, R. L. (2007). UV light abuse and high-risk tanning behavior among undergraduate college students. *Journal of the American Academy of Dermatology, 56*, 375-379. doi:10.1016/j.jaad.2006.08.064
- Radloff, L. S. (1977). The CES-D scale a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.
doi:10.1177/014662167700100306
- Rief, W., Buhlmann, U., Wilhelm, S., Borkenhagen, A. D. A., & Brähler, E. (2006). The prevalence of body dysmorphic disorder: A population-based survey. *Psychological Medicine, 36*, 877-885. doi:10.1017/S0033291706007264
- Roberts, L. W., Battaglia, J., & Epstein, R. S. (1999). Frontier ethics: Mental health care needs and ethical dilemmas in rural communities. *Psychiatric Services, 50*, 497-503.
doi:10.1176/ps.50.4.497
- Romanoski, A. J., Folstein, M. F., Nestadt, G., Chahal, R., Merchant, A., Brown, C. H., ... & McHugh, P. R. (1992). The epidemiology of psychiatrist-ascertained depression and DSM-III depressive disorders Results from the Eastern Baltimore Mental Health Survey Clinical. *Psychological Medicine, 22*, 629-655.
- Sobanski, E., & Schmidt, M. H. (2000). Body dysmorphic disorder: A review of the current knowledge. *Child Psychology and Psychiatry Review, 5*, 17-24. doi:10.1111/1475-3588.00280
- Stapleton, J., Turrisi, R., & Hillhouse, J. (2008). Peer crowd identification and indoor artificial UV tanning behavioral tendencies. *Journal of Health Psychology, 13*, 940-945.
doi:10.1177/1359105308095068

- U.S. Census Bureau (2010). ZIP code area census 2010 urban rural interactive table. Washington, DC: Government Printing Office.
- Veale, D. (2004). Body dysmorphic disorder. *Postgraduate Medical Journal*, *80*, 67-71. doi:10.1136/pmj.2003.015289
- Wehner, M. R., Chren, M. M., Nameth, D., Choudhry, A., Gaskins, M., Nead, K. T., ... & Linos, E. (2014). International prevalence of indoor tanning: a systematic review and meta-analysis. *JAMA Dermatology*, *150*, 390-400. doi:10.1001/jamadermatol.2013.6896
- Wilhelm, S., Buhlmann, U., Hayward, L. C., Greenberg, J. L., & Dimaite, R. (2010). A cognitive-behavioral treatment approach for body dysmorphic disorder. *Cognitive and Behavioral Practice*, *17*, 241-247. doi:10.1016/j.cbpra.2010.02.001
- Wilhelm, S., Phillips, K. A., Fama, J. M., Greenberg, J. L., & Steketee, G. (2011). Modular cognitive-behavioral therapy for body dysmorphic disorder. *Behavior Therapy*, *42*, 624-633. doi:10.1016/j.beth.2011.02.002
- Young, W., Weckman, G., & Holland, W. (2011). A survey of methodologies for the treatment of missing values within datasets: Limitations and benefits. *Theoretical Issues in Ergonomics Science*, *12*, 15-43. doi:10.1080/14639220903470205