

RESEARCH NEWS

Body Dysmorphic Disorder: a Problem of Perception?

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Whenever Michael looked in the mirror, he saw nothing but baggy eyelids and dark circles under his eyes. He believed they had looked that way since he was born, but it really started to bother him when he entered high school. By that time he was so self-conscious he would skip class on days when he believed he looked particularly ugly. He spent hours each day checking his eyes in mirrors and applying different types of eye creams. He couldn't stop thinking about them. Michael was so fixated on his appearance that he couldn't focus in school and his grades suffered. This contributed to his depression, and he became more and more reclusive. His friends and family didn't understand how he felt about his eyes. They told him he looked fine and should just stop thinking about it, but Michael dismissed them as just trying to be nice. He was certain about what he saw. No one seemed to understand.

Michael suffers from body dysmorphic disorder (BDD), a severe psychiatric disorder that causes people to be preoccupied with perceived physical defects and believe they appear disfigured and ugly. They are so troubled by what they perceive that they often spend hours checking themselves in mirrors, avoiding others, or trying to change their appearance, including getting cosmetic procedures. They subsequently experience significant distress and are unable to function adequately in work, school, or relationships. People with BDD often become depressed, and in many cases suicidal¹.

BDD affects about 1.7% of the population², yet is vastly under-studied and under-recognized. Some evidence suggests it is related to obsessive-compulsive disorder (OCD) because of similarities in symptoms such as having obsessive thoughts and engaging in compulsive behaviors. In addition, BDD and OCD often afflict members of the same family. Some people even suffer from both disorders.

One of the most noticeable symptoms of BDD is the sufferer's distorted perception of his or her appearance. For example, a person with BDD might believe his nose is crooked, or that he has acne scars all over his face, or that his hair is thinning; yet no one else notices these "defects." Moreover, many people with BDD are so firmly convinced that these flaws exist that no one can talk them out of it. In essence, they are often delusional. This seems to be analogous to what people with anorexia nervosa experience when they perceive that they are fat, yet to everyone else they appear to be extremely thin. What could be causing them to experience this? Could there actually be something abnormal in the way their brains are processing visual information that could account for these perceptual distortions?

Up to this point, very little was known about the neurobiology of BDD. Prior to our current study, only two small brain imaging studies in BDD had been published^{3, 4}, but neither had specifically examined visual processing. Visual processing refers to the mechanism by which one's brain takes in visual information from the external world, identifies what the person is seeing, and interprets that information. Understanding the brain basis for apparent perceptual distortions perhaps could improve our understanding of BDD and lead to strategies for better treatments.

People with BDD most often are concerned with "defects" on their face and head⁵. They constantly check their appearance in mirrors, and often scrutinize others people's faces. They tend to focus primarily on details,

usually on their face, and are not able to see the “big picture” that overall they look normal. A previous study of people with BDD that involved drawing and copying complex figures also suggested that this was occurring⁶. Another study found that they have abnormalities in face processing⁷. The results of these studies, in combination with their pattern of symptoms, led us to investigate if abnormal visual processing in the brain was underlying distorted perceptions in BDD.

To study this, we used a type of brain scan called functional magnetic resonance imaging (fMRI) to compare the patterns of brain activity in BDD sufferers to that of healthy control subjects. In order to test their visual processing, we had them view digital photographs of other people’s faces while they were in the brain scanner. In this study, we tested other people’s faces (as opposed to their own) because we did not want them to experience anxiety, depression or shame that they normally experience when viewing their own face. So by making the task emotionally-neutral and by using visual stimuli other than their own faces, we could determine if there were more general visual processing abnormalities in people with BDD.

Our brains normally process visual details, such as edges depicting contours of the nose, eyes, eyelashes, skin blemishes, exact shape of the mouth, etc., with specific visual networks. Likewise, our brains process holistic or “big picture” elements (for example spatial relationships between facial features such as the relative position of the eyes to the mouth and the general shape of the face) with other specific visual networks. We predicted that people with BDD might have an imbalance in these networks, perhaps using more detailed processing and less holistic processing. Therefore, we digitally altered some of the photographs to create some images that had only low-detail (which look blurred) and others that had only high detail (which look like line-drawings) in addition to normal photos. By doing this, we were able to use these different photo stimuli to probe the activity in different visual networks.

We enrolled 12 adults with BDD and 13 healthy controls in the study. None of the participants were taking any medications or receiving cognitive-behavioral therapy. The subjects viewed digital photographs of faces on goggles while in the fMRI scanner. We instructed them to push a button to match the identity of the faces, to ensure they were attending to them. We later analyzed the data to compare the brain activity of the BDD subjects to that of the healthy controls.

The results were striking. People with BDD used primarily the left half of their brain (left hemisphere) to process the high-detail, low-detail, and normal face types. This was in stark contrast to the healthy controls, who used mostly their right hemisphere to process faces (like many other studies have shown). Only when the healthy controls viewed the high-detail faces did they start to use their left hemisphere, which was expected since normally people use their left hemisphere to process details and the right to process holistically. This imbalance in laterality would suggest that the brains of people with BDD might be attempting to extract details from all face types, even when they have no details. In addition, they had abnormal activity in the amygdala, a region in the brain that is involved in processing emotion and fear.

This left hemisphere-predominant pattern of visual processing may account for their symptoms of focusing on details at the expense of seeing the big picture. In essence, they may “lose the forest for the trees.” For example, this suggests that the brain of someone with BDD might detect details of their skin such as pores, but cannot adequately perceive that in the context of their overall face, these pores are actually very small and, in fact, barely noticeable. These people may suffer in large part because of this pattern of perception, combined with the fact that they may assume everyone else sees them similarly.

The results from this study are the first to demonstrate that distorted perception in BDD is associated with abnormal brain functioning. The fact that this occurred in people with BDD while they viewed others’ faces, suggests that there may be more general abnormalities in visual processing beyond a self, body image distortion. The amygdala finding also suggests possible abnormalities in emotional processing regions. However, we are still at a very early stage of understanding people with BDD and how their brains work. This was a small study, and additional studies need to be performed to further investigate abnormal brain processes. In addition, if future research confirms that abnormal perception is a feature of

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(Problem of Perception continued)

BDD, it is certainly not the only problem. People also tend to have obsessive thoughts and perform compulsive or avoidant behaviors. In addition, they often overvalue appearance in general, and have a tendency toward depression and social anxiety. Cultural and societal influences most certainly play a part as well.

Nevertheless, abnormal perception may be an important feature of BDD. With the generous support of a grant from the OC Foundation, we have been able to extend this line of research to a new study investigating how people with BDD process their own faces. We also have embarked on investigations of other aspects of visual processing and abnormalities in brain structure. We look forward to building on our findings with future discoveries that can provide us with a better understanding of symptoms that result in so much suffering. With this knowledge, we can then investigate how current standard-of-care treatments of medications and cognitive-behavioral therapy affect visual processing. The ultimate goal is to rationally develop new treatments such as specific perceptual retraining methods, to remediate these abnormal brain processes.

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