



Behavioral and neural impairments of frontotemporal dementia: Potential implications for criminal responsibility and sentencing



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ABSTRACT

Individuals in the early stages of the behavioral variant of frontotemporal dementia (bvFTD), a progressive neurodegenerative disorder marked by atrophy to the brain's frontal regions, exhibit severe disturbances to social and moral processing and decision-making after the onset of the disorder. These behavioral impairments, underlain by the neural deficits associated with the disorder, can often lead individuals with bvFTD to criminally offend. As such, behavioral and frontotemporal lobe abnormalities exhibited by offenders with bvFTD potentially represent several complex challenges for the legal system. This paper examines some of the ways in which the behavioral and neural impairments associated with bvFTD may influence issues surrounding the criminal responsibility, specifically legal insanity, and sentencing of offenders with bvFTD in the U.S. legal system. As there is very little literature in these areas concerning bvFTD, the existing academic dialogue on psychopathy, a disorder with similar behavioral symptoms and neural deficits, is used to frame the discussion on these issues.

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1. Introduction

Structural and functional abnormalities of the brain's frontal and temporal regions have historically been connected to social misconduct and antisocial behavior. The prefrontal cortex is vital for social and moral decision-making, and brain disorders involving structural and functional disruptions to this area can often lead to criminal offending (Sapolsky, 2004). This is the case for the behavioral variant of frontotemporal dementia (bvFTD), a progressive frontotemporal lobe neurodegenerative disorder marked by extreme changes to social, moral, and emotional behaviors, in its early stages. The average age of onset for bvFTD is in the mid to late 50s, and there is evidence that men are more often affected than women (Bush, 2014; Neary, Snowden, & Mann, 2005). FTD is thought to affect between 20,000 and 30,000 individuals in the U.S., with prevalence estimates of bvFTD ranging between 15 and 22 affected persons per 100,000 individuals in the 45 to 64 age range (Knopman & Roberts, 2011).

Unlike other neurodegenerative diseases, such as Alzheimer's disease or other forms of dementia, memory and cognition are most often spared in the early stages of bvFTD, and the main presentation of the disorder appears in the form of severe behavioral changes. Main features of bvFTD are loss of empathy, lack of remorse, lack of insight into one's behavior and the appreciation of potential consequences, and emotional blunting (Neary et al., 1998). Yet by far, the most pronounced and severe features of bvFTD are disturbances to social

and moral decision-making, profound difficulty in following legal and moral rules and norms, and, correspondingly, the commission of social and often legal transgressions. bvFTD patients most often can acknowledge that their behavior is considered morally, socially, or legally wrong but do not care or show remorse for their actions (Mendez, Anderson, & Shapira, 2005).

Unfortunately, these behavioral features of bvFTD often lead diagnosed individuals in the early stages of the disorder to contact with the criminal justice system (Mendez, 2010). Often, as the onset of bvFTD is in middle age, this is the first time that most individuals with the disorder become involved in the criminal justice system, and the majority has no previous criminal records (Liljegren et al., 2015). In one study that included 171 bvFTD patients, a criminal infraction was the first presentation of the disorder for 14% of the sample; overall, 37% of studied bvFTD patients had a history of criminality. Crimes committed by individuals with bvFTD ranged from traffic violations to property crimes to sexual crimes to acts of violence and homicide, and individuals with bvFTD were significantly more likely to commit both criminal and violent acts compared to individuals with other forms of dementia (Liljegren et al., 2015). Another study of bvFTD patients found over half had a criminal record, many including acts of violence (Diehl-Schmid, Perneczky, Koch, Nedopil, & Kurz, 2013). Additionally, numerous other smaller studies have reported a high incidence of criminal behaviors, including hypersexuality and aggression, associated with bvFTD (Diehl-Schmid et al., 2007; Miller, Darby, Benson, Cummings, & Miller, 1997; Mendez, 2010; Mendez et al., 2005).

The literature on bvFTD reports that offenders with the disorder, the disorder's behavioral features, and the neurobiological abnormalities and degeneration associated with bvFTD may represent multifaceted

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practical and theoretical challenges for the legal system moving forward, including potential questions surrounding criminal responsibility and sentencing (Diehl-Schmid et al., 2013; Mendez, 2009, 2010; Sfera, Osorio, Gradini, & Price, 2014). Yet very little has been written in this area. As the criminal behavior of bvFTD patients pose great societal and legal burdens on families, the criminal justice system, and society as a whole (Liljegren et al., 2015), it is extremely important to fully comprehend the nature and complexities of the possible challenges that offenders with bvFTD could pose to the legal system, including how knowledge of the neural abnormalities associated with the disorder may affect perceptions of offending behavior by individuals with bvFTD.

Further, literature has previously drawn parallels between bvFTD and the neural and behavioral impairments associated with psychopathy (Boccardi, 2013; Engelborghs, Vloeberghs, Maertens, Marescau, & De Deyn, 2004; Mendez, 2006; Mendez, Shapira, & Saul, 2011). Recent years have included a substantial amount of literature on the challenges that psychopathic offenders create for the legal system and how to best effectively handle, address, and prevent their offending. The growing amount of research on the neural abnormalities associated with psychopathy, contributing to impairments in emotion recognition, decision-making, morality, and empathy, has also generated further dialogue surrounding the means by which neuroscience research on psychopathy may affect conceptions of psychopathic offending and influence its prosecution in the legal system (Aharoni, Funk, Sinnott-Armstrong, & Gazzaniga, 2008; Glenn & Raine, 2009). As there has been virtually nothing yet written on bvFTD in these areas, it is likely that this existing dialogue on psychopathy can help to inform similar discussions relevant to offenders with bvFTD in the legal system. Additionally, the differences between psychopathy and bvFTD are integral in informing these discussions surrounding offenders with bvFTD.

Thus, using previous literature on psychopathy as a lens, this paper aims to preliminarily fill the gap in this literature by examining some of the ways in which the behavioral features and neurobiological abnormalities associated with the early stages of bvFTD may influence issues surrounding the criminal responsibility and sentencing of offenders with bvFTD. I will first review the behavioral and neural similarities between psychopathy and bvFTD, as well as distinguish differences between the two disorders. Then, informed by previous literature on psychopathy, I will focus on two areas where the behavioral features and neurobiological abnormalities of bvFTD may represent potential challenges for the legal system: responsibility and punishment. First, I will discuss questions of whether the behavioral and neural impairments of offenders with bvFTD could potentially meet standards for judgments of not guilty by reason of insanity. Second, I will examine whether traditional punishments may be obsolete or ineffective for offenders with bvFTD, and how neuroscientific and behavioral evidence, as well as societal perceptions, concerning bvFTD could potentially act as either mitigating or aggravating factors in sentencing.

2. Psychopathy and bvFTD

Literature has previously often drawn parallels between bvFTD and psychopathy in two areas: behavioral characteristics and neural abnormalities. Although it is not included in the *Diagnostic and Statistical Manual of Mental Disorders*, psychopathy has been traditionally considered a personality disorder that includes significant social, moral, and emotional deficiencies (Hare, 1996). Although there are several important differences between bvFTD and psychopathy, psychopathy and bvFTD are marked by many similar behavioral characteristics. Both include serious emotional, social, and moral impairments to decision-making and judgment, often leading to criminal transgressions, and individuals with the disorders lack empathy, lack remorse, have poor ability to learn from punishment, and often exhibit aggressive tendencies (Hare & McPherson, 1984; Mendez, 2010; Mendez & Shapira, 2009; Miller, 1987).

bvFTD patients and psychopaths both tend to retain the ability to understand and recognize what are considered moral, social, and legal rules and conventions in society, even after committing criminal acts, and perform normally on many moral dilemma tasks by using logical, rather than emotional, judgments in order to make appropriate moral decisions (Cima, Tonnaer, & Hauser, 2010; Mendez & Shapira, 2009). Both bvFTD patients and psychopaths understand the distinction between what is considered morally right and wrong, but do not care about such knowledge or the consequences that ensue from their morally inappropriate behaviors (Cima et al., 2010; Mendez & Shapira, 2009). Similar to bvFTD patients, the deficits associated with psychopathy make psychopathic individuals significantly more likely to criminally offend (Kiehl & Hoffman, 2010).

bvFTD and psychopathy are also marked by similar structural and functional neural abnormalities that are thought to contribute to the behavioral impairments of both disorders. Both bvFTD and psychopathy do include degrees of frontal lobe dysfunction, specifically structural and functional dysfunction of the ventromedial prefrontal cortex (vmPFC) and the orbitofrontal cortex (OFC) (Blair, 2007; de Oliveira-Souza et al., 2008; Rosen et al., 2002). In bvFTD, these areas are marked by extreme atrophy and, in about 40% of bvFTD cases, neurofibrillary tangles (Goedert, Ghetti, & Spillantini, 2012; Neary et al., 2005). The anterior temporal regions have also been implicated in both bvFTD and psychopathy. These functional and structural neural abnormalities are impairments to a larger neural circuit underlying moral and social decision-making, empathy and emotion processing, and reward and punishment association and processing (Ciarumelli, Muccioli, Ladavas, & di Pellegrino, 2007; Glenn, Raine, & Schug, 2009; Perry & Kramer, 2015; Seeley, Zhou, & Kim, 2012).

Yet there are some major differences between psychopathy and bvFTD. First, bvFTD patients do not develop the majority of the personality traits traditionally associated with psychopathy, such as purposeful maliciousness or deviousness, conscious manipulation of others, deception, grandiosity, and superficial charm (Mendez et al., 2005). Thus, although bvFTD and psychopathy include many of the same behavioral tendencies, they do not share the majority of personal characteristics. Second, bvFTD patients do not usually exhibit the instrumental aggression exhibited by psychopaths. The crimes of bvFTD patients are not always associated with disinhibition or impulsive acts but are most often related to reactive aggression and response to the environment (Mendez et al., 2005). bvFTD patients who criminally offend rarely connive or plot their crimes, unlike psychopaths who exhibit goal-directed aggression (de Oliveira-Souza et al., 2008).

Finally, a substantial amount of literature has reported that severe functional and structural abnormalities of the amygdala have been found to be associated with psychopathy (for a review, see Umbach, Berryessa, & Raine, 2015). For psychopathy, impairments to the amygdala are thought to largely contribute to corresponding behavioral deficits exhibited by psychopaths, such as poor fear conditioning (Blair, 2007). For bvFTD, the amygdala has largely not been investigated as a central structure involved in bvFTD compared to the frontal and temporal regions (Rosen et al., 2002). Thus, unlike psychopathy, it is unknown to what extent the damage to amygdala may be associated with the behavioral deficits exhibited by bvFTD, largely due to the absence of literature in this area. Even so, general evidence has indicated that amygdala is involved in social, moral, and emotional decision-making and behavior (Bickart, Dickerson, & Barrett, 2014). Therefore, although currently unknown, it is possible that potential changes to the amygdala during the progression of bvFTD may be involved, along with atrophy to the frontal and temporal regions, in the development of the previously described behavioral deficits of the disorder.

3. Responsibility

Regarding issues surrounding the legal responsibility of offenders with bvFTD, clinicians and those who research and treat the disturbances

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