

POST-PRINT

This is a post-print (post-refereed, final accepted) version of the manuscript that has been published in *Neuroethics*. The citation details and the link to the final publisher version are below.

Bell, Stephanie, Carter, Adrian, Mathews, Rebecca, Gartner, Coral, Lucke, Jayne and Hall, Wayne (2014) [Views of addiction neuroscientists and clinicians on the clinical impact of a 'Brain Disease Model of Addiction'](#). *Neuroethics*, 7 1: 19-27. doi:10.1007/s12152-013-9177-9

Published online: 19 January 2013

<http://link.springer.com/article/10.1007%2Fs12152-013-9177-9#page-1>

Views of Addiction Neuroscientists and Clinicians on the Clinical Impact of a 'Brain Disease Model of Addiction'

Stephanie Bell & Adrian Carter & Rebecca Mathews & Coral Gartner & Jayne Lucke & Wayne Hall

S. Bell : A. Carter : R. Mathews : C. Gartner : J. Lucke : W. Hall
University of Queensland Centre for Clinical Research, The University of Queensland,
QLD 4029 Brisbane, Australia

W. Hall
Queensland Brain Institute, The University of Queensland, QLD 4029 Brisbane, Australia

A. Carter (Corresponding author)
University of Queensland Centre for Clinical Research, Royal Brisbane and Women's Hospital Campus,
The University of Queensland, Herston Road, Herston,
Brisbane, Queensland 4029, Australia e-mail: adrian.carter@uq.edu.au

Abstract Addiction is increasingly described as a “chronic and relapsing brain disease”. The potential impact of the brain disease model on the treatment of addiction or addicted individuals’ treatment behaviour remains uncertain. We conducted a qualitative study to examine: (i) the extent to which leading Australian addiction neuroscientists and clinicians accept the brain disease view of addiction; and (ii) their views on the likely impacts of this view on addicted individuals’ beliefs and behaviour. Thirty-one Australian addiction neuroscientists and clinicians (10 females and 21 males; 16 with clinical experience and 15 with no clinical experience) took part in 1 h semi-structured interviews. Most addiction neuroscientists and clinicians did not uncritically support the use of brain disease model of addiction. Most were cautious about the potential for adverse impacts on individuals’ recovery and motivation to enter treatment. While some recognised the possibility that the brain disease model of addiction may provide a rationale for addicted persons to seek treatment and motivate behaviour change, Australian addiction neuroscientist and clinicians do not assume that messages about “diseased brains” will always lead to increased treatment-seeking and reduced drug use. Research is needed on how neuroscience research could be used in ways that optimise positive outcomes for addicted persons.

Keywords Addiction . Treatment . Attitudes . Qualitative research . Neuroscience . Brain disease

Introduction

There is a long but unresolved debate about the impact of increasing medicalization of certain behaviours, such as mental illness and overeating [1–4]. Special concerns have been raised about the medicalization of addiction and its likely impact on the ability of addicted persons to access treatment to reduce their drug use and the harm that it causes [e.g. 5, 6].

Addiction is increasingly being described by US researchers and the National Institute on Drug Abuse (NIDA) as a “chronic and relapsing brain disease” [7–9]. The evidence cited for this view includes research on the genetics of addiction liability and neurobiological changes in the brains of addicted animals and humans [e.g. 8, 10]. The American Society of Addiction Medicine (ASAM) has described addiction as a “chronic brain disease” [11]. Despite high profile support, the brain disease model (BDM) has not been universally accepted [12–14].

Advocates of the BDM of addiction believe that its acceptance will have a number of socially desirable consequences, namely, increasing public acceptance that addiction is a medical condition, increased access to medical treatment for these disorders, and reducing reliance on imprisonment [9, 15]. They also argue that it will reduce stigma associated with addiction and thereby increase treatment-seeking and improve compliance with treatment [9, 15].

There is some support for these claims. Individuals who see addiction as arising from a character flaw rather than a medical condition are less likely to seek treatment [16–18]. Similarly, endorsement of genetic or neurochemical causes of mental illness, including alcohol dependence, have been associated with greater public support for medical treatment and use of medication [19]. By contrast, those who believe environmental factors cause mental disorders, including addiction, are more likely to favour psychotherapeutic interventions [16, 20, 21].

Critics counter that the BDM may adversely affect addicted individuals and the outcomes of addiction treatment [12]. Satel, for example, has described the BDM “rhetoric” as “fatalistic”, encouraging addicted individuals to believe that they “can never fully free themselves of their drug and alcohol problems” [22–25]. Davies [26] argues that the BDM exculpates the addicted person from taking responsibility for their condition: “it’s not me, it’s my disease”. Critics are concerned that biological understandings of addiction and other mental disorders may suggest that these disorders are incurable [27] or untreatable [28], and will therefore reduce their willingness to seek treatment [29].

There is also some evidence to support these criticisms. In a recent survey of public attitudes towards the treatability of mental illnesses, those who accepted psychological explanations were more likely to see mental illnesses as curable, less debilitating, and less likely to require professional assistance or hospitalisation than those who supported biological explanations [30]. Brain-based biological explanations also led persons with these disorders to believe that their condition was harder to overcome than if they attributed them to psychological causes [30]. If these findings are also true for addiction, the BDM could well discourage treatment-seeking or quit attempts. Chapman and MacKenzie have argued that a risk of depicting smoking as a brain disease is that smoking will be seen as requiring drug-assisted cessation, thereby reducing self-quitting attempts [31]. In contrast, Walker has argued that if a person accepts they have a disease that is beyond their control, this may paradoxically empower them to seek external assistance rather than rely on personal willpower [32].

There has been little empirical assessment of the impact of the strong promotion of the BDM of addiction by NIDA, ASAM and others. We conducted qualitative interviews with leading addiction neuroscientists and clinicians in Australia to gauge the extent to which these experts accepted the brain disease model of addiction. We also explored their views on the likely impacts of the BDM on addicted individuals’ beliefs and behaviour.

Methods

Sample and Recruitment

We recruited 31 Australian addiction neuroscientists and clinicians (10 females and 21 males) using expert and quota sampling methods: 48 individuals were contacted with a participation rate of 65 %. The average age of the sample was 45 years (ranging from 29 to 65). A database of Australian addiction neuroscientists and clinicians (developed by the authors) was used in identifying participants. All participants were conducting neuroscience research on addiction in Australia at the time of recruitment. The sample was divided into those who had current or past clinical experience in treating addicted persons (hereafter clinicians, n=16) and those without clinical experience (hereafter non-clinicians or neuroscientists only, n=15). The neuroscientists (n=15) included a behaviour geneticist (n=1), psychopharmacologists (n=2), human pathologists (n=1), animal researchers (n=7), and cognitive neuroscientists/psychologists (n=4). The 16 addiction clinicians included psychiatrists (n=3), clinical psychologists (n=11) and physicians (n=2). The majority of the clinicians treated persons addicted to opioids, alcohol and psychostimulants (n=14). Only two reported treating behavioural addictions, such as compulsive overeating. Ethics approval was obtained from The University of Queensland Behavioural & Social Sciences Ethical Review Committee.

Qualitative Interviews

Participants took part in a 1-hour semi-structured interview during 2009 and 2010: 26 interviews were conducted face-to-face and 5 via telephone. The interview schedule involved open-ended questions about participants' views on addiction aetiology, treatment, research and the impact of addiction neuroscience research on policy and the addictions field. These questions were informed by extensive research on the ethical and social impact of neuroscience research on addiction by the research group [for example see 33, 34].

Coding

All interviews were transcribed verbatim and coded in QSR NVivo (Doncaster, Australia) version 9 using descriptive thematic analysis [see 35]. A detailed coding structure was developed by three members of the research team to reflect the primary themes of the interview data. This paper represents a subset of these primary themes. Two members of the research group coded data for the primary themes of how the BDM of addiction can impact: i) the treatment of addiction and ii) addicted individuals' drug use and treatment behaviour. Data coded within each primary theme was then revised to establish secondary themes (see Table 1).

Primary themes	Secondary themes
1. Treatment of addiction	Increased treatment seeking
2. Self understanding & treatment behaviour	Focus on medical interventions Ignore social drivers of addiction
3. Endorsement of BDM	Facilitates change: positive impacts Gain insight or makes sense of one's condition Relieve guilt Motivate treatment-seeking Empowering Hindering change: adverse impacts Incurable and learned helplessness Undermines self-control and removes responsibility
	Positive Negative Ambivalent

An iterative approach was used in which new data that challenged the existing coding structure were used to revise the secondary themes until no new themes emerged. The third member of the research group reviewed coded data to ensure accurate coding and resolved disagreements between the two initial coders.

During the analysis process it was noted that many participants highlighted both positive and negative influences. The coding structure was later amended to include a global assessment of each participant's views on the impact of BDM. Two authors (AC, SB) independently assessed participants' overall assessment of the impact of BDM of addiction. Participants were classified according to whether they thought the impact would be predominantly positive or negative. Participants were coded as positive (endorse) or negative (against) if they were unambiguously supportive or critical of the BDM. Those that gave both positive and negative responses to the impact of the BDM were coded as "ambivalent". Discrepancies in classification (6 of 31 interviews; agreement rate = 80 %) were resolved to reach a consensus assessment.

Results

The Treatment of Addiction

Most interviewees believed that the BDM could lead to increased treatment-seeking by addicted individuals, because a pharmacotherapy may be more appealing than psychological treatments:

“[Addicted individuals] seemed a lot more willing to come forward for [pharmacotherapy] than they were when it was just cognitive behaviour therapy ... I think that fits into sort of an idea that there might be a magic bullet that if you can fix my brain, you’ll fix the addiction” (Cognitive Neuroscientist 1, male)

At the same time, this respondent also believed that a focus on medical interventions could be at the expense of psychological or behavioural treatments:

“Once you make something a brain disease people tend to think that that makes them less amenable to psychological treatments.” (Cognitive Neuroscientist 1, male)

This risked promoting a one-sided, biological approach towards addiction which would have the ability to influence policy, although not necessarily always in a positive way. Another respondent believed that brain disease explanations could reduce efforts to address social factors that drive recruitment into drug addiction:

“The problem I have with the medical model is that it basically lets politicians off the hook about doing anything in really disadvantaged environments and neighbourhoods. It becomes something that is still placed within an individual kind of perspective and doesn’t take an environmental, social or political context.” (Clinical Psychologist 1, female)

While it may be an advantage of the BDM that addicted people are more willing to seek treatment, the concern was that they may have unrealistic expectations about treatment efficacy and limit the range of potential solutions. Addicted Individual’s Treatment Behaviour Neuroscientists and clinicians perceived a wide range of possible positive and negative effects of neuroscience models of addiction on addicted individuals. Some believed that the BDM can give addicted individuals insight about their condition and relieve associated guilt, thereby empowering them to seek treatment and change their behaviour. Others believed that its acceptance could produce learned helplessness and provide an excuse for not changing their behaviour.

Facilitates Change: Potential Beneficial Impacts on Addicted Individuals Gain insight or Makes Sense of Their Condition

Those with positive views of the BDM emphasised that knowledge of the BDM could give addicted individuals valuable “insight” into their condition and encourage them to “take it [their addiction and treatment] more seriously” (Clinical Psychologist 6, male)

A neurobiological explanation of addiction could help addicted individuals make sense of their situation, as in “other medical disorders where there’s clear biological underpinnings” (Addiction Psychiatrist 1, male). It “helps people to understand medicine a little” and “makes them clear about what’s going on

for them” (Addiction Psychiatrist 1, male). Another clinician said:

“When I explain it, it’s like a penny drops; it’s like, ah, that makes so much sense now...that’s what’s really happening, that makes total sense.” (Addiction Physician 3, male)

Relieving Guilt Participants also believed that an understanding of the BDM may reduce the guilt that addicted people often feel about their drug use. Accepting that addiction was a disease was seen as making the disorder “more acceptable” (Clinical Psychologist 4, female) and reducing perceived moral weakness. As one clinician remarked:

“It means I’m not a bad person, or a weak person, I’m not morally bad; it means there have been changes in my brain.” (Addiction Physician 3, male)

An animal researcher similarly remarked that:

“[The BDM] is actually a very big relief to them and removes some of the self-punishment that goes along with being an addict.” (Animal Researcher 3, male)

Motivating Treatment-Seeking Many interviewees believed that the BDM would motivate addicted individuals to seek treatment:

“It will give people a reason to say, okay, there’s a defined reason why I’m an addict and therefore it’s treatable” (Animal Researcher 2, male)

While respondents were critical of any treatment that was too focussed on medical approaches, they remained optimistic about the positive impact of the BDM in motivating addicted persons to seek help.

“I think it creates a sense of hope, and optimism, so I think that what we can say to people is that we are adopting an approach that will maximise your likelihood of success.” (Clinical Psychologist 8, male)

Empowering Many interviewees believed that the BDM may help addicted individuals to understand their behaviour and motivate behaviour change.

“When they know that what’s going on in their brain as a result of taking drugs, and they know

that when they are exposed to all the cues and triggers, that things happen in their brain that make it much harder for them to abstain from drugs. Having that understanding is empowering” (Animal Researcher 4, female)

Clinicians provided examples of patients who reported that the BDM explanations had given them the strength to resist urges to use drugs:

“I certainly know some clients have said that explanation really helped me and when I had an urge to drink I thought about that and it helped me; it sort of helped me delay the urge” (Addiction Physician 3, male)

One addiction clinician described patients using brain scan images to represent what they were fighting to change.

“We had a guy years ago who [asked for] ... ‘a picture of the bit in my brain that lights up when I crave so I can put it up on the fridge door and know that’s my enemy.’ ... It was a way of visualising for him the struggle that he was fighting ... For him it was really empowering.” (Addiction Psychiatrist 2, male)

Hindering Change: Potential Adverse Impacts on Addicted Individuals

A significant minority of interviewees, including those who highlighted the positive impact of the BDM, also believed that neurobiological explanations could impede the recovery of addicted persons.

Incurable and Learned Helplessness These experts believed that the BDM could foster a fatalistic attitude in affected persons that they were unable to control their life circumstances. “Disease” was seen as carrying a connotation that addiction was biological, allowing addicted persons to say “it’s all in my genes” (Psychologist 1, female) and that “the brain is responsible for the addiction” (Cognitive Neuroscientist 2, male). These interviewees believed that the BDM encouraged a sense of learned helplessness and the belief that one cannot change their behaviour: it’s a “done deal” (Clinical Psychologist 5, female), and “a permanent condition” (Psychopharmacologist 2, male), or simply “my brain’s f**ked” (Clinical Psychologist 7, female).

“Their own search for things, for information and for treatments can be completely shut down by this hearing from someone that it is a disease and you’re always going to have it and it gives them a sense of helplessness.” (Clinical Psychologist 4, female)

They believed this would undermine addicted individuals’ beliefs in the effectiveness of treatment:

“[I]t implies though that there’s no treatments or almost, that that’s it, that it’s a disease therefore, it’s just going to lead to deterioration and no light at the end of a tunnel. I think that, from a psychological point of view, that could potentially lead to learned helplessness.” (Clinical Psychologist 5, female)

These respondents believed that while the BDM can encourage some people to enter treatment, it could reduce the motivation of others to seek treatment.

Undermines Self-Control and Removes Responsibility Some participants believed that the BDM provided an excuse for drug use and undermined a sense of personal responsibility for it.

“If it’s a brain disease that means that there’s something wrong with people’s brains which means that they take no personal responsibility for what’s happening to them and therefore that excuses their behaviour.” (Addiction Psychiatrist 1, male)

Some felt that some addicted individuals found it attractive to believe that they lacked any control over their drug use. They gave examples of individuals who responded this way.

“When I’ve tried to explain to [addicted participants] that this is not an absolute thing, that the changes we see in the brain don’t make it absolutely impossible to control, that’s sometimes met with resistance

... 'It's not me that's doing it, it's my brain.' That's an attractive idea for people doing things which are either illicit or immoral." (Cognitive Neuroscientist 1, male)

One expert provided the following analogy:

"Oh well I slept with this cocktail waitress because I have a sex addiction. It's not because I'm naughty and because I could, because I was sick of my wife." (Addiction Physician 2, male) Endorsement of the BDM of Addiction

One third of the 31 subjects interviewed (n=10) strongly endorsed the BDM of addiction and they generally believed that it would have a predominantly positive impact upon addicted individuals and their treatment.

"I think it's overwhelmingly helpful, because people generally need some explanation that is reasonably scientifically based" (Human Neuropathologist 1, male)

The remaining two-thirds (n=21) expressed more negative (n=7) or a combination of positive and negative views about the impact of the BDM (n =14). Seven believed that the model was flawed and that its impact would be predominantly negative:

"It is fairly seriously flawed in all sorts of ways as a basic model. In particular it ignores all sorts of factors" (Psychologist 2, male)

"I think it's simplistic in the extreme" (Psychopharmacologist 2, male)

Nearly half (n=14) held more mixed or ambivalent views, describing the BDM as a "double-edged sword" (Cognitive Neuroscientist 2, male).

The clinicians were generally more sceptical than the neuroscientists about the BDM and its likely impact upon addicted individuals (See Fig. 1). Despite scepticism towards the BDM all but one of the clinicians reported making use of neuroscience explanations in treatment. When they did so they generally described the impact of chronic drug use on the brain:

"They have to understand a very basic concept about neurotoxicity. What's the drug doing to the brain?" (Behaviour Geneticist 1, female).

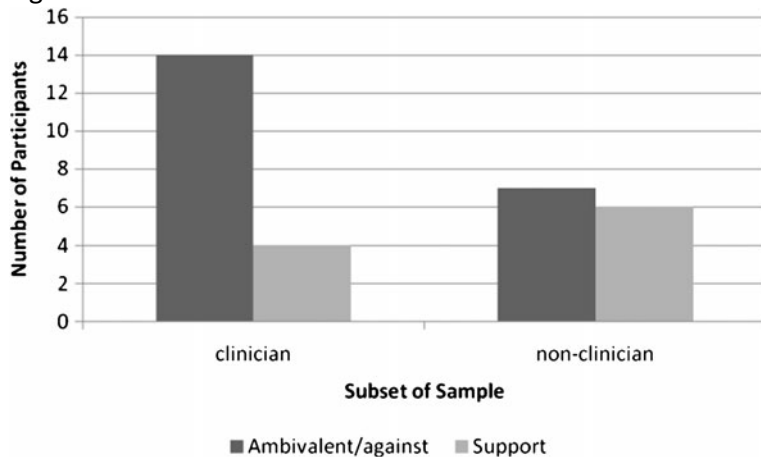
Discussion

This study assessed the perceived impacts of the brain disease model of addiction [11] among Australian addiction neuroscientists and clinicians. While our study indicated a preparedness within this group to explain addiction in terms of neurobiological changes brought on by drug use, their acceptance of the brain disease model was incomplete. This is consistent with previous studies of US clinicians and neuroscientists' views on the geneticisation of smoking [36]. It is also consistent with findings of studies of the acceptance and impact of brain disease explanations on opioid dependent individuals receiving pharmaceutical treatment [6].

Many of the interviewees were receptive to the findings of neuroscience research on addiction but their

opinions were more varied on whether this constituted a brain disease and the likely effects that the BDM would have on addicted individuals. Many believed the BDM could help addicted individuals to understand their own behaviour and may thereby facilitate behaviour change by: helping addicted people to gain insight into their condition; reducing guilt about their level of personal responsibility; and empowering them to seek treatment and resist drugs. The BDM was also seen as potentially reducing what many interviewees believed to be the damaging effects of moral views of addiction. The BDM was commonly spoken about as a useful rhetorical device for improving treatment of addiction and reducing the criminal punishment of individuals who needed treatment for their addiction.

Fig. 1 Interviewees overall endorsement of the BDM of addiction



This potential positive impact was seen to come at a cost however, with potential adverse impacts upon treatment and drug use for at least a subpopulation of addicted individuals. The most common concern was that it could hinder addicted individuals' behaviour change, reduce their willingness to enter treatment, undermine their ability to reduce drug use, and provide them with an excuse for not attempting to change their behaviour. These results reflect the ambivalence within the literature, and consistent with a recent study of opioid dependent individuals receiving pharmacological treatment [6]. Despite high profile support for the BDM of addiction by leading US scientists and clinicians, less than one third of the Australian neuroscientists and clinicians in this study strongly endorsed the model. These results contrast with the recent consensus statement of the US based ASAM which declared that addiction is a brain disease [11].

The lack of strong support for the BDM of addiction in our study may reflect differing attitudes between neuroscientists and clinicians in Australia and the US. These nations have different approaches to drug policy: harm minimisation has long been a key part of Australian drug policy while abstinence and zero tolerance have been more marked in the US [37, 38]. Future research is needed to determine if our findings generalise to similar samples of experts in the US, UK, Europe, and Canada.

Despite scepticism of the BDM of addiction, all but one of the clinicians we surveyed reported making some use of neuroscience explanations when treating addicted individuals. This probably reflects a more nuanced understanding of neuroscience research among clinicians who acknowledge the impact that chronic drug use has on brain and cognition but do not uncritically accept the strong form of the BDM advocated in the USA. These clinicians believed that neuroscience research could be useful in

treating addicted individuals but that it must be used in ways that do not adversely affect treatment outcomes. Further research is required to determine when and how best to present neuroscience research to addicted patients.

Limitations

This study has a number of limitations. First, it is unlikely that the views of our sample will generalise to all staff involved in addiction treatment (e.g. counsellors, especially those who are recovering). It is also uncertain how our findings may apply to clinicians and researchers in other countries.

Second, this study examined views about addiction in general, and did not investigate impacts of the BDM on persons with specific types of addiction. The majority of the clinicians we spoke to treated alcohol, opioid and psychostimulant addiction, and so our findings may reflect attitudes towards these addictions. Possible differences in the impact of the BDM on specific addictions, such as nicotine addiction and the behavioural addictions, need to be examined in subsequent studies. Interviews with members of the public, for example, suggest greater resistance to the brain disease view of nicotine than alcohol and opioid addiction [39, 40].

Third, all of the clinicians in our study were engaged in neuroscience research to some degree, which could have biased our sample's responses. Pinto et al. [41] found that clinicians involved in research were more willing to use research findings in treatment and had a more positive view about their impact. Future research could use quantitative measures in a larger sample to compare level of endorsement of the BDM of those with a solely clinical background and those with a solely research background.

Fourth, the views of clinicians and neuroscientists about the impact of the BDM on addicted patients may not coincide with the views and behaviour of addicted individuals. Research with addicted individuals is critical if we wish to understand how neuroscience affects addicted individuals' beliefs about addiction, drug use and quitting [6].

Conclusion

Despite promotion of the BDM of addiction in the USA by NIDA and ASAM, we found that only a minority of addiction neuroscientists and clinicians uncritically support a BDM of addiction. While most saw some value in neuroscience research on addiction, many were concerned about the potential adverse impacts of the BDM on addicted individuals' motivation to enter treatment and recovery. There was a belief that the BDM of addiction may provide a rationale for addicted persons to seek treatment and reduce stigma that impedes treatment-seeking. Whether this belief transfers into practice is an empirical question. Public attitude studies suggest that the relationship may not be as straightforward as advocates of the BDM assume [42].

Neuroscience research, particularly brain imaging can be extremely seductive and persuasive. It may influence our expectations of the clinical effectiveness of treatments [43, 44], people's self-perception [45], our judgment of facts [46, 47], and our understanding of moral decision-making [48]. Given this power, we should not assume that messages about "diseased brains" will always lead to increased treatment-seeking and reduced drug use. Messages about neuroscience research need to be tailored to individuals to foster better choices and health outcomes and avoid negative consequences. This requires information on how addicted individuals interpret this research. More research is needed to

understand how addicted individuals understand and respond to neuroscience research of addiction, and how best to present this research to optimise treatment and reduce unintended adverse consequences.

Acknowledgments The research presented in this paper was funded by Fellowships awarded to Dr Carter and Professor Hall by the National Health and Medical Research Council of Australia (Grant IDs 628935 and 569738 respectively). We would like to thank Anke Snoek, Carla Meurk and Daniel Buchman for comments on an earlier draft of this paper.

Declaration of Conflicting Interests The Authors declare that there is no conflict of interest.

References

- Illich, I. 1976. *Medical nemesis: the expropriation of health*. New York: Random House.
- Clarke, A.E., J.K. Shim, L. Mamo, J.R. Fosket, and J.R. Fishman. 2003. Biomedicalization: Technoscientific transformations of health, illness, and U.S. biomedicine. *American Sociological Review* 68: 161–194.
- Conrad, P. 1992. Medicalization and social control. *Annual Review of Sociology* 18: 209–232.
- Parr, J., and N. Rasmussen. 2012. Making addicts of the fat: obesity, psychiatry and the ‘fatties anonymous’ model of self-help weight loss in the post-war United States. *Critical perspectives on addiction* (series volume 14), 181–200. Bingley: Emerald Group Publishing Limited.
- Midanik, L. 2006. *Biomedicalization of alcohol studies: Methodological shifts and institutional challenges*. New Brunswick: Transaction Publishers.
- Netherland, J. 2011. “We haven’t sliced open anyone’s brain yet”: Neuroscience, embodiment and the governance of addiction. In *Sociological reflections on the neurosciences* (advances in medical sociology, volume 13), ed. M. Pickersgill and I. Van Keulen, 153–177. Bingley: Emerald Group Publishing Limited.
- Leshner, A.I. 1997. Addiction is a brain disease, and it matters. *Science* 278: 45–47.
- Volkow, N.D., and J.S. Fowler. 2000. Addiction, a disease of compulsion and drive: involvement of the orbitofrontal cortex. *Cerebral Cortex* 10: 318–325.
- McLellan, A.T., D.C. Lewis, C.P. O’Brien, and H.D. Kleber. 2000. Drug dependence, a chronic medical illness: implications for treatment, insurance, and outcomes evaluation. *Journal of the American Medical Association* 284: 1689–1695.
- Volkow, N.D., and T.K. Li. 2004. Drug addiction: the neurobiology of behaviour gone awry. *Nature Reviews Neuroscience* 5: 963–970.
- ASAM. 2011. *Public policy statement: definition of addiction* (long Version). Chevy Chase, MD: American Society of Addiction Medicine; Contract No.: Document Number |.
- Cunningham, J.A., and J. McCambridge. 2012. Is alcohol dependence best viewed as a chronic relapsing disorder? *Addiction* 107: 6–12.

- Vrecko, S. 2010. Birth of a brain disease: science, the state and addiction neuropolitics. *History of the Human Sciences* 23: 52–67.
- Vrecko, S. 2010. “Civilizing technologies” and the control of deviance. *BioSocieties* 5: 36–51.
- Dackis, C., and C. O'Brien. 2005. Neurobiology of addiction: treatment and public policy ramifications. *Nature Neuroscience* 8: 1431–1436.
- Cunningham, J.A., L.C. Sobell, and V.M. Chow. 1993. What’s in a label? The effects of substance types and labels on treatment considerations and stigma. *Journal of Studies on Alcohol* 54: 693–699.
- Moyers, T.B., and W.R. Miller. 1993. Therapists’ conceptualizations of alcoholism: measurement and implications for treatment decisions. *Psychology of Addictive Behaviors* 7: 238.
- Varney, S.M., D.J. Rohsenow, A.N. Dey, M.G. Myers, W.R. Zwick, and P.M. Monti. 1995. Factors associated with help seeking and perceived dependence among cocaine users. *The American Journal of Drug and Alcohol Abuse* 21: 81–91.
- Pescosolido, B.A., J.K. Martin, J.S. Long, T.R. Medina, J. Phelan, and B. Link. 2010. “A disease like any other?”: a decade of change in public reactions to schizophrenia, depression, and alcohol dependence. *The American Journal of Psychiatry* 167: 1321–1330.
- Kuppin, S., and R.M. Carpiano. 2006. Public conceptions of serious mental illness and substance abuse, their causes and treatments: findings from the 1996 general social survey. *American Journal of Public Health* 96: 1766–1771.
- Cunningham, J.A., J. Blomqvist, and J. Cordingley. 2007. Beliefs about drinking problems: results from a general population telephone survey. *Addictive Behaviors* 32: 166–169.
- Satel, S. 1999. The fallacies of no-fault addiction. *Public Interest*: Winter: 52–67.
- Satel, S. 2006. For addicts, firm hand can be the best medicine. *New York Times*. 15 August: <http://query.nytimes.com/gst/fullpage.html?res=9D07E4DB173EF936A2575BC0A9609C8B63&scp=1&sq=For%20addicts,%20firm%20hand%20can%20be%20the%20best%20medicine&st=cse>. Accessed 16 May, 2011. Archived at <http://www.webcitation.org/62jXgGGxv> on 27 October, 2011.
- Satel, S., and S. Lilienfeld. 2007. Medical misnomer: addiction isn’t a brain disease, *Congress. Slate*. 2 August: http://www.slate.com/articles/health_and_science/medical_examiner/2007/07/medical_misnomer.html. Accessed 2 August 2007. Archived at <http://www.webcitation.org/62jYPAQv1> on 27 October, 2011.
- Satel, S.L. 2001. Is drug addiction a brain disease? In *Drug addiction and drug policy: the struggle to control dependence*, ed. P. Heymann and W. Brownsberger, 118–143. New York: Harvard University Press.
- Davies, J.B. 1998. Pharmacology versus social process: competing or complementary views on the nature of addiction? *Pharmacology & Therapeutics* 80: 265–275.
- Herrman, H. 2001. The need for mental health promotion. *The Australian and New Zealand Journal of Psychiatry* 35: 709–715.
- Phelan, J.C. 2002. Genetic bases of mental illness—a cure for stigma? *Trends in Neurosciences* 25: 430–431.
- Kessler, R.C., C.B. Nelson, K.A. McGonagle, M.J. Edlund, R.G. Frank, and P.J. Leaf. 1996. The epidemiology of cooccurring addictive and mental disorders: implications for Prevention and

- Service Utilization. *The American Journal of Orthopsychiatry* 66: 17–31.
- Lam, D.C.K., P.M. Salkovskis, and H.M.C. Warwick. 2005. An experimental investigation of the impact of biological versus psychological explanations of the cause of “mental illness”. *Journal of Mental Health* 14: 453–464.
- Chapman, S., and R. MacKenzie. 2010. The global research neglect of unassisted smoking cessation: causes and consequences. *PLoS Medicine* 7: e1000216.
- Walker, M.J. 2010. Addiction and self deception: a method for self control? *Journal of Applied Philosophy* 27: 305– 319.
- Carter, A., B. Capps, and W. Hall. 2009. *Addiction neurobiology: ethical and social implications*. Lisbon: European Monitoring Centre for Drugs and Drug Addiction.
- Carter, A., and W. Hall. 2012. *Addiction neuroethics: the promises and perils of neuroscience research on addiction*. London: Cambridge University Press.
- Rhodes, T., and R. Coomber. 2010. Qualitative methods and theory in addictions research. *Addiction research methods*, 59–78. Oxford: Wiley Blackwell.
- Dingel, M.J., K. Karkazis, and B.A. Koenig. 2011. Framing nicotine addiction as a “disease of the brain”: social and ethical consequences. *Social Science Quarterly* 92: 1363– 1388.
- Bammer, G., W. Hall, M. Hamilton, and R. Ali. 2002. Harm minimization in a prohibition context— Australia. *Annals of the American Academy of Political and Social Sciences* 58: 80–93.
- Ritter, A., and J. Cameron. 2007. Australian clinician attitudes towards contingency management: comparing down under with America. *Drug and Alcohol Dependence* 87: 312–315.
- Meurk, C., A. Carter, W. Hall, and J. Lucke. 2012. Public understandings of addiction: the impact of addiction neuroscience research. *Neuroethics* under review.
- Morphett, K., J. Lucke, C. Gartner, A. Carter, C. Meurk, and W. Hall. 2012. Public attitudes towards the treatment of nicotine addiction. *Nicotine and Tobacco Research* under review.
- Pinto, R.M., G. Yu, A.Y. Spector, P. Gorroochurn, and D. McCarty. 2010. Substance abuse treatment providers’ involvement in research is associated with willingness to use findings in practice. *Journal of Substance Abuse Treatment* 39: 188–194.
- Sartorius, N. 2010. Short-lived campaigns are not enough. *Nature* 468: 163–165.
- Racine, E., S. Waldman, N. Palmour, D. Risse, and J. Illes. 2007. “Currents of hope”: neurostimulation techniques in U.S. and U.K. print media. *Cambridge Quarterly of Healthcare Ethics* 16: 312–316.
- Singh, J., J. Hallmayer, and J. Illes. 2007. Interacting and paradoxical forces in neuroscience and society. *Nature Reviews Neuroscience* 8: 153–160.
- Racine, E., S. Waldman, J. Rosenberg, and J. Illes. 2010. Contemporary neuroscience in the media. *Social Science and Medicine* 71: 725–733.
- Weisberg, D.S., F.C. Keil, J. Goodstein, E. Rawson, and J.R. Gray. 2008. The seductive allure of neuroscience explanations. *Journal of Cognitive Neuroscience* 20: 470– 477.
- McCabe, D.P., and A.D. Castel. 2008. Seeing is believing: the effect of brain images on judgments of scientific reasoning. *Cognition* 107: 343–352.
- Greene, J.D., R.B. Sommerville, L.E. Nystrom, J.M. Darley, and J.D. Cohen. 2001. An fMRI investigation of emotional engagement in moral judgment. *Science* 293: 2105–2108.