

NHMRC Australia Fellowship 569738 award to Professor Wayne Hall 2009-2013 postprint

Meurk, C., Hall, W., Morphett, K., Carter, A., & Lucke, J. (2013). What does 'acceptance' mean? Public reflections on the idea that addiction is a brain disease. *Biosocieties*, 8, 491-506.

Abstract

Public responses to the dissemination of neuroscientific explanations of addiction and other mental disorders are an interesting sociocultural phenomenon. We investigated how 55 members of the Australian public deliberated on the idea that 'addiction is a brain disease'. Our findings point to the diverse ways in which the public understands and utilises this proposition. Interviewees readily accepted that drugs affect brain functioning but were ambivalent about whether to label addiction as a 'disease'. Contrary to the prediction of neuroscientific advocates and social science critics, acceptance of a neurobiological conception of addiction did not necessarily affect beliefs about addicted persons' responsibility for their addiction. We discuss the theoretical and applied implications of these findings. Theoretically, we examine the complexity surrounding how people adopt new knowledge and its role in reshaping ethical beliefs. We also discuss the implications of these findings for the ethics of communication of neuroscientific information to reduce stigma and enhance social support for the treatment of addicted individuals.

Introduction

Public 'acceptance' of neuroscientific discourses on addiction: Empirical Evidence

Developments from the fields of neuroscience have the potential to influence how addiction is understood, particularly in relation to concepts of 'mental illness' and 'disease', and neuroscientific concepts and language are filtering into public understandings of 'mental illness' in a variety of ways (Rose, 2007; Bröer and Heerings, 2013). As Angermeyer et al (2011) have shown, in a number of OECD countries there has been increased public preparedness to accept biogenetic (including neurobiological) explanations of schizophrenia, depression and alcohol dependence. However, trends in the public's acceptance of neurobiological information are not uniform across mental disorders (Schnittker, 2008; Pescosolido et al, 2010; Easter, 2012; Rüscher et al, 2012). Surveys from North America and the United Kingdom show that whereas over three-quarters of the population will label schizophrenia, bipolar disorder and depression as 'mental illnesses', only one-half are prepared to label alcohol dependence or drug abuse in the same way (Pescosolido et al, 2010; Rüscher et al, 2012). Furthermore, there is incomplete concordance between preparedness to describe conditions as 'mental illnesses' and to accept neurobiological explanations of them (Pescosolido et al, 2010; Rüscher et al, 2012).

Commentators have expressed a range of views on the desirability of encouraging the public to embrace a neurobiological understanding of addiction. These range from optimistic beliefs in the ability of neuroscience to provide greater medical treatment of addiction and drug use (for example, Leshner, 1997) to concerns that neuroscientific explanations and treatments may marginalise other approaches to knowing and treating addiction and may limit responsibility to the addicted person (for example, Dingel et al, 2011). Some leading researchers have argued that increased public acceptance of a neurobiological conception of addiction will have important ethical implications for reducing stigma and thereby improving

treatment outcomes for addicted individuals (Lebowitz and Ahn, 2012), beliefs that are used to justify neuroscience education campaigns (Vrecko, 2010a). Some empirical studies support the possibility of realising the destigmatising aspirations of addiction neuroscience proponents (Furnham and Rees, 1988; Mehta and Farina, 1997), whereas more recent studies do not (Lam et al, 2005; Angermeyer et al, 2011).

The social operation of neuroscientific discourse: Interpreting 'acceptance'

One rationale for thinking that a neurobiological conception of addiction will reduce stigma is described by attribution theory. Attribution theory suggests that "low causal responsibility for a stigmatized characteristic [...] is associated with less blame and more positive emotions" (Phelan, 2005, p. 309). In other words, the assignation of blame for an outcome (for example, becoming or remaining addicted) will diminish if the behaviour is attributed to a characteristic over which an individual is considered to have limited control (for example, ones genetically determined constitution) (Phelan, 2005). However, as Phelan (2005) herself has demonstrated, a biological conception of mental illness may have multiple moral effects, including stigmatisation, particularly if the behaviour is seen as untreatable and the affected person is seen as likely to cause harm (Phelan and Link, 2012).

In a more general sense, Rose (2007) too has suggested a close relationship between holding certain understandings of the body and the shaping of a new style of ethics, which he terms somatic ethics. Although careful to note that such knowledge has not completely displaced older understandings, Rose emphasises how biological understandings have come to dominate other forms of public knowledge and subjects' (normative) beliefs in ways that both construct and impel certain kinds of governance of 'biological citizens'. The project of disseminating scientific knowledge to the public is one vehicle for this that Rose identifies, and such a mindset appears explicitly evident in some neuroscientists' advocacy of the enhancement of public understandings (Lebowitz and Ahn, 2012).

In contrast, a number of authors have emphasised the limitations of new biological understandings, suggesting that biogenetic and neurobiological discourses may be incorporated into existing understandings of personhood, health and illness in dynamic and nondeterministic ways (Schnittker, 2008; Easter, 2012). O'Connor and Joffe (2013) point out that the impact of neuroscientific knowledge cannot be assessed by focussing solely on the uptake of neuroscientific narratives, but rather by looking at how individuals reconcile these narratives with pre-existing narratives of personhood. On the other hand, Vrecko (2010a, b) illustrates the importance of understanding the social and historical contexts that have produced addiction neuroscience. Finally, as Pickersgill et al (2011) state, although the brain is an object of interest and significance for many, it is not "some magnificent epicentre of subjectivity, but [rather] an object of mundane significance" (p. 362). In a variety of ways, these scholars problematise the idea that public acceptance of neuroscientific understandings will entail the ethical and social effects, promised by their proponents or feared by their critics, in a linear or deterministic fashion.

Given the complex ways in which new discourses may be adopted, how do we understand what public acceptance of neurobiological understandings will mean? In theorising how neuroscientific discourse operates in relation to pre-existing discourses, Pickersgill et al (2011, p. 362) draw upon the metaphorical bricoleur (the bricklayer) to describe how

individuals assemble discourses (including neuroscientific discourses) out of older ones. Bricolage evokes a systematic building of diverse discourses in shaping a solid body of knowledge, beliefs or practice. Bröer and Heerings (2013) offer a discourse resonance model to understand how individuals integrate or reject novel perspectives. They focus on the agency of the individuals in their selection of publically circulating explanations based on how well they resonate – consonantly, dissonantly or autonomously – with their pre-existing understandings. While conceptualising how neuroscientific and other discourses may be integrated, such theories have not explained how ontological and normative conceptions interact. While Rose (2007) explains how new biological understandings – where biology is no longer taken to be immutable – foster a new kind of ethics, those who offer context-based accounts of the impact of neuroscientific knowledge have not offered an alternative explanation as to how new understandings of personhood and the body relate to normative judgements. Latour's (2008) idea of the 'cautious designer' offers a useful reconceptualisation of Levi-Strauss' bricoleur in thinking of how certain kinds of personhood may be influenced by neuroscientific discourses as well as particular ethical concerns. In contrast to the bricklayer, the designer compiles discourse by refashioning less solid ontologies and identities for symbolic, utilitarian, ethical and aesthetic reasons. The designer's ethical pre-conceptions may, therefore, shape their ontological conceptions of the body as much as their ethical beliefs derive from their ontological ones. To understand the 'cautious designer', one need not offer an account of dominant cultural narratives or 'read' shifting cultural norms but look to explain certain cause and effect relationships in the way discourses are comprised.

Here, we investigated what 'acceptance' of the idea that addiction is a brain disease entailed and how acceptance of this belief was related to ethical beliefs. We are an interdisciplinary team with expertise in neuroscience, ethics, psychology, population health and anthropology interested in the public policy and public health implications of addiction neuroscience and our motivations were twofold: first, to offer theoretically informed analyses that contribute to a dialogue between advocates of addiction neuroscience, social scientists, neuroethicists and the broader public on addiction neuroscience; second, to meaningfully engage with the public in shaping social contexts that support the treatment of addicted individuals and minimise the harms of drug use (Kearnes et al, 2006; Kurath and Gisler, 2009).

Methods

Recruitment and interviewing

Following ethical clearance from the University of Queensland Behavioural and Social Sciences Ethical Review Committee, 55 qualitative interviews were conducted by a market research company during 2011 with a representative sample of individuals residing in the Greater Brisbane region of Australia (full details of the study methodology have been reported elsewhere (Meurk et al, 2013b)). The interview guide, devised by Assistant Professor Jayne Lucke and Dr Adrian Carter in consultation with Professor Wayne Hall, investigated participants' (Table 1) views on addiction, their beliefs about addicted individuals' control and responsibility for their drug use and the treatment and prevention of addiction, and their acceptance of the claim that addiction is a brain disease.

The interview began with a broad discussion about addiction in which interviewees were not prompted with questions about addiction and the brain. Only after this often extensive discussion were participants asked explicitly about their knowledge of, and attitudes towards,

the 'brain disease' model of addiction. In order to prompt this discussion, interviewees were provided with the following information:

One idea that's been discussed recently by addiction experts is the idea that addiction is a brain disease. So the idea that when someone uses a drug repeatedly, it can change the way the brain works in ways that are not easily reversed. This has been shown in studies using animals and from studies looking at images of the brains of people who are addicted to drugs.

Participants were then asked:

Before today were you aware of this idea of addiction as a brain disease?

Do you agree or disagree with the idea that addiction could be a brain disease?

Why is that?

Does the idea that addiction could be a brain disease change the way you view someone with an addiction?

Why is that?

As these questions were asked towards the end of the interview, many participants were in a reflexive state of mind and they pondered the information given and the questions posed that they verbalised to the interviewer. Those who reported prior awareness of the brain disease model were asked where they had heard of the idea before and discussed their perception of what it meant, based on their prior knowledge. Those who had not heard of this idea before were asked to deliberate over its plausibility and its potential ethical entailments. Our aim in providing this prompt for participants was not to replicate the knowledge that those with a prior awareness may have picked up through the media, their own research or experience. Instead, the prompt allowed us to glean information about the processes by which people assess, and potentially adopt, novel ideas. By combining the responses of those with prior awareness of the brain disease model of addiction with those who did not, we were able to develop a nuanced understanding of the deliberative processes members of the public go through in assessing scientific claims.

Coding and analysis

Our approach to analysis blended the epistemological lenses of psychology and anthropology. Responses to questions related to the brain disease statement were read by Dr Carla Meurk and a set of codes generated to categorise and quantify: the extent of the sample's awareness of, and agreement with, the brain disease model of addiction; participants' perceptions of ways in which the brain disease model of addiction may affect judgements of addicted individuals. Thematic codes were derived that illuminated qualitatively the kinds of deliberations and reasoning that participants employed as they considered the relevance of the 'brain' to addiction. Here, we were influenced by the concept of 'think-aloud' or 'talkaloud' approaches that seek to dissect verbalised reasoning processes (Fonteyn et al, 1993).

We used standard thematic analysis to understand the definition and applicability of the term 'disease' to addiction and to identify the entailments participants thought followed from viewing addiction as a brain disease. Coding frames were discussed by all authors. Kylie Morphett and Professor Wayne Hall validated the coding by corroborating the categorisation of data and critically appraising data that had not been coded and excluded from analysis. The relevance of any discrepancies and omissions noted were discussed to reach consensus and analysis was modestly revised as a result.

The influence of a psychological perspective on the production of this text was evident in three ways. First, the personal, intimate engagement between participant and researcher valued in anthropological and qualitative sociological traditions was not a valued aspect of the data collection process that was here outsourced to an external provider (cf. Broom et al, 2009). Second, high importance was placed on the ‘reliability’ of analysis and double coding of data was carried out resulting in a highly structured process for discussing agreements and disagreements over coding. Third was the preference for an efficient writing style that separated the description of empirical findings from a discussion of their implications. This resulted in a less discursive empirical description than is common to anthropological (and/or sociological) modes of writing. In imposing restrictions on elaborating from interview excerpts within the body of the findings, the present text reacts against an overtly interpretive mode of analysis.

While both the process of analysis and presentation of findings were distinctive from an anthropological (particularly ethnographic) style of investigation and writing, this text reflects a post-structural anthropological gaze in prioritising concrete description of situated discursive practices over commentary on cultural norms (cf. Van Velson, 1967). In this way, the empirical bent of both psychological and anthropological perspectives come together, despite different commitments regarding methods of data collection and analysis.

Findings

Neuroscience information in spontaneous depictions of addiction aetiology among respondents

Findings presented here build on our analysis of this sample’s ‘naturally occurring’ depictions of addiction – that is, how this sample depicted addiction before being asked specific questions about addiction and the brain – reported elsewhere (Meurk et al, 2013b). In this previous work, we were interested in conceptualising the ‘impact’ of neuroscience information based on the public’s unprompted accounts of addiction aetiology. Consistent with others’ findings (Netherland, 2011; Pickersgill et al, 2011; Bröer and Heerings, 2013; O’Connor and Joffe, 2013), our interviewees saw the causes of addiction as multifactorial. We described participants’ views as arising from various combinations of six causes that, in descending order of prevalence, were: ‘character’ (poor choices, lack of willpower and/or a weak or addictive personality); ‘emotion-experience’ (a drive for the ‘thrill’ or the ‘buzz’ and/or using drugs to escape or erase a traumatic past or obliterate the present); ‘social-environment’ (linked to certain forms of social dysfunction at various scales from the family to broader society and culture); ‘rational-learning’ (resulting from learned behaviour and knowledge); ‘biologicalbody’ (linked to genetic predispositions, the brain, an individual’s biology and/or ‘chemical imbalances’); and the addictive properties of the drugs themselves. We concluded that the layering of different causal factors suggested that although popular neuroscientific discourses were readily incorporated into pre-existing understandings of addiction, they had not displaced older understandings and so had limited ‘impact’.

Having identified these six ‘ontological domains’ (Karasaki et al, 2013) in examining how neuroscientific understandings could be said to have ‘impacted’ upon public understandings

of addiction, we examine the issue here from a slightly different angle by looking at the discursive processes that underpin 'acceptance' and how ontological beliefs might shape ethical conceptions and vice versa. Initially, 51 per cent of participants identified the 'brain' as important in understanding addiction. When subsequently presented with the brain disease statement, 60 per cent claimed to be aware of the idea that addiction is a brain disease; a further 11 per cent claimed partial awareness or were unsure in their responses. A total of 55 per cent of participants agreed with or accepted the idea that addiction is a brain disease after they were presented with the brain disease statement, whereas a further third (38 per cent) tempered their agreement by suggesting the brain disease model offered a plausible hypothesis or a partial explanation of addiction. Those who claimed prior awareness of the brain disease model of addiction reported that this was acquired through some, or all, of the following channels: 53 per cent cited that their knowledge came from the media (television, news, radio or Internet), 33 per cent through personal networks or experiences of addiction, 17 per cent from formal education and/or 13 per cent professional experience.

The majority of participants therefore 'accepted' the brain as a relevant factor in addiction. Yet, an extensive diversity of views underpinned this acceptance as was evident through the different deliberative processes employed by participants (Fonteyn et al, 1993). Participants' responses to the brain disease statement afforded the chance to investigate how multifactorial beliefs about addiction and addicted personhood are maintained in light of new information.

Deliberative strategies for assessing the idea that addiction is a brain disease

We noted five discursive strategies in participants' deliberations about the relevance of the brain to addiction that may explain why acceptance of the proposition does not lead to a displacement of pre-existing understandings or homogenisation of viewpoints. We describe these as: compartmental, compositional, hierarchical, relational and colonial strategies. Compartmental strategies were used by individuals to explicitly distinguish the brain from other factors of causal relevance in order to temper agreement with the proposed idea. Those who employed this strategy could discount the importance of the brain compared with other factors (such as other 'mental' or phenomenological elements) that they had mentioned earlier in the interview. For example, although the person below agreed that the brain was a factor, they explicitly recapitulated:

... there is this need for belonging and acceptance and fitting in and things like that, so you do what everyone else does. So that's not a brain thing, that's an emotional thing.
(female, 40-49, university degree)

Alternatively, this strategy allowed participants to accept that the causes of addiction could be both/and or either/or:

I do think addiction does play a part in your brain, yes, I think there's probably a little section in your brain that wants it, and you probably can't stop that little section from telling you to have it. But I think it's probably willpower on top of the - you can probably stop that little addiction, that little brain disease with willpower. (female, 25-29, apprenticeship/certificate/diploma)

These compartmentalist excerpts explicitly reproduced the views that emotional states are not the same as brain states (former excerpt) and that moral agency is not reducible to brain

functions (latter excerpt). Thus, they evidently reproduced a lay ontology akin to property dualism in which certain mental states and brain states are not seen as being reducible to each other.

Those who employed what we term compositional strategies in their appraisal used their pre-existing understanding of the brain's constitution to support the proposition. Drug use (and abuse) was seen as 'affecting' the brain's 'chemistry' or 'wiring', highlighting multiple ways in which the public understood what the brain was – as either a neurochemical or electrical object:

I mean the brain can malfunction because it is actually like a, like a big electrical storm in there (female, 60–69, high school)

... do I agree with the impact of substance on brain chemistry? Yes, of course it does. (male, 50–59, university degree)

These interviewees both accepted the brain's role in addiction yet drew on distinct understandings of the brain to depict quite divergent understandings of addiction aetiology. For one participant, addiction was related to a brain (electrical) malfunction, for the other (through reinterpreting the question posed) it pertained to the (chemical) interaction between an addictive substance and an otherwise 'normal' chemical brain.

Hierarchical strategies were used by those respondents who asserted that the brain played a central role in the functioning of persons, or indeed as the central site of personhood itself: Because the brain controls everything about you. It's not your heart that cries out nicotine, it's something up here in your head that causes that. So it has to be the brain that controls that sort of stuff, just as it controls our thoughts, breathe in, breathe out, when we've got pain, when we haven't got pain. The brain tells us that, not the actual body. Okay? (female, 40–49, university degree)

Hierarchical strategies were closely linked to what we term relational strategies where participants accepted the proposition by assigning a particular characteristic that they had previously articulated to the brain's functioning. In other words, these respondents reformulated their beliefs to subsume other descriptions under that of brain function: [A]ddiction can change the way that your brain works and cause you to continue wanting to use a thing. I mean this is what I was talking about with my physiological effects previously, mostly. (male, 18–24, secondary school)

Compositional, hierarchical and relational strategies all conveyed the extent to which the brain could be (but was not necessarily) afforded a central role in understanding addiction, and by extension, personhood more broadly. However, we distinguish these approaches from the rare cases of 'colonisation' (cf. Rose, 2007; Bröer and Heerings, 2013) we observed in which participants (as shown below), who reported not having heard of the idea before, accepted the proposition in its entirety on the basis of its scientific authority:

Respondent: I really hadn't thought of that side of it. I mean, I know about liver and heart and that sort of thing but never had I thought about my brain. [...]

Interviewer: Okay. Do you – would you agree or disagree with this idea?

Respondent: Well I – I mean if it's been proven I guess I have to accept it but I didn't know it. (female, 60–69, secondary school)

As she did not possess a relevant pre-existent knowledge base, this respondent found herself unable to deliberate over the proposition offered. In the absence of knowledge, she deferred to the authoritative (scientific) explanation described by the interviewer.

The diversity of strategies used by participants is important. Participants held a variety of positions about the centrality of the brain in their understandings of addiction. While some respondents said that 'the brain controls everything about you' or were willing to subsume other processes they had discussed in relation to brain functioning, there were many who resisted the central role of the brain (Pickersgill et al, 2011). Furthermore, we detected an important difference between those who accepted the brain's centrality and those who appeared to have been 'colonised' by a neurobiological conception of addiction. In particular, we noted that some prior knowledge of, or beliefs about, the brain could be 'protective' against colonisation because it allowed the individual to critically appraise the proposition rather than feeling compelled to accept it on the basis of scientific authority.

Second, broad acceptance of the brain disease model of addiction did not unify, nor homogenise, participants' knowledge on addiction nor addicted personhood. Rather, through their various discursive strategies, individuals reproduced heterogeneous ontologies of the relationships between brain and mind, including forms of mind/body dualism. However, in comparison to their previous discussions in which participants had readily identified social–environmental causes of addiction as important (more so than they identified the biological body), the brain disease proposition did prompt participants to talk about the addicted individual's makeup – their mental properties and the substance – to the neglect of social–environmental causes. In framing the conversation with participants, the idea that addiction is a brain disease increased attention to bodily concerns and downplayed social ones.

Diverse definitions of disease: Between the biophysical and the ethical

Many respondents who reported 'partial awareness' and/or 'partial acceptance' of the idea that addiction was a brain disease accepted that the brain was an organ of relevance to addiction but nonetheless contested the claim that addiction was a 'disease' of the brain. Many of these respondents gave answers along the following lines:

I don't know about addiction as a brain disease but I know that it does affect – it affects the brain so it changes it. If it's a disease or not, I'm not sure. (female, 50–59, diploma/certificate/apprenticeship)

Although this respondent (and others like her) accepted that drug use could 'change' the brain, she remained unsure as to whether this was sufficient to make addiction a 'disease'. In contrast, some participants who accepted evidence that drug use changed the brain also accepted that this entailed that addiction was a disease:

I think [addiction] has to be [a brain disease]. If it irreversibly effects the way the brain is tuned or wired, whatever the right word is, if you change something that cannot be changed back then I think you have created some sort of permanent damage and so that makes it a brain disease. (male, 18–24, secondary school)

For some, a critical issue in deciding on the appropriateness of labelling addiction as a brain disease was whether or not they thought that chronic drug use produced irreversible changes in the brain. However, the appropriateness of the definition was also assessed on the basis of its possible future moral consequences:

Yeah, [addiction] could be [a brain disease]. I mean, if it got to the point where it wasn't reversible you could see it as a brain disease but isn't it just kind of like another excuse? (female, 18–24, secondary school)

Participants' division over whether neurobiological change constituted a disease makes clear the limited power of neuroscientific knowledge to inform questions of terminology. The aforementioned respondent reacted against the idea that addiction was a 'disease' on the ethical ground that the label might be used as an 'excuse' by addicted individuals for drug use. Others expressed similar ethical rejections. Some were concerned about how a disease labelling may be capitalised on by biomedical industries:

I don't like the label addiction, brain disease, therefore psychiatrist's got another sub-market to deal with – a drug company's something, that's technically what disease sub-categorisation does, it just gives another opportunity for industry; i.e. pharmaceutical companies, to make another class of drugs. (male, 50–59, university degree)

Not all ethical appraisals of the term disease led to a rejection of the utility of a 'disease' label. Some reasoned that the label of 'disease' was more appropriate because they preferred to view addiction in this way rather than as a criminal activity, however, this deliberation was decoupled from discussion of neuroscience:

It's more of a disease than an actual crime to take the drug, I think. (male, 18–24, secondary school)

Participants' appraisals, and widespread acceptance, of the relevance of the 'brain' prompted them to articulate diverse ontologies of addiction and addicted personhood. In assessing the appropriateness of the term 'disease', their thoughts about biophysical processes interplayed with deliberations over the ethical and social consequences of using such a label. On the matter of the 'disease' label, the power of neuroscientific knowledge was strictly limited. In fact, in some deliberations neuroscientific knowledge appeared to have only the most superficial relevance. Assessment of the appropriateness of labelling addiction a disease involved first an assessment of what makes something a 'disease' in other contexts, and then a comparison of what they knew about addiction with what they knew about the other disease exemplar:

Malfunction, like epilepsy, is a brain disease. (female, 60–69, secondary school)

[T]hey are not the same even when they stop drinking. They are not the same person. They either change their personality, or something in their brain, it's gone, damaged, ruined. It's like, I guess, it's like pneumonia, the more you have pneumonia, the more scarring on your lungs you have. Eventually, something's got to go. (female, 40–49,

apprenticeship/certificate/diploma)

Overall, interviewees' responses suggested they were more prepared to accept that the brain processes played a role in addiction (albeit in diverse ways) than they were prepared to accept that addiction was a disease. In other words, very few participants rejected the importance of the 'brain' in addiction but many explicitly questioned the idea that it was a 'brain disease'.

The ethical consequences of 'acceptance'

Participants' ambivalence about labelling addiction as a 'disease' was reflected further in their views on the implications of this idea for the way in which addicted individuals should be treated. Over half of our respondents (58 per cent) indicated that the knowledge that addiction was a brain disease had, or would, change their views of addicted individuals; 19 per cent were either unsure or thought that this knowledge might partially modify their views. Yet, for many participants the empathy expressed for addicted individuals was not conditional on how addiction was caused or defined. Empathic responses to the question 'does the idea that addiction could be a brain disease change the way you view someone with an addiction?' included:

No, not really. I've always had like a bit of a soft spot that, you know, like I don't think they really wake up and go, 'I think I might become an alcohol addict', you know, they don't intentionally set out to do that. (female, 40–49, apprenticeship/certificate/diploma)

I don't think so. They need help no matter what, don't they? (female, 50–59, apprenticeship/certificate/diploma)

A prominent dissenting view was expressed by others who answered this question by saying that addicted individuals were responsible regardless of how addiction was labelled:
Yep. Yes. [addiction is a brain disease]. But I still think people need to be – and take responsibility and accountability for themselves. (female, 40–49, university degree)

I do think – it is – it could be a brain disease. But I mean – it's – I still say it is a personal choice. [...] it is an active choice by the person themselves. (male, 18–24, secondary school)

Some argued, in opposition to those who expressed unconditional empathy, that even if addiction was a brain disease, addicted individuals were responsible for becoming addicted in the first place:

No not really. Nobody forced them to start drinking or taking the drugs in the first place because you weren't addicted to anything then. (female, 50–59, secondary school)

Only a small minority of our sample (five) behaved in a way that was consistent with the predictions of attribution theory in thinking that accepting the idea that addiction was a brain disease would make them more sympathetic to addicted individuals:

It does because it gives me a more of an understanding of what – if I didn't have that appreciate, I think I'd say, 'Look guys, just – you know, person's lack of will and just loser and just hasn't got any control.' If I understand the impact of the brain chemistry on brain chemistry then you tend to want to be a bit more sympathetic because you know they have less control. There's no point saying they should have done – what they

should have done before they were addicted but it's fact now that they're addicted so – yeah. (male, 50–59, university degree)

These five respondents accepted the ethical entailments of the brain disease model of addiction posited by proponents of neuroscientific explanations of addiction – that is, that repeated drug use changes the brain in ways that undermine the ability of addicted individuals to make free choices to use drugs or not. However, these respondents' comments suggested that it was their acceptance of a role of neurobiological processes rather than the term 'disease' that affected their viewpoints.

Overall, even though more than half of the respondents thought that the brain disease idea would affect their views, the justifications they provided suggested that this belief was mostly conceptually decoupled from a neurobiological conception. In other words, the idea that addiction is a brain disease did not necessarily resonate with the beliefs that informed their moral judgements about addicted persons.

Discussion

By first aggregating (quantifying) their responses and then dissecting them, we uncovered considerable diversity underlying purported 'acceptance' of ideas regarding the brain and addiction in participants' ontologies of addicted persons and the brain, their definitions of disease and the ways in which biophysical knowledge informed their moral judgements of addicted persons and vice versa. Moreover, we showed the varied discursive strategies through which these differences were reproduced. Our elucidation of such heterogeneity highlights the complexity that underlies popular 'acceptance' of scientific claims. The proposition could resonate with an individual's pre-existing beliefs in numerous ways that were consonant or dissonant (Bröer and Heerings, 2013). Yet, critical appraisal was only possible where an individual could recall relevant information about the brain, or about disease. Thus, we are led to distinguish between respondents' articulations of acceptance that conveyed neurocentrism and those who conveyed a colonisation of subjectivity because lack of prior knowledge prevented them from critically appraising the new information (cf. Rose 2007; Bröer and Heerings, 2013).

The role of the brain in understanding addiction was readily accepted by participants but there was more ambivalence about the appropriateness of labelling addiction as a 'disease'. In these deliberations, different discursive strategies were used. 'Disease' could be assessed by drawing upon neurobiological knowledge about persistent brain changes that could be produced by chronic drug use. Others, however, viewed 'disease' through a moral lens, rejecting the idea because they thought its ethical implications were unacceptable. Finally, there were those who compared addiction with images of other diseases and thus considered disease in biophysical, but not neurobiological, terms. Neuroscientific insights were shown to have limited power in terms of whether or not participants accepted that addiction was a disease. There was no ascendant viewpoint as to whether a 'disease' was a biophysical or ethical entity; it evidently had a diffuse social meaning.

The impact of the brain disease model on individuals' moral judgements of addicted individuals appeared to be modest. Although over half considered that the idea that addiction was a brain disease would, or had, change(d) their views of addicted persons, this was often unrelated to whether they expressed empathy for addicted individuals or held addicted individuals responsible for their condition. It was a small minority (n=5) who drew the sort of moral implications from a neurobiological conception for which proponents of neuroscience hope (Leshner, 1997; Dackis and O'Brien, 2005).

Overall, our findings support that of others (Pickersgill et al, 2011; Bröer and Heerings, 2013; Meurk et al, 2013a) in suggesting that acceptance of a neurobiological conception of addiction does not necessarily entail either ontological reductionism or a homogenisation of beliefs. Indeed, the dissemination of some neurobiological information may even enhance the prospect of more critical appraisals by the public, that is, be 'protective' against any feared colonisation of subjectivity. Moreover, individuals' deliberations over ontological and normative matters took place in relation to each other but were by no means related in a linear or deterministic fashion, that is, beliefs about the body (including the brain) and beliefs about ethics could equally inform each other.

Taken together, these processes explain how new discourse modestly refashions bodies and ethics in a way consistent with Latour's (2008) notion of 'design'. Further, this insight into how the public supports, or rejects, the biomedicalisation of addictive behaviour usefully informs questions of the ethics of health communication. Through the careful and creative rearrangement of concepts, a mixture of utilitarian, affective and disciplinary responses – medical and punitive – intermingled in individuals' accounts (Latour, 2008). This lack of solidarity in public views regarding empathy or judgement of addicted individuals, as these were related to neurobiological concepts, suggest a lay understanding of addiction that is far from 'medicalised'. Although not necessarily opposed to considering the medical aspects of addiction, respondents' views suggest that addiction neuroscience is not necessarily an enabling discourse to the medicalisation of deviance (Vrecko, 2010c; Kaye, 2012).

We present our findings to prompt a broader dialogue between addiction neuroscientists, neuroethicists, social scientists and the public as to risks and benefits of neuroscientific knowledge and brain disease perspectives in reducing stigma and enhancing social support for the treatment of addicted individuals. Critics are concerned that neuroscientific understandings of addiction may be totalising, reductive and marginalise other ways of understanding and treating addiction and thinking about (addicted) personhood (Dingel et al, 2011). We observed that framing a discussion with the public around the neurobiology of addiction did appear to restrict participants' attention, at least momentarily, to causes that reside within the individual (Dingel et al, 2011). In the same 'moment', however, in a small number of participants, even the limited, verbal, neuroscientific information provided through the course of this interview was able to reshape their views in ways that made them more empathic to addicted persons. More often, the term disease appeared to play a minor role in discussions about the nature of addiction and in participants' moral judgements about addicted individuals. Thus we conclude that exposure to or acceptance of neuroscientific information should not be taken to mean one is made subordinate to it.

Conclusion

What does acceptance mean? Here, through an interdisciplinary lens and a context-based analysis, we investigated how 55 members of the Australian public deliberated on a single proposition – that ‘addiction is a brain disease’. While quantitative survey questions might tell us the extent to which an idea is deemed acceptable, useful or advantageous, it tells us comparatively little about how the accepted proposition might be used. Qualitative enquiry showed that beliefs about what causes addiction and normative beliefs about addiction and addicted persons informed each other; ontological conceptions did not cause particular normative entailments in a linear and unilateral way. Thinking about deliberative processes of a critical public in terms of ‘design’ allows us to understand how viewpoints take shape in a way that preserves both their inherent flexibility and impermanence; it thereby does not charge the purveyors of new discourses as attempting or achieving the production of monolithic thinking. In this study, we focussed on participants’ responses to their pre-existing experiences of mediated information and verbalised information provided to them. We did not investigate participants’ responses to visual or textual representations of the brain disease model of addiction. The latter is a worthwhile avenue for future enquiry.

Acknowledgements

We would like to thank the staff at Roy Morgan research who recruited and interviewed participants for this research, along with the participants themselves for offering their time to take part in interviews. Dan Buchman provided useful critique that assisted in the development and clarification of arguments, and we are grateful to Sarah Yeates for her editorial assistance. We also thank the thoughtful and attentive comments made by the manuscript’s anonymous reviewers.

This research was funded by an Australian National Health and Medical Research Council Australia Fellowship (Grant ID: 569 738) to Professor Wayne Hall.

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