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Markers of biology and 'being': Imaginaries of deterioration and the biological redefinition of Alzheimer's disease

Abstract

The Alzheimer's disease (AD) research landscape is dominated by efforts to predict and prevent the condition. In clinical practice, it is difficult to establish normal ageing from pathological cognitive deterioration and 'imaginaries of deterioration' tied to 'loss of self' take on a material form and impact assessment and diagnostic practice. Drawing on qualitative data gathered across a memory service in the UK, this paper captures practitioners' reflections on the utility and potential impact of prediction and earlier detection. Practitioners maintain that this biological framing may reinforce uncertainties associated with sociocultural depictions of the condition and reify normative values concerning cognition and age; provoking questions concerning what kinds of values are produced by, and aligned with, bioscientific agendas. Overall, there emerges a paradox entangled in biologically redefining AD: purported precision and prediction on the one hand and increasing uncertainty on the other entwined with sociocultural imaginings of a future with AD.

Key words:

Alzheimer's disease; prediction and prevention; memory; cognition; loss of 'self'

Introduction

The classification of Alzheimer's disease (AD) has undergone a series of redefinitions since its inception in 1906 marked by the difficulties separating processes of ageing from deterioration, efforts to define the condition as a public health priority, and in response to difficulties establishing a cure (see Lock, 2013). Historically, the focus of attention in scientific research has centred on efforts to target the onset of symptoms associated with the presence of amyloid plaques and neurofibrillary tangles in the brain, which are thought to lead to cognitive deterioration. This has been described as the 'amyloid cascade hypothesis' (for discussion of this medical term see Hardy and Higgins, 1992; Milne and Badger, submitted). More recently, in response to difficulties establishing a cause and cure, bioscientific research has centred on determining the earliest biological stages of the condition to predict onset, modify the disease or prevent pathology via therapeutic intervention (see Boenink van Lente and Moors, 2016; Lock, 2013). The purpose of this paper is to capture memory service practitioners' reflections on the utility and potential impact of current AD research and the biological redefinition of the condition. As this paper will go on to demonstrate, practitioners in the clinic work to negotiate and make sense of conflations between cognition, memory and 'self', which I define as 'imaginaries of deterioration' and which take on a material form in the present, whilst raising concerns that the biological framing of AD will reproduce uncertainties and anxieties and reify normative values concerning cognition and age.

Background

Current biomarker and genetic research initiatives aim to detect presence of pathology prior to individuals reporting symptoms. Several biomarkers have been discovered (not yet used in routine clinical practice) including “assays for amyloid β and tau in cerebrospinal fluid and molecular markers for cortical hypometabolism” (Frisoni and Visser 2015, 781). It is anticipated that biomarkers may be used by drug developers in clinical trials to “halt or reverse” (Frisoni and Visser 2015, 781) degeneration yet, thus far, there remains no way to prevent or delay progression to late-stage dementia. Described by Beard and Neary (2013, 12) as the “diagnostic creep” of Alzheimer’s, the National Institute of Ageing/Alzheimer Association diagnostic guideline was expanded in 2011 to include the addition of biomarkers (Albert et al. 2011; Sperling et al. 2011) as well as the label Mild Cognitive Impairment (MCI). MCI is used to describe symptoms of cognitive decline associated with the earliest stages of pathological cognitive deterioration and to label those ‘at risk’ of developing AD in the future despite uncertainty concerning rates of conversion to AD (see Lock 2013).

The shift towards a biological framing of AD marks a more general shift in contemporary biomedicine towards the geneticisation and molecularisation of the biomedical sciences whereby understanding and intervening on health and disease occurs at the level of genes, genomes and proteins, reconfiguring identities and responsibilities (see Clarke et al. 2003; Lippman 1991, 1992; Novas and Rose 2000; Rose 2001). This shift in contemporary biomedicine informs the basis of what has been termed more broadly as personalised medicine (Prainsack 2017) and is particularly visible in fields such as oncology. For specific sub-types of cancer, screening techniques to predict and prevent onset, and to develop treatments that target specific disease types have begun to be introduced in clinical practice (see Ocaña and Pandiella 2010).

With respect to AD, scientists are stubbornly committed to understanding the condition within biomedical and neurogenetic frameworks despite the fact that it “is the most commonly diagnosed subcategory of dementia [and] proves to be an elusive phenomenon" (Lock 2013, 11) and the translation from research to the clinic is complex. Thus far, drug trials have largely been unsuccessful, the clinical utility of technologies such as biomarkers and genetic tests have not been established, and cure dominates ways of managing AD whilst care (with respect to non-biomedical intervention) is grossly under resourced (see Boenink, van Lente and Moors 2016; Chilibeck et al. 2011; Kitwood 1997; Lock 2013; Anonymous 2017). Moreover, Lock (2013, 98) argues that there are inherent "uncertainties associated with predicting the future by means of biomarker testing", which produce anxieties for individuals, particularly since AD prognosis is unclear and there remains no cure or means of preventing deterioration and there are limited effective treatments. As Schicktanz et al. (2014, 4) argue, "an increasing gap between prognosis/diagnosis and treatment can be accompanied by stigmatisation". Overall, whilst a biological framing of AD is purported to lead to accurate prediction of future disease onset and the development of methods of prevention, paradoxically, it has the potential to produce further complexities and uncertainties (c.f. Metzler 2010). The disease is not only nosologically complex (a definitive diagnosis can only be made post-mortem), but also stigmatised and feared.

Sociocultural discourses tied to 'loss of self'

Despite AD's complexity as outlined above, the biological model is widely successful in attracting research funding: delaying, slowing down and 'warding off' loss of cognition is a powerful discourse driving biotechnological development. US company SomaLogic (2018) stresses the need to discover biomarkers to detect those "at greatest risk" of developing the condition in order to preserve cognition and 'memory' for as long as possible. This urgency to 'slow down' AD and prevent cognitive deterioration has led to a renewed focus on the biological heterogeneity of AD through the adoption of a precision medicine approach (see Milne 2018; Reitz 2016). There is an underlying sense of urgency to scientifically locate, slow down and find ways to capture this condition, which carelessly erodes memory and in turn self: imagery which pervades ways of conceiving AD and adds to its nosological and clinical complexity. As Beard (2016) contends, the biomedical framing of AD is privileged over the clinical and social experiences of the disease.

Alzheimer's disease is highly stigmatised and feared; perceived and portrayed primarily as a process of loss of self to the 'horrors' of Alzheimer's (see Beard 2004; Taylor 2010; Zeilig 2014). As Taylor (2010, 37) explains when discussing the discourse of horror which persists around AD, "a person you love, and to whom you are bound by unbreakable ties, turns out to be someone you do not know at all, who does not 'care' about you and may even seek to harm you: this is the classic goth plot". Behuniak (2011) describes the way in which AD is metaphorically conceived as a living death and whilst the negative perceptions of individuals diagnosed with AD closely relate to the privileging of the biomedical model for understanding and managing dementia, Behuniak also argues that the social construction of people with dementia as zombies dominates scholarly and popular literature, reinforcing the fear and anxiety around diagnosis, and marginalising individuals living with AD.

Central to the "classic goth plot" of dementia, is loss of memory, which as Taylor (2010) explains, is the overarching way in which individuals conceptualise an (ageing) future with AD. As Ballenger (2006, 106) notes, "in its frightening totality – effacing the memories and abilities that are widely seen as the very essence of personhood – senile dementia seems to taint the entire experience of ageing". The idea that the individual diagnosed may become someone we do not 'know', effaced of their memories and unable to 'recognise' family members or friends prevails (Taylor 2010) as memory is upheld as the very essence of one’s “soul” (Hacking 1998, 70). In Western societies, cognition and memory are markers of what it means to be human which demonstrates our cultural preoccupation with memory in what Post (1995) describes as a ‘hypercognitive society’, rendering individuals with cognitive deterioration somehow less than human and fuelling the stigma surrounding the condition (see also Davis 2004; Hillman and Latimer 2017; Kontos 2006). ‘Loss’ or ‘death of self’ tied to cognition and memory has the potential to further impact those tested at earlier stages since individuals may be more ‘cognizant of the stigma attached to it’ (Taylor 2010, 42) resulting in earlier social demotion (Beard and Fox 2008).

Whilst Kitwood’s pioneering work on promoting a person-centred approach to dementia care has successfully challenged pejorative assumptions that persons with dementia are somehow less than human, a significant body of social science literature has examined how the deterioration of cognition framed in terms of loss of self or death of self pervades lay and professional understandings of Alzheimer’s (see Davis 2004; Millett 2011; Robertson 1990; Tappen et al. 1999; Taylor 2010). This notion of ‘loss of self’ conjures imaginings of a ‘non person’ as cognitive deterioration progresses (Davis 2004). Despite this discourse dominating understandings of AD there is no agreement about what the ‘self’ constitutes and therefore how it is in turn ‘unmade’ and ‘lost’ through pathological deterioration associated with Alzheimer’s (Millett 2011).

In what follows, this paper will explore the way in which memory clinic practitioners approach and reflect on the scientific impetus to predict AD and detect the condition at earlier stages. Firstly, I will show that assessing cognition and diagnosing AD requires careful negotiation of what I describe as ‘imaginaries of deterioration’ tied to loss of cognition, memory and ‘self’, which pervade societal perceptions of the condition. Examining how these anticipations of a future with AD interact with the promissory claims of prediction and earlier detection, the paper then goes on to highlight the uncertainties and ambivalences emergent across practitioners' accounts as they reflect on the extent to which this biological (re)framing has the potential to reinforce 'imaginaries of deterioration' and uncertainty concerning the future (c.f. Adams, Murphy and Clarke 2009). Concurrently, a sense of hope is also evoked in their accounts related to the potential eradication of the condition in the future. This discourse of hope concerning a cure may however, further efface care as a means of approaching and managing the condition. Overall, this paper highlights the complex inter-relations between the privileging of biological causes of AD, and the wider sociocultural perceptions of AD.

Emergent across practitioners' accounts is the paradox inherent to this biological (re)framing: the production of uncertainty concerning the future and the potential for prediction and earlier detection to reinforce and reify particular normative values concerning cognition and also ageing (see Beard 2016). Tensions central to AD diagnostics are reproduced but also *challenged* by health care practitioners: they work to negotiate and make sense of the complexity around AD in the clinic and carefully craft futures and notions of memory since efforts to biologically redefine AD may work to intensify imaginaries of deterioration.

Methods

This paper draws on qualitative ethnographic data collected in two memory clinics in Yorkshire, UK as part of an ESRC funded doctoral project examining how cognitive screening technologies are used in clinical practice in the process of diagnosing AD. In the memory service where this research was carried out, individuals over the age of 65 were referred by their GP for in-depth cognitive testing. Overall, 10 observations were carried out and included observations of initial consultations where cognitive screening tools were used to assess cognition and observations of multi-disciplinary team meetings (MDT). MDTs bring together memory nurses, consultant psychiatrists, psychologists, speciality nurses and occupational therapists to discuss new referrals to the service, adjudicate on a diagnosis, discuss potential treatment options for individuals diagnosed, and arrange referral to care facilities. Observing clinical consultations, I was interested in potential patients' (I use the term potential patient throughout the paper to account for the fact that individuals were experiencing symptoms of deterioration but had not yet been given a formal diagnosis and also to account for the paper's analytical emphasis on pre-patienthood, see Beard and Fox 2008), family members' and practitioners' interactions with the tests in healthcare practice. During observations I carried a notepad and made fieldnotes where I recorded interactions, relations, verbal practices, non-verbal practices, space of the setting and personal reflections. I transcribed the fieldnotes as soon as possible following fieldwork as I opted not to use a recorder: I was concerned that the presence of a recorder would disrupt the setting, which was perhaps already compromised by my presence. 26 semi-structured interviews were conducted with all staff members using cognitive screening tools in the memory service which included memory nurses, trainee psychiatrists, consultant psychiatrists, clinical psychologists and consultant geriatricians. Neurologists were not members of this particular memory service team. Data for this paper were taken from observations of consultations and interviews with practitioners.

Data were collected over a one-year period and the research project was approved by the relevant NHS Research Ethics Committee. Interview questions centred on the role of cognitive screening tools in navigating diagnostic complexity in the organisation of the memory service. Ethnographic methods were used to capture the choreography (c.f. Thompson 2007) of AD in practice, demonstrating how though multiple interactions between professionals and 'potential patients' (c.f. Beard and Fox 2008), AD is both present and absent: classification is not always arrived at in clinical encounters. Discussions concerning scientific innovation including biomarkers were arrived at through a broader discussion of the utility and drive to detect AD at earlier stages. I analysed data thematically and carried out situational analysis in order to consider the "key elements and conditions that characterise the situation of concern" (Clarke 2003, 554) and provide 'thick descriptions' (Geertz 1973) of encounters with the memory service. Overall, this ethnographic study captured the ways in which a diagnosis of AD is clinically uncertain and socially and culturally complex.

Findings

Imaginaries of deterioration: Enactments of memory in the clinic

In the following analysis, I will capture how imaginaries of deterioration tied to loss of cognition and memory take on a material form (see Tutton 2017), which practitioners work to negotiate in the clinic. Initially, I show the moments of tension through which 'memory' was enacted during clinical encounters and the ways in which practitioners work to negotiate potential patients' concerns and anxieties. I then develop the analysis to explore practitioners' reflections concerning prediction and earlier detection.

Across initial consultations where practitioners use cognitive screening tools to test cognitive function, tensions around memory and loss of memory were present, linked to concerns and anxieties around the meaning of AD more generally. Practitioners began consultations by questioning individuals about what they were 'forgetting' and asking them to describe in detail how this was impacting their day-to-day lives. At times, these conversations provoked moments of tension in the clinic particularly between potential patients and family members, as potential patients would perhaps downplay the difficulties they were facing. During consultations and unprompted, potential patients worked to affirm or *perform* their ability to remember by reeling off key historical dates or reciting rhymes. This tension was central to the following observation with Speciality Doctor 1,

> *The potential patient began by stating that he's unconcerned about his memory, shrugging his shoulders, at which point his wife interjected, 'he's always forgetting things'! In response, the potential patient laughed and shook his head, 'I can remember everything from the 1940's' and proceeded to give numerous examples but was again interrupted by his wife, 'it's his recent memory loss that's causing me concern'. Following up on this, the practitioner asked both the potential patient and family member to describe some of the difficulties they were facing at which point the potential patient smiled and shook his head, 'I don't think I'm that bad'. The practitioner asked him directly what he was like at remembering names and the potential patient responded, 'I can remember everything. It happens to everyone.'*

Memory was central to constituting AD in the clinic and was also entangled with the stigma attached to the condition. Responding to this tension in the clinic towards the end of the consultation, the practitioner attempted to mediate their responses through reassurance work, *'I know I'm giving you a hard time'* (see Anonymous 2018). Here, the act of remembering was central to ways in which deterioration was defined and explained in the interaction between family member and the individual being assessed. Through recalling names, events and downplaying 'loss' of memory and asserting that *'it happens to everyone'*, the potential patient attempted to hold on to and protect ‘memory’, perhaps to avoid the stigma associated with the condition and as a means to preserve identity and self (Beard 2014, 2016): a finding which accords with Beard and Fox’s (2008) description of the diagnostic process as a ‘degradation ceremony’. Evoked in this account is also a sense of the clinical tension and difficulty defining normal and pathological deterioration.

Similarly, during an observation with Trainee Psychiatrist Three, the practitioner began the appointment by asking the potential patient and family member to describe their ‘memory’ difficulties to which the potential patient grew gradually more and more frustrated eventually interrupting the practitioner to say, *‘I know who the Prime Minister is as well and where he lives’!* [1] Here the potential patient appeared to resist the focus on memory, which dominated the encounter and in doing so, protect identity and sense of self.

Towards the end of the consultation, Trainee Psychiatrist Three scored the results from the cognitive screening test at which point the potential patient began reciting rhymes perhaps as a way to hold on to memory and protect from the test result. At this point the family member also remarked, *‘is this where you can tell us if she’s doolally’*! Here concerns around memory are tied to imaginings of decline and antiquated assumptions concerning mental health more generally (c.f. Anonymous 2017). Negative assumptions regarding AD pervaded clinical encounters, eloquently expressed during an interview with Occupational Therapist 2 (OT 2),

> *We’re seeing people over 65 in their 70’s/80’s/90’s…they want to be independent they can’t understand why they’re not independent there’s a huge stigma attached to*

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[1] As part of the Addenbrooke’s Cognitive Examination 111, patients are asked to name the current UK Prime Minister.

> *dementia and mental health and they don't want to admit that and they think that they should be that they're loony they keep saying, 'oh I'm going doo-lally' or 'I'm going potty' or you know 'I should be in the loony bin' or you know it seems like what they're saying we know aren't true and we know that they're not going crazy and they're you know that they're alright but their memory is poor perhaps and it's trying to explain that to them. And the stigma, you know there's a huge stigma and it's hard to get over that stigma for them I think. So there's so there's lots and lots of different things going on that hugely effect what we do.*

The stigma surrounding AD pervades perceptions of the condition, which as Occupational Therapist 2 explains, is difficult for both potential patients and practitioners to negotiate. The dominant perception of AD is tied to the notion of loss of 'self' and personhood, well-established in social science literature (Davis 2004; Gilleard and Higgs 2010, 2013; Higgs and Gilleard 2017; Kitwood 1997; Millett 2011). Yet as the practitioner here explains, this is tied specifically to memory. 'Admitting' difficulties associated with memory is challenging for individuals experiencing cognitive deterioration particularly when loss of memory is stigmatised and conflated with loss of personhood, '*they're alright but their memory is poor and it's trying to explain that to them'* according with Taylor's (2010, 37) assertions that the "classic goth plot" persists. Loss of memory is conflated with loss of 'self' and we anticipate a future where the person with AD becomes someone whom we do not recognise. This has affective consequences and impacts potential patients' and families' anxieties concerning a future with AD deterioration (c.f. Adams, Murphy and Clarke 2009) since cognitive ability and memory are positioned as markers of *'independence'* and therefore a particular way of 'being in the world'.

Memory is privileged in Western culture (Hillman and Latimer 2017; Kontos 2006) impacting how we perceive those whose memory is 'failing' through conditions such as AD as OT 2 explains during conversation

> *I haven't got a great memory myself so we place a lot of importance… memory is absolutely key it's key to what you, who you are from the past and it's key to what you're doing at the moment, at the moment and it's part of that… sense of identity and sense of self-worth because if you've always had a good memory and then the last say, the last year, you're struggling with it you start to feel that you've lost control so and that sense of losing control is very overwhelming…so, and it might be that your house starts to get into a bit of a state that you wouldn't necessarily have wanted it to get into and then other people come in then and say, 'why has your, you know, why's your house dirty'? And then you feel undermined and you know, so it can really sort of snowball and I think all on the basis that you're losing your memory…I had a gentleman who wanted to speak to his bank and he couldn't because he couldn't remember all the security information to get through so he couldn't get any access to his bank details and he's not able to get out of his flat so you know anything; you know the world is sort of against him really and he's doing nothing wrong.*

This extract provokes questions around the implications of what it means to 'lose' memory, which this practitioner describes as *'loss of control'*, attached to identity and 'self'. Since we place great importance on memory, the inability to remember words, dates and material objects is attached to a slow erosion of identity seen here with respect to efforts to uphold a tidy and clean house. As OT2 explains, those whose memory remains intact are not equipped to take account of deterioration, *'why is your house not clean?'* in a world that she describes is *'against'* people living with deterioration: a hypercognitive society (Post 1995).

These extracts from interviews and conversations with health care practitioners highlight some of the tensions regarding the discourse around loss of cognition and the persistence of imaginaries of deterioration linked primarily to forgetfulness and memory. Whilst Moreira and Palladino (2005) have shown that trials in the 1990s for other conditions affecting cognition such as Parkinson's disease were extended to incorporate activities of daily living alongside the focus on memory, potential patients' and family members' imaginings of cognitive deterioration in these clinics were tied predominantly to loss of memory. Across the memory service, practitioners work to acknowledge the implications of the emphasis on memory and cognition and to account for deterioration since after all as Memory Nurse 1 remarked, *'forgetfulness is a small part of the cognitive decline really.'* Anticipations for the future with regards to deterioration are marked by uncertainty and remain the focus of societal perceptions of AD, and care as a means of accounting for and managing the condition is effaced, under-resourced and undervalued in a post-welfare, neoliberal society (see also Latimer 2018).

Imaginaries of deterioration tied to loss of cognition, memory and 'self' pervade perceptions of AD and as witnessed, take on a material form (see Tutton 2017) in the clinic as they impact approaches to, and interactions with, the assessment process. With the refocussing of scientific attention towards prediction and earlier detection, the question remains as to how these wider promissory claims attached to innovation projects which purport to render a future with AD more certain and controllable, interact with dominant socio-cultural depictions of the condition. Practitioners raise their concerns that earlier diagnosis and the detection of risk in asymptomatic individuals have the potential to increase anxieties in individuals since deterioration cannot be prevented. Here we see the paradox between purported precision and prediction on the one hand and increasing uncertainty on the other; entangled with wider sociocultural imaginings of AD. I conclude by arguing that it is imperative to attend to the kinds of normative values with regards to cognition and age that may be reified as part of these promissory agendas.

Practitioners' reflections on research development: classifying 'memory loss'

Whilst the aim of earlier detection is to anticipate future illness as well as enrol individuals into research studies and where possible begin treatment, the question remains as to how to proceed given that onset of pathology cannot be prevented (c.f. Lock 2013). Despite the overall drive to predict and detect AD at earlier stages practitioners were careful to acknowledge that there are those who may actively resist diagnosis and/or the assessment process. Individuals do not always seek to account for their memory concerns through formal diagnosis as Trainee Psychiatrist 1 explained when discussing early diagnosis during interview,

> *You need to make sure that they actually want their memory tested first of all because not everyone wants to know that they've got cognitive impairment…sometimes I think people think they want a diagnosis because we want to know what's causing the memory loss and they want treatment…but not everybody wants that diagnosis.*

In recognition of the fact that individuals may not actively seek a diagnosis, practitioners carefully negotiate a label for memory decline, *'what's causing the memory loss.'* Potential patients do not necessarily seek a label to make sense of deterioration and diagnosis can often exacerbate feelings of anxiety and concern (see Anonymous 2017). Perhaps retaining a sense of personhood or identity lies in resistance to categorisation due to the stigma attached to the condition (c.f. Goffman 1963). With respect to pre-symptomatic testing for genetic conditions, Mendes et al (2018) have shown that there are a number of reasons as to why individuals choose not to engage (choose 'not to know') particularly if there is no clinical or therapeutic benefit available. With respect to AD, what is interesting from this practitioner's account is that they are careful to recognise differences in engagement given the potential uncertainties provoked by testing as they reflect on the complexity of the drive to biologically locate and redefine AD.

At the same time that practitioners raised their concerns regarding earlier detection they also discussed their *hopes* in relation to research development.

> *I'm hoping that this is the future direction of travel, I'm hoping that it'll lead to significant improvements in the sort of the I suppose the spectrum of the sort of armory of interventions we're able to offer patients.*
> (Interview Consultant Psychiatrist 1)

> *Myself just like anybody else I'm hoping that indeed yes they can find those biomarkers that that will identify your risk and hopefully that they find the true kind of aetiology of the disease process to work out ultimately possibly a cure for this horrible illness but yeah it's tricky the current kind of situation where we haven't, there isn't an end point.*
> (Interview Clinical Psychologist 3)

Central to practitioners' reflections on the future direction of AD research was their articulations of hope to both identify risk, and treat or cure AD, described by Consultant Psychiatrist 1 as a *'horrible illness'*. Yet the consultant psychiatrist was also careful to note that given that there is no certainty in prognosis or means of prevention, *'no end point'*, identifying risk becomes inherently complex. In this way, feelings of hope only extend so far; there is no means to prevent AD and there is a lack of therapeutic benefit, which has the potential to render biomedical intervention futile as Consultant Psychiatrist 3 argues,

> *Identifying it in its very early stages for people who are mostly asymptomatic I don't think is helpful because there's no treatment or cure or prevention or treatment we have that could prevent it in the future so I think it's not just a waste of resources but potentially harmful to patients.*

Here, a lack of means to prevent deterioration has the potential to 'harm' individuals who as described by the psychiatrist, are asymptomatic; it provides little certainty in terms of prognosis and exacerbates patients' anxieties since it is tightly bound to the stigma around cognitive decline. The psychiatrist therefore demonstrates the inherent tension between identifying individuals earlier (in part as a means to enroll them in research studies to track conversion rates) and the lack of clinical utility with regards to diagnosis. This finding accords with a wealth of literature highlighting the uncertainties and ambivalences associated with genetic risk testing (see for example, Lock 2013; Mendes et al. 2018; Novas and Rose 2000; Scott et al. 2005). As Consultant Psychiatrist 3 further explained during interview when asked to reflect on the direction of AD research,

> *…there was the issue on the news yesterday about the proteins and the blood test and obviously by all means if there is a blood test where you can identify early well again there might be the issue about how you kind of then manage that because in terms of anxiety because what do you do in the absence of a cure in the absence of any*

> *meaningful…if you were to find out early well it's like in all kind of illnesses and genetic illnesses where you have kind of diagnostic blood tests that can kind of establish your risk it needs to be very carefully managed how services deal with that.*
>
> (Interview Clinical Psychologist 3)

Clinical Psychologist 3 reflects on the role of technologies for identifying risk and detecting the condition at earlier stages but also reflects on the extent to which it has the potential to raise anxieties, a point echoed across interviews. This accords with Taylor's (2010) concerns that knowing (and associated uncertainty) may increase anxiety in individuals more 'cognizant' at earlier stages and therefore insight into the stigma attached to the condition particularly since we place such emphasis on memory and cognition as markers of personhood. In turn, reflecting the contradictions inherent to a biological framing (see Milne and Karlawish 2017).

Imaginaries of deterioration and anticipations of a future with AD circulate in clinical consultations and a great deal of emphasis is ascribed to cognition and memory. Further research is required to examine how imaginaries of a future with AD might be impacted by earlier detection and labelling of risk in a context where AD remains elusive and prognosis uncertain. In the move towards prediction and earlier detection despite absence of prevention, it is important to reflect on how we account for experiences of deterioration and changes to cognition and memory as *alternative* ways of being in the world (c.f. Latimer 2018) particularly given practitioners' concerns around the intensification of patient anxieties and uncertainties. Here we see the paradox of biological precision as demonstrated by increased uncertainty: prediction and prevention have the potential to reify normative values around cognition and also ageing as demonstrated eloquently during a conversation with Clinical Psychologist 1.

> *I think psychologically people find it very difficult to value the experiences of someone with dementia as much as they would value the experience of somebody who's a top athlete. Ok so but who's to say that this next moment of this person with dementia's life is of any less value than the next moment of Christiano Ronaldo's life? You know and it's that sort of it's that I think where greater value is placed on certain people's lives and experiences whereas, yes you may have dementia but that doesn't mean that you don't enjoy playing with a doll let's say even though you're 90. Or that you don't enjoy having your hand massaged or held - you may not enjoy or be able to write a novel like you did when you were 50 but that's not - do you know what I mean?*

As Clinical Psychologist 1 reflects, 'valuing' the experiences of individuals with dementia is difficult in a context where pushing the limits of what it means to be human is privileged and praised i.e. being a top athlete. Here the practitioner stresses the need to account for experiences of decline and *changes* in cognition in individuals with dementia through more mundane practices of affection such as having their hand massaged or playing with a doll (c.f. Latimer 2018). This account also highlights the devaluing of the ageing process and ageing bodies more generally where cognitive deterioration has the potential to represent a failed later life (c.f. Gilleard and Higgs 2010, 2013). To begin to consider the impact of biotechnological innovation aimed at predicting AD or detecting AD at earlier stages will require us to recognise the experiences of those with dementia beyond reduction to cognition and memory and attend to the kinds of normative values concerning cognition and its association with age which may be reified by biomedical agendas. The meanings ascribed to dementia shift from imaginaries of deterioration linked to cognition and memory such as recalling objects, names, places to recognising and accounting for other ways of being in the world through highlighting difference or deficit (Latimer 2018; Taylor 2010) and practising prediction and earlier detection with care to alleviate the importance we ascribe to cognition (Boenink, van Lente and Moors 2016).

Discussion

This article renders visible the complex entanglements around the promissory claims of innovation in biomedicine aiming to predict and detect AD at earlier stages, and the socio-cultural discourses tied to memory and cognition which pervade societal perceptions of the condition. Throughout this paper I have demonstrated moments of tension around cognition and memory in the clinic and it becomes clear that AD is culturally and socially complex, which practitioners struggle to contain alongside clinical uncertainty. Adding to this complexity is the fact that individuals are faced with knowing and anticipating deterioration for longer through earlier detection (see Anonymous 2017). Biologically (re)defining AD through prediction and earlier detection may work to reinforce the tensions around cognition, memory and 'self' as individuals may be more aware of the stigma associated with the condition, particularly since deterioration cannot be prevented (see Schicktanz et al. 2014; Taylor 2010).

Drawing on moments of interaction in clinics and practitioners' reflections on research agendas, in the first section of the analysis, I demonstrated the way in which 'imaginaries of deterioration' tied to cognition and memory pervade perceptions of AD in the clinic. These imaginaries of a future with AD have "material form in the present" (Tutton 2017, 480) and shape the interactions of the assessment process. In exchanges between practitioners, potential patients, and their families, memory as a process of remembering names, events, places, and people is central to initial encounters. Assessments produce and provoke moments of tension as potential patients work to hold on to memory as a means of stigma avoidance and in an effort to protect identity as they recite rhymes, poems and songs following intense questioning about their ‘forgetfulness’ as framed by the practitioners. As evidenced during consultations and interviews with practitioners, this tension around memory was closely tied to antiquated assumptions concerning AD diagnosis more generally and the dominant discourse of ‘loss of self’ related to madness and senility (Beard 2016; Higgs and Gilleard 2017; Anonymous 2017). Continually framing AD with respect to loss of cognition and memory provokes tensions with regards to how we perceive dementia more generally as an imagined hopeless future (see Anonymous 2017).

In the second section of the paper, I captured practitioners’ reflections on how these imaginaries of deterioration, which take on a material form might interact with the wider promissory claims of prediction and detection of the condition at earlier stages. Biomedical temporalities push the horizons of the disease to earlier stages and yet this is challenged by practitioners in their accounts. For many practitioners, whilst prediction and earlier detection are entangled with hope for the future, they also acknowledge the extent to which this biological approach to managing the condition may produce further anxiety and uncertainty for individuals. With the biological reframing of the condition we see the colonising of a particular future for managing AD (c.f. Borup et al. 2006): a specific construction and organisation of care is imagined in terms of prevention and prediction. A sense of ambivalence also emerged across practitioners’ accounts, as the making of AD in the clinic requires practitioners to oscillate between negotiating dominant socio-cultural discourses tied to cognition and memory in the context of lack of treatment and means of prevention, and their own (biomedical) hopes with respect to eradicating AD.

The findings of this paper therefore accord with previous literature on the uncertainties and ambivalences provoked by genetic and genomic testing for conditions for which there is no cure or means of prevention (e.g. Mendes et al. 2018; Novas and Rose 2000; Scott et al. 2005). Yet, what is further troubling with regards to AD is the uncertainties provoked by the societal emphasis placed on cognition as the 'decisive carrier of personhood' (Leibing 2006, 258) coupled with the way in which the ageing process and ageing bodies are also devalued: deterioration represents a failed later life (c.f. Latimer 2018). Furthermore, the biological redefinition of the condition works to assert and promote a particular set of normative values about cognition *and* also age that effaces difference and deficit or what Latimer (2018) argues are other ways of 'being in the world'.

Imaginaries perform the techno-innovation economy in relation to AD as scientific agendas are driven by hopes for a cure, eradication and prevention (c.f. Lock 2013). Yet, as I have shown in this paper, promissory visions and efforts to biologically (re)define the condition have the potential to provoke individual anxieties and uncertainties concerning a future with AD. We therefore begin to see the interaction of competing futures: promissory futures as controllable via prediction and earlier detection interacting with individual futures as uncertain and shaped by socio-cultural depictions of deterioration and deficit related to cognition and also age. As many of the practitioners I interviewed explained, anticipations of the future provoke uncertainties and anxieties (Adams, Murphy and Clarke 2009) and have the potential to be reinforced by the promissory claims of prediction and earlier detection.

The question remains as to how these meta-discourses of prediction and earlier detection impact those most affected including potential patients and their families, and this requires careful consideration and further research in order to understand how individuals engage (or dis-engage) with innovation agendas. Widening the focus from the normative futures of prediction and earlier detection to considering the kinds of futures crafted in everyday practices and processes of assessment and diagnosis which as I have shown, take into account the imaginaries of deterioration which pervade societal perceptions of AD. What kinds of values circulate as part of these promissory agendas and how might things be otherwise?

Overall, this paper has shown that there emerges a paradox entangled in biologically redefining AD: purported precision and prediction on the one hand and increasing uncertainty on the other; entangled with wider sociocultural imaginings of AD. We therefore begin to see the limits of the biomedical epistemology of AD as framed around symptoms of memory decline and cognition related to plaques and tangles. The ways in which we understand Alzheimer's cannot be reduced solely to pathology i.e. the plaques and tangles, which may or may not be present in the brain particularly since "there is no hard scientific boundary between disease and normality" (Hughes, Louw and Sabat 2006, 2).

It is imperative to address how practitioners and patients approach prediction and earlier detection through emphasising the material form that imaginaries of deterioration take in everyday clinical encounters and highlighting their consequences: widening the focus from normative futures of techno-innovation to take into account the socio-cultural context in which innovation is practised. Who is impacted by the utility of earlier detection and prediction, and what kinds of values are produced by, and aligned with, these biomedical agendas? For many of the practitioners I interviewed, their concerns were focussed primarily on the anxieties and anticipations produced by the biological framing of the condition alongside the way in which this framing provokes questions in relation to the (de)valuing of experiences of dementia and age more broadly. Perhaps as Beard (2016), Hillman and Latimer (2017) and Latimer (2013,

2018) have discussed, allowing for multiple meanings of dementia and ageing to co-exist beyond cognition and memory may alleviate the complexity concerning ways of approaching and managing AD, and reconfigure imaginaries of deterioration. Further research is required to examine how these complex entanglements between cognition, memory and 'self' relate to identities and experiences of AD in the context of emerging innovation.

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