After the Biomedical Technology Revolution: Where to Now for a Bio-Psycho-Social Approach to Social Work?

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Abstract

In the late twentieth century, the bio-psycho-social framework emerged as a powerful influence on the conceptualisation and delivery of health and rehabilitation services including social work services in these fields. The bio-psycho-social framework is built on a systems view of health and well-being (Garland and Howard, 2009). The systems perspective encourages medical and allied health professions, including social work, to recognise and to respond to the multiple systems impacting on individual health and well-being (Engel, 2003). This paper analyses how advances in biomedical technology, particularly in the fields of neuroscience and human genomics, are challenging the bio-psycho-social approach to practice. The paper examines the pressures on the social work profession to embrace biomedical science and points to the problems in doing so. The conclusion points to some tentative ways forward for social workers to engage critically with biomedical advances and to strengthen the bio-psycho-social framework in the interests of holistic and ethical approaches to social work practice.

Keywords: Biomedical technology, bio-psycho-social perspective, health, professional identity, social work practice, social work theory

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Introduction

In the late twentieth century, the bio-psycho-social framework emerged as a powerful influence on the conceptualisation and delivery of health and rehabilitation services including social work services in these fields. The

bio-psycho-social framework is built on a systems view of health and well-being (Garland and Howard, 2009). The systems perspective encourages medical and allied health professions, including social work, to recognise and to respond to the multiple systems impacting on individual health and well-being (Engel, 2003). In this paper, I analyse how advances in biomedical technology since the 1990s, particularly in the fields of neuroscience and human genomics, are challenging the bio-psycho-social framework. I will outline the pressures on the profession to embrace biomedical science and technologies and the problems of doing so. I will argue for some tentative ways ahead to promote critical engagement with biomedical advances and to strengthen the bio-psycho-social framework in the interests of holistic and ethical approaches to social work practice.

The bio-psycho-social framework

Reference to the bio-psycho-social framework is ubiquitous in the health care literature and is referred to in a variety of disciplines and across many fields of practice including mental health, disability, rehabilitation, palliative care and acute medical care (see Bisman, 2001; Collins, 2005; Engel, 2003; Nelson-Becker *et al.*, 2013). Indeed the shared ownership of this framework by medical, allied health and nursing disciplines is such that it is difficult to trace the origins of the term. Certainly, the medical profession claims to have coined the term. The American medical practitioner George Engel was a key exponent of this approach. In his seminal paper on the topic, first published in 1977, Engel (2003, p. 1) proclaimed that ‘The bio-psycho-social model is a scientific model constructed to take into account the missing dimensions of the biomedical model’. In the context of the growing authority of biomedical science and technology today, it is important to recall that recognition of the ‘missing dimensions’ of biomedicine was a founding principle of the bio-psycho-social framework.

Social workers can also lay claim to a bio-psycho-social perspective dating back to the work of the American social work pioneer, Mary Richmond. In her foundational work *Social Diagnosis*, published in 1917, Richmond insisted the social workers understand the impact of the biological as well as the psychological and the socio-economic contexts of service users. Some argue that the bio-psycho-social perspective supports a move away from a traditional biomedical model of care and towards a holistic approach to human need which recognises ‘the inter-relationships between physical, psychological, and social functioning’ (Harris and White, 2013, p. 16). Others contend that the perspective urges social workers to recognise the biological aspects of human need within the profession’s person in environment approach (Taylor *et al.*, 2010). The bio-psycho-social perspective has provided a framework for inter-disciplinary collaborations involving social workers working alongside other professionals to address the biological,

psychological and social dimensions of human need in fields as diverse as child welfare, nutrition and disability services (Collins, 2005; Conrad, 2010; Shor, 2010). Yet the framework is not without its critics. For example, Fawcett and Reynolds (2010, p. 1490) contend that the perspective reinforces a 'symptom-diagnosis-treatment' model that can over-value professional knowledge and disempower service users.

Support for the bio-psycho-social approach can be found in the Ottawa Charter pronounced by the World Health Organization in 1986. Improved citizen engagement in achieving health and well-being lay at the core of the Ottawa Charter. The Ottawa Charter strengthened the bio-psycho-social framework by recognising the social context of health and the role of health and social care workers in promoting social equality and inclusion as a means to improving health outcomes (Hancock, 2011). Similarly, in 2001, the World Health Organization endorsed the International Classification of Functioning, Disability and Health (commonly referred to as the ICF). The ICF supports a bio-psycho-social approach in which biomedical and psycho-social interventions are recognised as vital components of disability support services.

The rise and rise of biomedical science

Substantial advances in biomedical science and technology since the 1990s are reshaping health and rehabilitation services and have implications for many other areas of social work practice. These advances extend the scope and authority of biomedical interventions potentially further elevating the 'bio' dimension of the bio-psycho-social framework.

Biomedical technologies now enable geneticists and medical practitioners to identify genetic markers of a range of diseases and disabilities. This has broadened the focus of health care practice to include identification of, and intervention with, the biologically susceptible that is those whose genetic profile indicates increased risk of disease (Nelkin and Lindee, 2004). Advances in predictive testing have enabled scanning and elimination of embryos carrying 'gene disorders' prior to implantation (Verlinsky, 2005, p. 24), and contributed to increased use of surgeries to prophylactically remove tissues or organs, such as breasts, ovaries, thyroid or the colon in individuals at high risk for genetically linked diseases (You *et al.*, 2007). Aside from the ethical concerns, health professionals also cite issues about their negative impact on health, such as the elevated risk of cardiovascular disease and osteoporosis among women who have had their ovaries removed (Clarke *et al.*, 2006).

Similarly, advances in neuroscience, particularly developments in diagnostic imaging such as functional magnetic resonance imaging (fMRI), have increased the capacity of scientists and clinicians to measure aspects of brain structure and activity (Rees, 2011). There is a broad and growing

range of applications of neuro-imaging including, but not limited to, health, rehabilitation, welfare and justice (Sahakian, 2011; Treadway and Buckholz, 2011). In the fields of health and human welfare, neuro-imaging applications including the identification of brain disease, injury or other abnormalities. Importantly, too, neuro-imaging has contributed to insights about brain plasticity referring both to the capacity of the brain to be harmed by adverse social conditions and to repair itself, to varying extents, under positive environmental conditions (Garland and Howard, 2009).

The race to embrace?

Many in the scientific community acknowledge that the application of biomedical technologies is at an early stage with many unresolved technical, ethical and social concerns (Rees, 2011; Stirling, 2011; Treadway and Buckholz, 2011). Yet these cautionary voices are muted by two features of how the biomedical revolution has unfolded over the past two decades. First, proponents of biomedical technologies have powerful and articulate allies among political and scientific leaders particularly in the USA. These champions propose that biomedical technologies represent a giant leap forward in our understanding of humans and offer profound solutions to a range of human problems, including social issues (see Bush, 1990; Clinton, 2000; Perry, 2002). Second, the technologies themselves provide compelling visual images that are accessible, but also easily misinterpreted, by a range of health professionals, users of services and the general public (Rose, 2011; Wastell and White, 2012). As I shall argue, it is this combination of factors that has elevated biomedical science and technology from being an important dimension of health care to one that is proposed by its champions as central to the future of our health care services and, further, to the resolution of major social problems.

In 1990, George Bush senior declared the 1990s as the ‘decade of the brain’. His announcement heralded a series of initiatives between the Library of Congress and the National Institute of Mental Health to introduce the members of the Congress and the public to cutting edge research on the brain. In his declaration, he stated that ‘a new era of discovery is dawning in brain research. Powerful microscopes, major strides in the study of genetics, and advances in brain imaging devices are giving physicians and scientists ever greater insight into the brain’ (Bush, 1990, p. 1).

He further claimed that this new dawn in scientific discovery would lead to greater insights and treatments for a range of health and social challenges, from spinal cord injuries, psychiatric illness to ‘the war on drugs’.

In 2000, the first map of the human genome was completed and this achievement was met with accolades by world leaders. In his announcement,

US President Bill Clinton used powerful rhetoric to describe this advance in biomedical knowledge. He stated that:

Today, we are learning the language in which God created life. We are gaining ever more awe for the complexity, the beauty, the wonder of God's most divine and sacred gift. With this profound new knowledge, humankind is on the verge of gaining immense, new power to heal. Genome science will have a real impact on all our lives—and even more, on the lives of our children. It will revolutionize the diagnosis, prevention and treatment of most, if not all, human diseases (Clinton, 2000, p. 1).

Demonstrating the growing intersection between politics and biomedical discovery, political leaders such as Clinton and British Prime Minister Tony Blair assumed an unusually high profile in the announcement of the mapping of the human genome. Their pronouncements also encouraged a view of scientific advances as revolutionising health care which were, in the words of Clinton, akin to 'learning the language in which God created life'.

This rhetoric of miraculous scientific advance is also mirrored among champions within the scientific community. Nelkin and Lindee (2004, p. 8) observed that scientists promoting these advances deployed explicit religious metaphors such as the 'Holy Grail' and linked the biomedical advances to the aspiration that 'the genome — when mapped and sequenced will be a powerful guide to the moral order'. Far from shying away from religious metaphors, James Watson, Founding Director of the Human Genome Project, famously asked 'If we don't play God, who will?' (Forbes, 1996, cited in Petersen, 2001, p. 1256).

Imaging technology has also played a vital role in expanding the authority of biomedical science and technology. Brain images are used extensively by neuroscientists and these images have now become commonplace in the professional and popular media. Brain images have been credited with providing new information about the neurological causes and effects of a range of disorders and concerns, from addictions to child neglect (see Perry, 2002; Sahakian, 2011). Recently, too, proponents of brain-imaging technologies have argued that the images provide opportunities to assess the efficacy of interventions, including psycho-social interventions, for achieving recovery of brain activity following injury (Farmer, 2009; Matto and Strolin-Goltzman, 2010).

Advances in the human genome project and in neuro-imaging have played an important role in extending the scope and authority of biomedicine. At the very least, biomedical innovations are changing the nature and range of health care interventions to include identification and treatment of the biologically susceptible (Nelkin and Lindee, 2004). As a consequence, social workers in health services may be involved in service user decision making about genetic testing and treatment interventions for those found to be at increased risk of disease. Technological advances can also aid 'psycho-social' assessment. For example, neurological evidence about brain plasticity can support psycho-social assessment and intervention to highlight the psychological and social

conditions needed to maximise recovery of survivors of brain injury ([Garland and Howard, 2009](#)).

Yet the uncritical expansion of biomedical authority threatens to displace recognition of the psycho-social dimensions of health and social care practices. One concern is that the benefits of the technologies are ‘over-hyped’ ([Stirling, 2011](#), p. 89) such that clinical judgement and psycho-social assessment are undermined. For example, while neuro-images provide information about brain structure and activity, the images cannot determine the causes of brain abnormalities. Furthermore, existing assessment procedures involving interviews and analysis of the clinical histories of the individual are necessary to achieve insights about the causes and impact of any observed injuries or abnormalities ([Rose, 2011](#); [Wastell and White, 2012](#)). At most, neuro-images may complement clinical judgement and evaluation in some circumstances, but they are not a replacement for other information gathering and relationship building processes between practitioners and service users ([Chan and Harris, 2011](#); [Rose, 2011](#)).

A further risk is that social concerns may be reconceptualised as biomedical concerns, thus marginalising questions of social justice and psycho-social interventions ([Petersen, 2001](#)). For example, in observing that ‘early deprivation and poverty, in interaction with genetic predisposition, are key factors in future mental health problems’, [Sahakian \(2011, p. 62\)](#) proposes that interventions are needed to ‘develop the brain’s resilience to damage’ from an early age. The prospect and potential of psycho-social interventions, such as interventions to prevent poverty, are marginalised by the increased focus on biomedical analysis of the causes of, and responses to, ill-health and disability. This is a far cry from the Ottawa Charter’s advocacy for preventative social interventions to improve health for all.

The expanding influence of biomedical science and technologies in the health and rehabilitation sciences threatens to undermine the bio-psycho-social framework in two ways. First, the growing authority of biomedicine leaves little space for acknowledgement of the gaps in this knowledge base. This shift is significant because, without recognition of the limitations of the biomedical model, the legitimacy of the bio-psycho-social approach is in doubt. Second, biomedical solutions are being proposed to problems that have a strong social component such as the contribution of extreme social-economic disadvantage to increased risk of mental health problems ([Petersen, 2001](#)). One consequence is that psycho-social interventions proven to benefit for vulnerable individuals and communities are likely to become less available to them.

How should social work respond to the biomedical imperative?

Much is at stake for the social work profession in debates about the future of the bio-psycho-social framework. Social work is strongly aligned to the

'psycho-social' dimensions of service provision. The biomedical revolution has increased pressure on social work profession to rethink its knowledge and skill base. Bisman observed that 'Always faced with the extraordinary breadth of their profession's domain, recent technological advances in DNA and brain research pressure social workers to reconsider the meaning of the psychological and social issues *via-a-vis* the physiological' (2001, p. 87).

The growing authority of biomedicine particularly in health and disability services has intensified long-standing concerns among some social workers of the need for the profession to strengthen its understanding of the biological basis of human need. Collins remarks that 'the biological component of the time-honored bio-psycho-social perspective in social work is often missing' (2005, p. 478).

With the expanding influence of biomedicine, some powerful groups within the social work profession have called for the embrace of biomedical knowledge to maintain our relevance to the contemporary service environment. In 2003, the NASW (National Association of Social Workers in the USA) published a statement on standards for integrating genetics into social work programmes which proposed that social work education programmes mandate students to complete courses on genetics. The NASW standards states that 'social workers shall acquire a basic understanding about genetics as a science and a field of study, including its biological, psychosocial, ethical, and legal aspects', and they go on to add that 'social workers need to become familiar with general terminology used in human genetics and basic patterns of biological inheritance and with the role of genetic factors in maintaining health and preventing disease' (NASW, 2003, p. 8). Importantly, the NASW statement proposes that all social workers, not only those working specialist health disciplines, require a working knowledge of genetics.

Similarly, some social workers advocate for practitioners and researchers to acquire knowledge of neuroscience and the capacity to use neuro-imaging technologies. Rosemary Farmer describes neuroscience as the 'missing link for social work', adding that 'neuroscience is enhancing our understanding of what it means to be human' (Farmer, 2009, p. 2). Matto and Strolin-Goltzman argue that social workers have a 'unique obligation' to participate in the development about the application of neuroscience to social work, further stating that 'social work researchers can use neuroscientific knowledge about the mechanisms of risk related to psychosocial problems to advance the development of new treatment interventions, and they can use brain-imaging technology to measure outcomes at the neural level' (2010, p. 148).

Like Perry (2002), Matto and Strolin-Goltzman (2010) applaud what they see as the possibilities that neuroscience and related imaging provides to 'neurobiological outcomes related to the implementation of psychosocial interventions' (p. 148). Garland and Howard (2009) express a more cautious view, arguing that social workers should view biomedical technology and psycho-social approaches as complementary in advancing our understanding

of service user need and practice outcomes. The value of neuroscience, according to proponents in the social work community, is both in terms of improving assessment and in providing scientific data about the impact, or otherwise, of our practices on the structure and function of the brain (Farmer, 2009; Matto and Strolin-Goltzman, 2010).

To date, the strongest advocacy for social workers to embrace of biomedical science and technology has come from the USA. Nonetheless, the global influence of biomedical technologies means that social workers in other national contexts need to grapple with how we will respond to the biomedical imperative. Indeed, there is strong evidence that many health and welfare fields in which social workers practice internationally are changing in response to biomedical advances (see Petersen, 2001; Rose, 2011; Wastell and White, 2012). For example, recently in Western Australia, the Coroner investigating the suicide of a fifteen-year-old Aboriginal boy concluded that the childhood neglect suffered by him had resulted in neurological changes that had contributed to his death (Vickers, 2014). Indeed, one-third of the thirty-seven-page Coroner's report is dedicated to summarising the expert evidence on neurological damage associated with early childhood neglect including reference to evidence from children raised in the appalling conditions of Romanian orphanages of the Ceausescu era. Only one sentence in thirteen pages of expert testimony summarised by the Coroner concedes the contribution of social disadvantage to elevated risk of suicide. Apart from this, there is no recognition of the social factors associated with the ongoing effects of European colonisation, institutionalised racism, violence and economic exclusion that have been shown also to play significant roles in high suicide rates among Aboriginal teenage males (see Hunter and Milroy, 2006). The Coroner concludes her report by urging the Child Protection authority to integrate recent 'advances' in neuroscience in their practice with vulnerable children (Vickers, 2014, p. 37).

The case for caution

While social workers cannot avoid the revolution in biomedical science and technology, we need to think carefully about how we respond to it. To enthusiastically embrace biomedical science and technology within the knowledge base of social work is fraught with risk. Chief among these risks is the potential for social workers to do harm.

The potential for harm is significant because of the inherent complexity of biomedical sciences and technology. Social workers and indeed all allied health professionals should keep abreast as informed, but not expert, readers of biomedical information. To do more, such as to incorporate this knowledge into our practice in a way that might inform assessments, interventions or evaluation seems fraught with risk. The fields of genetics and neuroscience are growing at rapid rates with internal fields of specialisation and

many areas of dispute (Treadway and Buckholtz, 2011; Rose, 2011; Stirling, 2011). Without formal and lengthy training in these fields, we cannot hope to offer knowledgeable input about information derived from these technologies in an informed and ethical manner. We risk oversimplifying the knowledge from these fields and uncritically accepting claims of biomedical experts to the detriment of service users.

A good example of the potential for harm arising from an uncritical acceptance of biomedical evidence can be found in what appears to be the premature and uncritical approach to claims about neurological damage arising from child neglect. I refer to claims and debates stemming from a paper published by Professor Bruce Perry in 2002 on the topic of childhood experience and genetic potential (see also Wastell and White, 2012). In this paper, Perry published a now widely cited image comparing the brain scan of a 'normal' three-year-old and the brain image of a three-year-old who had suffered 'extreme neglect' (Figure 1).

Perry asserts that 'these images illustrate the negative impact of neglect on the developing brain' (2002, p. 93). This image has been extensively circulated, appearing, for example, on the cover of Allen's (2011) report on early intervention presented to the government of the UK and in a foundational text on social work and neuroscience (see Farmer, 2009).

Despite the wide use of the image as apparent proof of the structural brain abnormalities associated with neglect, a review of Perry's (2002) paper and the preceding conference abstract (Perry and Pollard, 1997) from which the image was drawn points to several problems in the image and the interpretations made of it. Perry's (2002) paper is a translation piece which assumes the reader has no background in neuroscience. The first part of the paper purports to introduce the reader to the 'major processes of neuroscience' and 'core principles of neurodevelopment'. Given the enormous complexity of neuroscience principles and processes, such an introduction is inevitably superficial. The application of neurodevelopment principles to understanding child neglect is then outlined by reference to five studies, one published

Figure 1 Comparison of brain CT scans of two children, source Perry, 2002, p. 93

more than a century ago and three of the remaining four studies published three decades or more previously. Four of the five studies referred to neurological outcomes for children raised in appalling institutional conditions ‘devoid of individual attention, cognitive stimulation, emotional affection or other enrichment’ (Perry, 2002, p. 91), including one example of a child raised in a ‘dungeon’ (Perry, 2002, p. 90), and to the poor outcomes experienced by children raised in Romanian orphanages in the late twentieth century. These environments are quite unlike those typically encountered by child protection workers in contemporary post-industrial societies such as the UK, the USA or Australia. While children in these countries may also experience serious and chronic neglect, it is often of a very different type to the extraordinary sensory deprivation experienced by children referred to in Perry’s literature review and, as such, caution is called for in applying these findings to other contexts.

Perry’s paper reports on a study of 122 children in the USA who were subjected to neglect. In contrast to accepted biomedical science conventions, the paper has a brief methodology section which is one paragraph in length, there is no control group of ‘non-neglected’ children and the findings include post-hoc interpretation of brain images provided to Perry’s team by a subset of research participants who already possessed these images. Less than half the children who participated in the study (43 of the 122 participants) provided MRI or computed tomography (CT) scan images and there is no explanation provided by Perry as to why this subset already possessed clinical neurological images. This is an important omission given that MRI and CT scans are costly and invasive and, as such, are not standard procedure in general medical assessments of children. Further, understanding of the clinical history of the individuals involved is vital to the assessment of the causes of observed brain ‘abnormalities’. As Wastell and White note in their critical review of the image of the two brains published in Perry’s paper, ‘Without details of the case history for the neglected child, such an image is meaningless; perhaps the child was the subject of massive birth trauma, or some congenital condition’ (2012, p. 401). Furthermore, in contrast to scientific convention, there are no scale factors to indicate whether the two contrasting images presented in Figure 1 are depicted on the same scale. The premise of Perry’s argument depends on these scale factors being the same for both images, yet this crucial information is not supplied in the paper.

Remarkably, the inference drawn by both Perry and those who reproduce the image (see Allen, 2011; Farmer, 2009) that child neglect contributes to brain abnormality is not fully supported by the text of the article. Even within this small and highly selective sample, the vast majority (88.5 per cent) of the ‘chaotically’ neglected children and more than one-third (35 per cent) of the ‘globally’ neglected children showed *no* evidence of brain abnormality (see Perry, 2002, p. 92). At the very least, these findings should urge us to be cautious in applying claims about the neurological impact of child neglect to the wide range of serious child neglect we encounter in our practice.

Notwithstanding the methodological and interpretive limitations of the paper, debates within the neuroscience community itself also urges caution in the interpretation of CT and MRI images at a population level. Neuroscientists note that ‘variation in both subtle and gross morphological aspects’ of human brains exists across the population (Treadway and Buckholtz, 2011, p. 544), meaning that it is possible for differences between two individuals’ neuro-images to be attributed to expected population variation. Rees (2011, p. 15) warns against drawing inferences from individual scans, observing that ‘while they [neuro-images] can provide insights into the group average (or typically, representative) patterns of brain activity, they provide less insight into the variability of these patterns of brain activity associated with an individual’. Non-specialist readers of neuroscience images should be mindful of neuroscientists warning regarding the limitations of these images as well as the problems in relying on the post-hoc assessment of pre-existing images of a subset within a research sample.

As a critical and engaged audience, we need to ask more about how biomedical information is presented to us, such as to critically engage with questions of how findings were produced and what alternative explanations might be made of this evidence. The power dynamics of health and welfare fields where biomedical authority is dominant makes this a challenging task. However, it is in the interests of those who receive our services and for the continued support for holistic approaches to service provision that we do not uncritically embrace biomedical claims, particularly where those claims threaten to undermine the credibility and relevance of psycho-social understanding, and responses to, human need.

The potential for harm is great also because of the many unanswered questions about the implications of these technologies. In the contemporary context, Treadway and Buckholtz warn that:

... whereas technological innovations of the last quarter century have rendered the human genome accessible to scientific inquiry in ways never before thought possible, the ethical, legal, and social implications of the resulting flood of information are far from settled (Treadway and Buckholtz, 2011, p. 534).

Social workers have been among those who have expressed concern about the creation of a ‘biological underclass’, people who either don’t have access to expensive biomedical interventions or for those who face discrimination as a result of their genetic profile (Freedman, 1998, p. 216).

The list of human rights concerns arising from the new technologies is long. Concerns include the potential constraints on the rights of people living with disabilities, people with genetic markers for disease and their families. Troy Duster notes that ‘while the “front door to eugenics is closed”, the “back door” has already been opened by contemporary medical care practices such as genetic counselling, the selective identification of genetic disease,

and the conceptualisation of genetic health' (1990, cited in [Nelkin and Lindee, 2004](#), p. 170).

Biomedical technology is portrayed in the popular media as offering new opportunities which the responsible citizen should avail themselves of in order to protect their own health and that of their families ([Roy, 2008](#); see also [Petersen, 2001](#)). For example, advances in predictive genetic testing place increased pressure on prospective parents not only to undertake tests, but to act responsibly, namely to abort the foetus, where abnormalities are detected ([Raspberry and Skinner, 2011](#)).

Another human rights concern relates to the potential loss of privacy and potential for discrimination against those found to be biologically susceptible. The legal rights of individuals to withhold private information about their genetic profiles from third parties, such as health insurance companies, are yet to be clarified. Social workers have joined others in raising concern about increased potential for discrimination by health insurance companies towards those with high-risk genetic profiles ([Otlowski *et al.*, 2003](#)).

The further potential for the harm arises from the reconceptualisation of social problems as biomedical in origin (see [Sahakian, 2011](#)). While we can recognise increasing knowledge about the contribution of genetics and neuroscience as factors contributing to, or reflecting, social problems, we must resist attempts to locate causes and consequences of social problems within the individual. The opportunities for the further medicalisation of social problems afforded by biotechnology risks the loss of a social justice perspective and the increased stigmatisation of individuals regarded as biologically vulnerable.

Renegotiating the bio-psycho-social in the biomedical age

The social work profession cannot afford to be indifferent to the expanding influence of biomedicine on many domains of health and social work. We must engage critically with biomedicine and biomedical authority so as to understand its benefits and limitations and to create space to recognise other dimensions of human need. This critical engagement is important to preventing excessive and potentially damaging applications of biomedicine on service users lives and to promoting holistic practice approaches. In this section, I will discuss how social workers can use a bio-psycho-social framework to thoughtfully and critically engage with both the challenges and opportunities of biomedical technology and to promote continuing recognition of the biological, psychological and social dimensions of human need.

Turning first to social work education, the bio-psycho-social perspective provides a framework for emerging practitioners to articulate the interdependence of the biological, psychological and social aspects of human need and to support holistic responses that integrate insights from biomedical, psychological and social science (including applied social science)

disciplines. With the growing authority of biomedical knowledge, it is important that social work education build students' confidence and capacity to critically interrogate biomedical knowledge claims. This involves three aspects.

First, social work education can promote students' awareness of contemporary debates amongst biomedical researchers and ethicists about the utility and limits of biomedical technology. Awareness of these debates will enable social workers to resist investing biomedical information with greater certainty than is warranted. In contrast to the promises made about biotechnology by global political leaders and some within the scientific and professional communities, there remain many areas of great uncertainty within genetics and neuroscience (Nelkin and Lindee, 2004; Treadway and Buckholtz, 2011). These uncertainties are acute in practice domains where there is a complex interplay of social and individual factors, namely the terrains where social workers practice. For example, referring to genetic testing in the context of forensic psychiatry, Treadway and Buckholtz state that 'it is impossible to know whether, in a specific individual, genetic factors play any role whatsoever in the presenting clinical phenomenon' (2011, p. 336). Awareness of the continuing gaps in biomedical knowledge is important in advocating for a holistic view of the individual that goes beyond their biomedical profile and includes psychological and social dimensions of their lives.

The second element of building students' capacity to critically engage with biomedical knowledge is to increase students' understanding of the principles of the scientific method on which biomedical authority is based. Grounding in the scientific method will assist emerging practitioners to rigorously engage with biomedical evidence and to avoid the selective and superficial embrace of biomedical knowledge. For example, in relation to neuro-imaging, bio-ethicists Chan and Harris warn that there is:

The danger that the possibilities offered by neuroimaging may be misinterpreted and thus misapplied, overstretching the current capabilities of the technology and leading to false assumptions being made about the extent to which brain states constitute 'windows on the mind' (Chan and Harris, 2011, p. 79).

The dangers of the uncritical integration of neuroscience and genetic research findings could be reduced if social workers were equipped to be critical readers of biomedical research and the translation pieces that purport to offer the non-specialist reader insight into scientific discoveries.

The third element is to encourage social workers to critically analyse all claims to authority through the lens of the service users' perspective. Social workers have a long tradition of critically assessing the impact of psychological interventions and social practices on service users' lives, particularly where these practices fail to take account of the broader social and economic conditions that contribute to vulnerability (Healy, 2014). Social workers need to extend this critical approach to the analysis of potentially costly and invasive

biomedical interventions on service users' lives by asking questions about costs, benefits and other implications for service users. For example, proponents of the extension of biomedical technologies in child welfare propose that these technologies can demonstrate the biological impact, such as to changes to the brain, arising from psycho-social interventions (Perry, 2002; Matto and Strolin-Goltzman, 2010). But we also need to ask: do these changes really matter to the service user? While changes to brain activity may be a by-product of bio-psycho-social interventions, such neurological changes are hardly likely to be the most pressing concern for the service user. From a service user rights perspective, the most meaningful measure of change is surely whether the service user experiences positive change arising from our interventions (Fawcett and Reynolds, 2010).

We turn now to advocacy for and with service users subject to biomedical assessment and interventions. Our value framework requires that we protect service user self-determination and challenge a deterministic view of biomedical information. Supporting service user self-determination involves encouraging a considered view of the promise and limits of biomedical technologies. For example, predictive technologies, such as genetic tests, can raise complex ethical issues regarding the potential impact on the service user's life (McCoyd, 2013). Concerns exist about the benefits of genetic testing, particularly given the risks of false diagnosis and the fact that, for most conditions, a 'positive result is indicative only of a potential risk factor' (Rose, 2011, p. 70). Learning one carries a marker for a particular condition is likely to have a significant impact on that individual's life and questions must be asked about whether the benefits of this impact are adequate to justify the economic and personal cost. These questions are especially important where no interventions are available or where the individual's chance of developing the condition is low to moderate, even if elevated compared to the population. These questions are also important to protecting individual rights to choose not to avail themselves of biomedical advances should they decide this based on a considered review of their situation.

An ethical stance also requires that social workers are attuned to the potential harms to the human rights of service users that biomedical science and technology may produce. Given our commitment to social justice and human rights, we also have a responsibility to raise these issues among our peers, in our inter-disciplinary teams and in society including through legal and social policy advocacy. We need to advocate for the protection of service user rights, such as the right to informed consent, privacy and confidentiality as vital principles of ethical health and rehabilitation service provision. These principles are at risk as predictive technologies provide information that can be of value to third parties, such as health care insurers, and which may result in increased vulnerability of those identified as biologically susceptible (Freedman, 1998).

Finally, we turn to a research agenda for social work. Social workers need to build knowledge about the benefits and limitations of the biomedical

revolution for service users' lives. Indeed, such work has commenced with social workers in fields such as reproductive technology and health and disability services undertaking research with consumers to highlight the dilemmas created by biomedical technologies (see [McCoyd, 2013](#); [Otlowski et al., 2003](#)). Inter-disciplinary conversations and collaborations between social workers and researchers from the biomedical, psychological and social science disciplines who recognise the value of the bio-psycho-social framework may assist in building knowledge about the biological, psychological and social dimensions of human needs and effective responses to those needs ([Fitzgerald and Callard, 2015](#)). For example, within the field of psychiatry, some eminent clinical researchers highlight that holistic interventions supporting people living with mental illness to gain meaningful work and participate in their communities are important dimensions to achieving recovery from illness ([McGorry et al., 2013](#); see also [Hunter and Milroy, 2006](#)). At this time of rapid advance and elevation of the biomedical, it is important that our profession commit also to engaging in research on effectiveness of psycho-social interventions including investigations with service users about the forms of change that matter to them. In building our knowledge base, it is also important that we systematically review literature in cognate fields such as public health, social policy and social psychology about psycho-social interventions that have contributed to positive outcomes for service users.

Conclusion

The revolution in biomedical science and technology brings with it both opportunities and threats. One threat is that the uncritical extension of biomedical authority will produce dangerous shifts in how service user needs are conceptualised ([Petersen, 2001](#); [Wastell and White, 2012](#)). The original insight of the founders of the bio-psycho-social framework into the limitations of biomedicine and the necessary complementarity of psycho-social perspectives to address the 'missing dimensions' of biomedical science in addressing human need remains and is perhaps more urgent today. There is much social workers have to offer to debates about the application of biomedical technologies particularly regarding the social and ethical implications of these technologies on service users' lives. It is vital that our profession builds the confidence and capacity to be critical and engaged advocates for the responsible use of these technologies and for continuing importance of the bio-psycho-social framework.

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