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Canadians' support for radical life extension resulting from advances in regenerative medicine

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ABSTRACT

This paper explores Canadian public perceptions of a hypothetical scenario in which a radical increase in life expectancy results from advances in regenerative medicine. A national sample of 1231 adults completed an online questionnaire on stem cell research and regenerative medicine, including three items relating to the possibility of Canadians' average life expectancy increasing to 120 years by 2050. Overall, Canadians are strongly supportive of the prospect of extended lifespans, with 59% of the sample indicating a desire to live to 120 if scientific advances made it possible, and 47% of respondents agreeing that such increases in life expectancy are possible by 2050. The strongest predictors of support for radical life extension are individuals' general orientation towards science and technology and their evaluation of its plausibility. These results contrast with previous research, which has suggested public ambivalence for biomedical life extension, and point to the need for more research in this area. They suggest, moreover, that efforts to increase public awareness about anti-aging research are likely to increase support for the life-extending consequences of that research program.

Introduction

Calls for the development of medical therapies that could either delay or reverse the aging process in humans as a technological solution to the looming demographic crisis (Dobriansky, Suzman, & Jodes, 2007; Peterson, 1999) have appeared in a number of high-profile venues in recent years (see Olshansky, Perry, Miller, & Butler, 2007; Rae et al., 2010, for example). Indeed, ongoing preclinical work in this area suggests that at least some aspects of human aging may be modifiable in future decades. Some prominent examples include the use of rapamycin to delay aging in genetically heterogeneous mice (Harrison et al., 2009) and the attenuation of accelerated aging in mice by means of the selective targeting of senescent cells (Baker et al., 2011) and the reactivation of telomerase (Jaskelioff et al., 2011). As Fishman, Binstock, and Lambrix (2008) document, the emergence of a community of researchers who view aging as a legitimate target for biomedical intervention (due to its status as a key risk factor for a variety of chronic diseases) played an important role in the development of biogerontology as a separate field.

Rae et al. (2010) propose three complementary approaches to intervening in the process through which age-related damage and degeneration leads to specific diseases and loss of function. The first two – improved public health policies and metabolic manipulation using pharmaceuticals – are aimed at postponing the onset of age-related decline, whereas the third – regenerative therapies – would aim to repair and reverse the damage caused by aging. As they note, "[t]his is the goal of regenerative medicine, a term often limited to cell therapy and tissue engineering: replacing lost cells and tissues with versions that are new and structurally youthful to restore function," though they propose to "broaden its scope to include conceptually similar interventions targeting other age-related changes" (Rae et al., 2010, p.3).

As the effort to develop true anti-aging biotechnologies gains pace, then, understanding how the public would perceive the resulting biomedical extension of the human lifespan has become increasingly important (Lucke & Hall,

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2005). Engaging with the public early on in the development cycle of a new technology ("upstream" engagement) can serve to increase the democratic legitimacy of regulatory and science policy regimes (Tait, 2009; Wilsdon & Willis, 2004) and help to avoid political controversies like that generated by embryonic stem cell research. Indeed, public discomfort with life extension has been proposed as one of the key obstacles in building a publicly funded research program to delay or reverse aging (Miller, 2002). Specifically, Moody (2001–2002) argues that "strong" life extension, in which the maximum human lifespan is extended well beyond it's current observed maximum of about 120 years is likely to cause a lot more ambivalence among both researchers and the public than "weak" life extension in which compression of morbidity occurs without increasing maximum lifespan, since the latter can be perceived as "more of the same," whereas lifespans in excess of 200 years would likely trigger fundamental changes to social institutions. This intuition is backed by existing research, with Cicirelli (2011), for example, finding that his sample of elderly Americans were more positively disposed towards the idea of life extension than the idea of living "forever." Understanding how the general public views the goal of radically extending the human lifespan, then, may help scientists engaged in this area of research to communicate more effectively with the public (Juengst, Binstock, Mehlman, & Post, 2003), and may facilitate decision-making by policymakers tasked with regulating and/or funding this research agenda.

While the study of public opinion on the topic is in its early stages, existing research has found that although individuals tend to ascribe benefits to anti-aging biotechnology, they also believe that extended lifespans could lead to significant negative effects, and question the morality of the proposition. This results in ambivalence regarding the anti-aging research agenda, at best. Two qualitative studies of Australian attitudes, for example, found significant polarization, with some participants strongly supportive and others strongly opposed, largely on ethical grounds (Partridge, Underwood, Lucke, Bartlett, & Hall, 2009; Underwood, Bartlett, Partridge, Lucke, & Hall, 2008). Using a survey of a larger and more representative sample of 605 Australians, Partridge, Lucke, Bartlett, and Hall (2009, 2011) found similar results. While most respondents listed positive considerations in responding to open-ended questions about life extension technology, a greater percentage reported negative ethical and personal considerations (Partridge, Lucke, et al., 2009). This led to relatively ambivalent attitudes, with 65% of participants supporting the development of life-extending technologies, but only 35% indicating that they would personally make use of these technologies if they were to become available (Partridge et al., 2011).

Two older UK-based studies paint an even more negative picture. In a representative mail survey of 1187 English and Welsh respondents, 37% of respondents indicated that a gene therapy that would extend average life expectancy to 100 years should be banned, with only 30% believing it should be freely available (Calnan, Montaner, & Horne, 2005). Similarly, in a national survey on British attitudes towards cloning, 74% of respondents expressed the belief that the use of therapeutic cloning by a person who is "in good health and wants to live longer" should not be allowed (Shepherd et al., 2007). Overall, then, existing work suggests that the Australian and British publics, at least, are unconvinced about the wisdom of anti-aging research.

In this study, I explore Canadians' support for an intermediate life extension scenario in which average life expectancy in Canada would increase to 120 years by 2050 as a result of advances in regenerative medicine. I chose 120 because this figure logically implies an increase in maximum observed lifespan, and therefore counts as "strong" life extension, but is more likely to be perceived as plausible by respondents than the higher figures suggested by Moody (2001/2002), since, even if an anti-aging pill was available today, the oldest humans in 2050 could only be about 150 years of age. I framed this life extension scenario in the context of Rae et al.'s (2010) "regenerative therapies," moreover, both because of the high profile of regenerative medicine and stem cell research in the media, and because, despite the original rapamycin study's surprising effects on older mice (Harrison et al., 2009), this approach could more plausibly lead to "strong" life extension among people who are already old today than metabolic modulation. The goal of both of these choices was to portray biomedical life extension as a real medium-term possibility that could affect participants' own lives.

In contrast to the existing research that I summarize above, the present study finds substantial enthusiasm for life extension in a recent national survey of Canadian adults. 59% of respondents expressed a desire to live to 120 if medical advances made it possible and 47% found the possibility of increasing average Canadian life expectancy to 120 years by 2050 to be plausible. Overall, the results indicate surprising openness to radical life extension among the Canadian public, and point to the need for more public opinion research on the topic to ascertain whether the contrast between this study's findings and previous research reflects a change in public sentiment over the past 10 years, differences in sample composition, cross-national differences, or the ways in which life extension is framed in different studies.

Study description

A sample of 1231 Canadian adults completed an online questionnaire that aimed to measure respondent attitudes towards regenerative medicine and stem cell policy. Data was collected by Opinion Search, Inc. using its online access panel between June 29th and July 17th of 2012. Opinion Search's panel members are recruited through partnerships, on the web, and using random telephone dialing, and are invited by email to complete online market research and public affairs surveys in exchange for points, which they can cash out for rewards such as retailer gift cards or magazine subscriptions. The survey response rate was 10.42%, which is typical for online surveys. 84.6% of the respondents completed the survey in English, while 15.4% completed it in French. Participants were randomly selected from the panel using stratified sampling based on age, province of residence, and gender to ensure that the sample was generally representative of the general population. Participant ages ranged from 18 to 89, with a mean age of 48.2, 17.5% were 65 and over, and 12.3% were under 30. 50.4% of the sample was female, and 46.5% held a university degree. While the age and gender distribution is in line with the overall population of Canadian