Psychology & Health

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/gpsh20>

The Relationship between Age-Stereotypes and Health Locus of Control across Adult Age-Groups

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Accepted author version posted online: 13 Oct 2014.

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To cite this article: Kerry Sargent-Cox & Kaarin J. Anstey (2014): The Relationship between Age-Stereotypes and Health Locus of Control across Adult Age-Groups, Psychology & Health, DOI: [10.1080/08870446.2014.974603](https://doi.org/10.1080/08870446.2014.974603)

To link to this article: <http://dx.doi.org/10.1080/08870446.2014.974603>

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Publisher: Taylor & Francis

Journal: *Psychology & Health*

DOI: <http://dx.doi.org/10.1080/08870446.2014.974603>

**The Relationship between Age-Stereotypes and Health Locus of Control
across Adult Age-Groups**

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Objective: This study integrates healthy ageing and health psychology theories to explore the mechanisms underlying the relationship between health control expectancies and age-attitudes on the process of ageing well. Specifically, the aim of this study is to investigate the relationship between age-stereotypes and health locus of control.

Design: A population-based survey of 739 adults aged 20 to 97 years (mean=57.3 years, SD=13.66; 42% female) explored attitudes towards ageing and health attitudes. A path-analytical approach was used to investigate moderating effects of age and gender.

Results: Higher age-stereotype endorsement was associated with higher chance ($\beta=2.91$, $p<.001$) and powerful other ($\beta=1.07$, $p=.012$) health expectancies, after controlling for age, gender, education and self-rated health. Significant age and gender interactions were found to influence the relationship between age-stereotypes and internal health locus of control.

Conclusion: Our findings suggest that the relationship between age-stereotypes and health locus of control dimensions must be considered within the context of age and gender. The findings point to the importance of targeting health promotion and interventions through addressing negative age-attitudes.

Keywords: age-stereotypes; health locus of control; stereotype embodiment theory; healthy ageing

Introduction

A key objective for health psychology is to understand psychosocial factors that allow us to age well at all points of the lifespan. A central tenet in both the healthy ageing and health

psychology fields is that health is embedded in social attitudes and beliefs, as these are likely to influence and inform psychological processes and mechanisms that affect behaviours (Golub & Langer, 2007). Whilst a great deal of work has been done in these fields separately, there has been relatively little theoretical and empirical integration of these analogous viewpoints. In the current study we aim to integrate “stereotype embodiment theory” (Levy, 2009), which explicitly addresses the role of age-stereotypes in psychosocial and health development, with a sociocognitive health psychology view regarding the role of perceived control of health in health outcomes. Bringing these two perspectives together will create a greater understanding of the relationship between attitudes to ageing, and the mechanisms linking social-cognitions related to health.

Stereotype Embodiment Theory

In stereotype embodiment theory Levy (2009) proposes that healthy ageing is implicitly linked to sociocultural beliefs about age and the ageing process. Levy has shown that age-stereotypes held in early adulthood predict cardio-vascular events up to 20 years later (Levy, Zonderman, Slade, & Ferrucci, 2009). Age-stereotypes have been associated with functional health outcomes (Levy, Slade, & Kasl, 2002; Sargent-Cox, Anstey, & Luszcz, 2012), predict longevity in later life (Levy & Myers, 2005; Levy, Slade, Kunkel, & Kasl, 2002), influence the recovery from a major health event such as myocardial infarction (Levy, Slade, May, & Caracciolo, 2006), and can impact on will-to live and medical decisions in older adults (Levy, Ashman, & Dror, 1999-2000; Marques, Lima, Abrams, & Swift, 2014).

Levy suggests that the relationship between age-stereotypes and healthy ageing develops through multiple pathways. The psychological pathway hypothesis posits that age-stereotypes are internalised and become a belief structure – a lens through which one’s own ageing is viewed and interpreted. For example, it has been shown that priming age-stereotypes in older adults can influence their performance in physical, functioning, cognitive, and psychological

domains (e.g. Auman, Bosworth, & Hess, 2005; Hausdorff, B., & Wei, 1999; Hess, Auman, Colcombe, & Rahhal, 2003; Levy, 2000).

The second pathway of interest is the behavioural pathway. Negative age-stereotypes are often based on the inevitability of decline with age in many health domains (Sarkisian, Hays, & Mangione, 2002). It is argued that this sense of inevitability lowers an individual's perceptions of control over the ageing process, thus reducing the likelihood that health preventive behaviours are performed as they are seen as futile (Levy, 2009). Indeed, poor age-stereotypes and self-perceptions of ageing have been associated with lower engagement in preventive health behaviours including poor diet, greater likelihood of smoking and lower levels of physical activity (Levy & Myers, 2004; Sarkisian, Prohaska, Wong, Hirsch, & Mangione, 2005).

Health and Perceived Control

Despite what we know about stereotype embodiment we are yet to understand the extent to which endorsement of negative age-stereotypes are related to perceived control over health. Important social determinants of health, including sociocultural attitudes, subjective norms and perceptions of control (Ajzen, 1988, 1991), are argued to guide health behaviours and outcomes and lead to control expectancies (Leventhal, Forster, & Leventhal, 2007). Perceived control is the extent to which people believe they have control or agency over changes in the environment through actions and decisions (Fung, Abeles, & Carstensen, 1999). Notions of perceived control have been applied to the health domain to understand behaviours such as health care seeking and physical activity (Wallston & Wallston, 1981). Health locus of control reflects three dimensions: internal, powerful others and chance (Wallston, Wallston, & De Vellis, 1978). Internal control refers to beliefs of high personal agency over the environment and self, including health outcomes. Control attributed to powerful others relates to beliefs that health outcomes are in the control of medical professionals and family members, whereas chance

locus of control describes beliefs that health is a result of happenstance or luck (Wallston, et al., 1978). Studies have shown that those with internal locus of control are more likely to have a good diet, exercise regularly and not smoke (e.g. Helmer, Kramer, & Mikolajcz, 2012; Steptoe & Wardle, 2001). Attributing health to chance has been associated with lower sport or physical activity levels, lower systematic health help seeking, and poor oral hygiene behaviours, higher alcohol consumption and higher likelihood of smoking or smoking relapse (e.g. Gotz, Hapke, & Lampert, 2011; Helmer, et al., 2012; Scheffer et al., 2012). Having higher powerful other expectancies has been related to a lower risk of illicit drug use, less physical activity and poorer nutrition (Helmer, et al., 2012). In summary, better health outcomes are associated with internal locus of control compared to attributing control externally to powerful others or chance.

The link between performing positive health behaviours across the lifespan, health outcomes, and ultimately healthy ageing, is well-established. Nevertheless, even with this knowledge individuals do not always follow health promoting behaviour guidelines. Therefore, health psychology aims to understand how, why and when individuals engage in preventive health behaviours to produce positive health outcomes. Taken together, Levy's stereotype embodiment theory along with sociocognitive theories of health suggest that understanding the influence of perceptions of control over health and ageing is an imperative piece of the puzzle that needs exploring. By linking the two theories we suggest those who internalise stereotypical poor attitudes of ageing may be more likely to view the ageing process as an inevitable period of decline, thus resulting in lower internal and higher external locus of control over health as they age.

Age and Gender

When considering the role of age-stereotypes and health locus of control on health behaviours, research indicates that both age and gender should be taken into account. For example, Levy (2009) posits that sociocultural attitudes and images are internalised from a

young age and become an unchallenged “knowledge” framework. Recent research has found support for the internalisation hypothesis by showing that adults aged over 80 hold more negative ageing bias than younger adults (59 to 79 years: Davis & Friedrich, 2010), and the relationship between age-stereotypes and self-concept in adults aged 30 to 80 years is stronger for older adults (Kornadt & Rothermund, 2011). Age is also considered to be an important consideration with regards to control beliefs. Both cross-sectional and longitudinal studies have shown that perceptions of control may follow a lifespan developmental trajectory with increased internal control developing in early adulthood and declining in later life (Krause & Shaw, 2003; Lachman & Firth, 2004; Mirowsky, 1995; Mirowsky & Ross, 2007). Cross-sectional research has also shown that internal locus of control is lower in older adults compared to younger (Bailis, Segall, & Chipperfield, 2010), whilst powerful others expectancies and chance expectancies are higher in older compared to younger adults (Bailis, et al., 2010; Lückenhoff & Carstensen, 2007).

Stereotypes of ageing are often gender based and contextualised around social roles (Hummert, Gartska, Shaner, & Strahm, 1994), indicating that gender is a central issue to understanding the effects of attitudes and beliefs of ageing (Kite & Wagner, 2004). Further, men have been shown to hold more negative age-stereotypes compared to women, and there is preliminary evidence that this gender difference may increase in older cohorts (Bodner, Bergman, & Cohen-Fridel, 2012). In relation to perceptions of control, gender differences have also emerged, though they are inconsistent. Studies have shown women have a lower sense of control compared to men (Lachman & Firth, 2004), and cluster analysis has shown gender differences in complex patterns of health locus of control in relation to coping strategies for pain (Buckelew et al., 1990). In contrast, men have been shown to have higher mean scores on all three health locus of control dimensions compared to women (Poortinga, Dunstan, & Fone, 2008). Cohort and historical effects are also likely to influence gender differences in social

roles and perceptions of control. For example, Gatz and Karel (1993) found in a sample of women aged between 14 and 99 years that older women were more likely to have lower perceptions of control than their younger counterparts. These findings suggest that age and gender are important considerations within the context of age-stereotypes and control expectancies. Indeed, the relationship between endorsing age-stereotypes and perceived control over health may interact with age and gender due to possible cohort and ageing experiences.

Covariates of Health Locus of Control

To understand influences of health locus of control it is also necessary to consider confounding variables. Poor objective and self-reported health status have been positively associated with external health expectancies (Poortinga, et al., 2008; Wallston & Wallston, 1981), in particular with low internal and high external health expectancies. Self-rated health is a robust proxy measure for health status and is associated with poorer physical functioning, higher health-care service utilisation, increased risk of mortality, and physicians' ratings of health (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Emmelin et al., 2003; Idler & Benyamini, 1997; Sargent-Cox, Anstey, & Luszcz, 2008; Sargent-Cox, Anstey, & Luszcz, 2010). Further, self-rated health has been shown to be associated with age-attitudes and stereotypes, particularly in older adults, whereby poorer age-attitudes are related to poorer self-rated health (Moor, Zimprich, Schmitt, & Kliegel, 2006). Another consideration in terms of health locus of control is socio-economic status and education. In the context of locus of control and health, it has been shown that higher education, as measured by number of years in formal schooling, is positively associated with internal sense of control and a healthier lifestyle (Mirowsky & Ross, 1998). It has also been found that socio-economic status (SES), self-rated health and health locus of control are linked, with the association between health effects and SES influenced by health locus of control (Poortinga, et al., 2008). Taken together, this

literature suggests that our investigation of the effect of stereotypes on health locus of control should control for the influences of self-rated health status as well as socio-economic factors such as education.

Current Study

The synergies between Levy's theory and the theory of health locus of control, whilst highly salient, have not previously been explicitly explored. In particular, it is unclear how sociocultural views of age are associated with perceptions of control over health. The current study aims to fill this gap in the literature by specifically investigating the relationship between age-stereotypes and three dimensions of health locus of control; internal, powerful others and chance expectancies. In this study we are guided by the stereotype embodiment theory which suggests that age-attitudes are the basis for health and ageing expectations. Furthermore, our focus here is on the relationship between these concepts rather than a direction. Therefore, informed by Levy's (2009) stereotype embodiment theory, and findings from the health locus of control literature, it is hypothesised that higher endorsement of age-stereotypes will be associated with lower internal control, and higher powerful other and chance control expectancies.

A further contribution to the literature will be the investigation of the associations between age-stereotypes and health locus of control at different ages, and by gender. In light of past findings regarding age and possible gender differences in control expectancies and age-stereotypes (e.g. Mirowsky & Ross, 2007; Poortinga, et al., 2008), it is expected that the relationship between age-stereotypes and health locus of control dimensions hypothesised above will be stronger for older adults. Because evidence regarding gender differences in control is inconsistent our analysis of the effects of gender, as well as age by gender interactions, will be exploratory.

Methods

Participants

There were 3000 individuals randomly selected and invited to participate in a survey on health and wellbeing in Australian Capital Territory (ACT) between July and September 2011. Names and addresses were randomly drawn from publicly available data obtained from a private sector Australian residential database company. The target of 3000 was selected to take into account a response rate for a mail out survey of approximately 25%; one standard deviation below the mean response rate (mean = 45%, SD = 20%) for mail surveys calculated by meta-analysis (Shih & Fan, 2008). This response rate is consistent with previous larger scale Australian population based studies such as the Path Through Life Study that achieved a total response rate from a mail out between 19.4% (20-24 year cohort) and 52.8% (60 to 64 year cohort). Response rate takes into account refusal (approximately 50%), as well as 'not found', 'out of area' and 'deceased' (Anstey et al., 2011). Dillman, Smyth and Christian's (2009; Poortinga, et al., 2008) procedure for a mixed mode survey was used as a guide to increase response rate. An initial invitation (with online link to survey) was mailed out, followed approximately 1 week later by the paper questionnaire mail out. A follow-up reminder to all non-responders was sent out at 6 weeks, resulting in a 783 completed and returned questionnaires (response rate of 26.1%). From these respondents 44 had missing data, leaving a final sample of n=739 (42.2% female) aged between 20 and 92 years (mean = 57.31, SD=13.67). The majority of participants were married (65.8%), had an undergraduate degree (24.1%), or higher (19.5%), and employed full time (65.3%). Those not in the final sample due to missing data were more likely to be widowed or never married $\chi^2(5) = 13.91, p=.016$, have primary school (approximately 12 years of age) as their highest education $\chi^2(5) = 16.41, p=.022$, and have higher mean powerful other expectancies ($t(761)=-2.81, p=.005$). There

were no significant group differences in any of the other variables of interest (including age, gender, stereotypes, and internal or chance health locus of control).

Comparing the sample characteristics to the population of the ACT in 2011 (Australian Bureau of Statistics, 2012) the sample had a lower proportion of females (51.2% female in ACT), was older (72.6% of sample compared to 37.5% of ACT population aged 50 and over), had a larger proportion with a post-graduate degree (19.4% of sample compared to 9.6% of population), a higher proportion in full time employment (65.5% of sample compared to 50.7% of population) and a higher proportion who were married (64.5% sample versus 51.5%). The sample was consistent with the population by retirement status (39.2% for sample versus 33.1%: Australian Bureau of Statistics, 2013).

Measures

The endorsement of age-stereotypes was measured with the stereotype sub-scale of the Fraboni Scale of Ageism (FSA: Fabroni, Saltstone, & Hughes, 1990; Rupp, Vodanovich, & Crede, 2005). The 10-item sub-scale reflects levels of antagonism or hostility towards the elderly due to misconception or myths about them, and includes items such as “Many old people just live in the past”, “Old people complain more than other people do” and “Most old people would be considered to have poor personal hygiene”. Items are rated on a 4-point likert-type scale from strongly disagree to strongly agree”. The item scores were averaged so the range of possible scores was between 1 and 4, with a higher score indicating a stronger endorsement of age-stereotypes. Mean age-stereotype scores for the sample were 2.09 ($SD = 0.43$). In line with previous research (Cronbach α 0.79 (Rupp, et al., 2005)), the subscale has shown good reliability (Cronbach α 0.78).

The 18-item Multidimensional Health Locus of Control (MHLC – Form A) measures three areas regarding the extent to which participants believe their own behaviour (Internal),

luck (Chance), or external influences such as medical professionals (Powerful Others) control or influence their level of health (Wallston, et al., 1978). Responses to items, including 'I am in control of my health', 'Luck plays a big part in determining how soon I will recover from an illness', and 'Having regular contact with my physician is the best way for me to avoid illness' are made on a likert-type scale from 1 – strongly disagree to 6 - strongly agree. The 6 items in each sub-scale are summed with possible range 6 – 36, with a higher score indicating a higher sense of Internal, Chance or Powerful Other control. The sample showed an overall high mean MHLC Internal score (23.87, $SD=4.48$), and mid-ranged MHLC Chance (16.14, $SD=4.89$) and Powerful Other (16.89, $SD=5.23$). The sub-scales showed reasonable to good internal consistency (Cronbach α 0.70, 0.67, 0.74 respectively) consistent with previous findings (Cronbach α 0.77, 0.75, 0.67 (Wallston, et al., 1978)), and has been found to display good discrimination of constructs (Robinson-Whelen & Storandt, 1992).

Covariates

Self-rated health (SRH) was measured with the single item global measure asking respondents "In general, how do you rate your health?". Items are scored from 1 – Poor to 5 – Excellent. Higher SRH scores are therefore indicative of better health. The sample had a mean SRH score of 3.59 ($SD=0.91$). Respondents were asked the highest level of education that they had completed. Responses were collapsed to reflect "primary / secondary school" (24.5%), "trade or other certificate" (21.0%), "undergraduate degree or diploma" (35.0%), and "higher postgraduate degree" (19.5%). Age and gender were also included in models as main effects and interaction terms.

Statistical Analysis

All analysis was performed using SPSS (version 20). Prior to analysis, the relationship between single items of the three MHLC subscales and the FSA Stereotype subscale was

empirically explored. All items were entered into a confirmatory factor analysis using Principle Axis Factoring extraction and Direct Oblimin rotation, forcing a four-factor solution. The resulting four factors were consistent with the original MHLC sub-scales and FSA stereotype scale compositions and no items were found to cross-load onto other factors at a criteria of $>.30$ loading. These results support the independence of the items in measuring the separate constructs of health locus of control domains and age-stereotypes (Allen & Bennet, 2008).

To explore the main hypotheses regarding the relationship between age-stereotypes and MHLC sub-scales, as well as the subsidiary investigations concerning the moderating effects of age-group and gender on this relationship, the PROCESS macro in SPSS was used (Hayes, 2012). This macro takes a standard path-analytic approach to conditional process modelling (Preacher & Hayes, 2004, 2008). The PROCESS method estimates main effects and interactions for the model, as well as conditional effects of age-stereotypes on MHLC dimensions for males and females separately, at the 10th, 25th, 50th, 75th and 90th percentile values of age. These conditional effects provide further information on patterns of interactions.

Each of the MHLC dimensions was modelled separately, with a hierarchical approach taken. The first step of these models (i.e. models 1) addresses the main hypotheses and examines the unadjusted relationship between age-stereotypes and MHLC dimensions. The second step (models 2) includes covariates and main effects (education, SRH, gender and age) to further explore the age-stereotype / MHLC dimension relationship adjusting for these variables. The final step (models 3) introduces the interaction terms to investigate the moderating effects of age, gender and age-stereotypes on MHLC dimensions.

Results

Prior to the main analyses the correlation matrix for all model variables was examined (Table 1). Being female was associated with lower endorsement of age-stereotypes ($r = -.098$), lower Internal control ($r = -0.073$) and Powerful Other control expectancies ($r = -0.091$). Age was significantly associated with poorer SRH ($r = -0.156$), stronger endorsement of age-stereotypes ($r = 0.229$), lower Internal control ($r = -0.130$), and higher endorsement of Powerful Other expectancies ($r = 0.386$). Higher SRH was associated with lower endorsement of age-stereotypes ($r = -0.098$), higher Internal control ($r = 0.227$), and lower Chance ($r = -0.125$) or Powerful Other control expectancies ($r = -0.192$). Age-stereotypes was not found to be associated with Internal control expectancies ($p > .05$), but stronger age-stereotype endorsement was associated with higher Chance ($r = 0.249$) and Powerful Other control expectancies ($r = 0.194$).

MHLC Chance Expectancies

Table 2 displays the estimates for the MHLC Chance, Powerful Others and Internal Expectancies models. In model 1 for MHLC Chance there was a significant positive effect of age-stereotypes found ($B = 2.91$, $SE = 0.43$, $p < .001$), suggesting that more negative stereotypes were related to higher chance expectancies of health. In model 2 there were no significant main effects for age ($B = -0.00$, $SE = 0.01$, $p = .966$) or gender found ($B = 0.60$, $SE = 0.36$, $p = .100$). No significant interaction effects for age or gender by stereotypes were found in the final model, however the main effect of age-stereotypes was attenuated. Model 3 explained 8% ($p < .001$) of the variance in Chance health expectancies.

MHLC Powerful Others Expectancies

In the MHLC Powerful Others model 1, there was a positive relationship shown with age-stereotypes ($B = 1.07$, $SE = 0.43$, $p = .012$), indicating that higher endorsement of age-stereotypes was associated with higher Powerful Other expectancies. Older age and being male

were also shown to be related to higher Powerful Others expectancies in model 2. The inclusion of the age and gender interactions in model 3 attenuated the main effect of age-stereotypes ($B = -2.61$, $SE = 2.50$, $p = .297$), age ($B = 0.03$, $SE = 0.09$, $p = .722$) and gender ($B = -2.08$, $SE = 7.57$, $p = .783$) on Powerful Other expectancies. No significant interactions were found in this model and it explained a total of 20% ($p < .001$) of the variance in Powerful Others health expectancy.

MHLC Internal Expectancies

In model 1 of the MHLC Internal expectancies, age-stereotypes was not significantly related to Internal control ($p > .05$), though significant negative relationships were found with age, gender and education, and a positive relationship with self-rated health in model 2. Significant two-way (age by gender - $B = 0.26$, $SE = 0.12$, $p = .032$; age by stereotype - $B = 0.16$, $SE = 0.04$, $p < .001$; and gender by stereotype - $B = 8.74$, $SE = 2.04$, $p = .006$) and three-way (age by gender by stereotype - $B = -0.13$, $SE = 0.05$, $p = .019$) interactions were found when included in model 3. The two-way interactions were examined by plotting estimates (See Figure 1). The age by gender interaction indicated that compared to younger females, older females had lower internal health expectancies, whereas this age-group difference was not apparent for males. The age by stereotypes interaction indicated that weaker endorsement of negative age-stereotypes was associated with higher Internal expectancy scores, and stronger endorsement of negative stereotypes was related to lower Internal expectancy scores. This difference in Internal expectancy scores as a function of age-stereotype endorsement became weaker for older age-groups. Plotting the significant gender by stereotype interaction indicated that weaker endorsement of negative stereotypes was associated with greater Internal expectancies for males while stronger endorsement was related to lower Internal expectancies. Age-stereotype endorsement was not associated with different Internal expectancies scores for females.

However, the interpretation of these interactions should be tempered by the higher order three-way interaction found for age by gender by stereotypes on MHLC Internal scores. The conditional effect of age-stereotypes by age group interaction was only significant for males (conditional effect for males- $B=0.16$, $SE=0.04$, $p<.001$; females $B=0.03$, $SE=0.04$, $p=.486$). To understand this further we plotted the conditional effects of age-stereotypes on MHLC Internal for males and females at different percentiles of age (39 years - 10th percentile; 58 years - 50th percentile; and 74 years - 90th percentile). Figure 2 displays these interaction effects for males and contrasts them with females demonstrating the association between endorsement of age-stereotype and Internal health expectancies across age groups is evident for the males only. This final model explained a total 10% ($p<.001$) of the variance of Internal health locus of control.

Discussion

Our objective was to examine the relationship between age-stereotypes and health locus of control dimensions across the adult age range. Consistent with our hypotheses and the notion of sociocultural attitudes informing health expectancies and control, in the unadjusted models, as well as adjusting for age, gender, education and self-rated health, we found that higher endorsement of age-stereotypes was associated with greater attribution of health to chance and powerful others. We did not, however, find support for the hypothesis that higher endorsement of age-stereotypes was related to lower attribution of health to internal control, in the unadjusted (model 1) and adjusted model for the main effects (model 2). Levy argues that age-stereotypes inform our expectations regarding how we will age, and can manifest into self-fulfilling prophecies (Levy, 2009), suggesting that those with negative views of ageing may have a more external locus of control regarding their own ageing process. To our knowledge this is the first study to specifically link age-stereotypes to external locus of control

expectancies of health, and provide support for the principle tenet underlying Levy's psychological and behavioural pathways from age-stereotypes to healthy ageing outcomes.

However, the interpretation of these results should be tempered by the significant changes in the associations between age-stereotypes and the MHLC dimensions when age and gender interactions were introduced into the final models. The outcome of these interactions was surprising, and disparate. The interaction terms acted as suppressor variables for internal health control. In contrast, the interaction terms attenuated the relationship between age-stereotypes and external health expectancies.

The exploration of these interactions indicated that age differences in the relationship between age-stereotypes and internal health control was only apparent for males, where younger males with a strong endorsement of negative age-stereotypes showed lower internal control, and this relationship appeared to weaken for older males. Age-differences in the relationship between age-stereotypes and internal health expectancies for males may be related to social gender constructions, whereby young males may be particularly vulnerable to the internalisation of age-based stereotypes surrounding health, as they are socialised to be strong, independent, refuse to admit pain, deny infirmity, and to minimise ill health (Courtenay, 2000). Studies have shown that masculine ideals are associated with coping with problems such as ill-health (Mahalik et al., 2002), and not being vulnerable (Verdonk, Seesing, & de Rijk, 2010). Males have also been shown to equate loss of health and loss of independence with reduced masculinity (Smith, Braunack-Mayer, Wittert, & Warin, 2007). Thus, strong negative endorsement of age-stereotypes may be linked to reduced perceptions of masculinity and increased health vulnerability for young males. However, in older males the relationship between age-stereotypes and internal locus of health control may weaken due to age-related changes in health becoming normalised and less of a threat to masculinity. There is a paucity of research on changes in the relationship between gendering of health, age-stereotypes and

health locus of control in the literature, and the cross-sectional nature of our study limits our ability to disentangle developmental or ageing effects. However, they do provide interesting preliminary work indicating the need for future prospective research.

Another consideration is the potential for the items in the age-stereotype scale to be different for different groups; in other words, the scale may be group variant. On face value the items from the FSA stereotype sub-scale do not appear to be gender specific, however, gender differences have been found for this scale, with males showing a stronger endorsement of negative age-stereotypes compared to females (Rupp et al, 2005). This stronger endorsement of negative age-stereotypes for males was replicated in the current sample, and may provide some explanation as to why younger males who strongly endorsed negative stereotypes had lower internal locus of control scores.

The idea that the interaction of age-stereotypes with age and gender are of importance for health locus of control dimensions is further supported by the interaction terms attenuating the relationship in the external control expectancies models. This is consistent with the literature that shows that age-stereotypes can be dependent on gender, in that older males and females are perceived differently (DeArmond et al., 2006; Kite, 1996; Kite & Wagner, 2004); and that gender and age differences are apparent in external locus of control dimensions (Buckelew, et al., 1990; Poortinga, et al., 2008). However, we must be careful not to over-emphasise these interaction terms as they were not significant in the models, and they did not contribute towards a significant increase in explained variance of health locus of control. Nevertheless, taken together with our findings for internal locus of control, our results indicate that the relationship between age-stereotypes and health locus of control dimensions must be considered within the context of age and gender interactions.

Implications

A major objective of the current research was to integrate healthy ageing and health psychology theories to explore mechanisms for the relationship between perceptions of control and age-attitudes on healthy ageing. Both stereotype embodiment theory and sociocognitive theories of health advance the importance of sociocultural attitudes on health outcomes across the lifespan. Our findings of the relationships between age-stereotypes and health locus of control, and the implications of age and gender interactions, provide an important link to the mechanisms that may underlie Levy's hypothesised behavioural pathway to health. Levy (Levy, 2009) argues that expectations and perceptions of one's own ageing is inextricably bound and shaped by cultural attitudes and stereotypes of age. Our findings indicate that future expectations regarding ageing may be an important mechanism for understanding the relationship between age-stereotypes and health expectancies. For example, older adults are already living with greater health changes and therefore their health and age-expectancies may have already been realised, whereas younger adults may be more influenced by negative age-stereotypes, particularly in relation to their personal control over health and ageing expectancies. Gender differences are also apparent in future age and health expectancies as well as anxiety, as research has found that females and younger adults have greater ageing anxiety and poorer age-expectations (Abramson & Silverstein, 2006; Cummings, Kropf, & DeWeaver, 2000). These age and gender differences in age-expectancies have important implications in relation to health outcomes with age for males and females, as stronger negative-age-stereotypes and lower internal expectancies may influence motivation for performing health behaviours that will facilitate good health and healthy ageing (Levy, 2009; Sarkisian, et al., 2002; Sarkisian, et al., 2005).

Our findings have important applied implications for the targeting of health promotion and interventions as they suggest that addressing age-stereotypes and their relationship to health and healthy ageing may need to be targeted differently for males and females, as well as

for different age groups. The next step in this research endeavour is to investigate the predictive quality of age-stereotypes on the performance of health behaviours, and the moderating effects that health locus of control may have on this relationship. Furthermore, for the concept of age-stereotypes and attitudes to be helpful in the context of healthy ageing it is also important to understand individual differences in the susceptibility to internalising age-stereotypes, the relationship between internalisation of age-stereotypes with future ageing and health expectations, and the identification of periods, or transition events, in adulthood that may increase the risk of vulnerability to negative age-stereotypes and age-expectations. For example, research has shown that personality traits such as neuroticism are associated with endorsement of negative age-attitudes (Moor, et al., 2006). Furthermore, context and specificity of information is important in triggering or priming age-stereotypes (for example, see Casper, Rothermund, & Wentura, 2011; Levy & Leifheit-Limson, 2009). It is these “who and when” questions that should be the basis for future research endeavours in this area.

Strengths and Limitations of the Current Study

The strengths of the study include the population based, broad age-range of the sample, providing the opportunity to examine the association of age-stereotypes with health locus of control across the adult age-range. Nevertheless, the difference in characteristics of the sample compared to the population, including over-representation of males and older adults may introduce a selection bias and places a caveat on the generalisability of the findings. It should also be noted that only a small, though significant, amount of variance was explained in the models, ranging from 8% for chance locus of control to 20% for powerful others. Further investigation is needed to determine what additional factors influence and individual's health locus of control, so that the independent contribution of age-stereotypes can be better understood. The limitations of the cross-sectional design meant that we could not explore the relationship between dynamic or developmental changes in age-stereotype and health locus of

control or the direction of causality as discussed previously. Future research in this area would benefit from longitudinal and lag-design studies that can tease out directionality and developmental change. Nevertheless, we believe that cross-sectional studies such as this one can provide us with important contextual information that guides these more expensive longitudinal works.

Conclusion

Age-stereotypes are a particularly interesting social phenomena as they are one of the only 'isms' (i.e. sexism, racism etc) to still be seen as socially acceptable (Nelson, 2002). One has to only look at the birthday card section in the local newsagent to witness Western cultures' tolerance, and indeed, endorsement, of ageism and negative age images. The strong argument that arises from stereotype embodiment theory and supported by our findings here is that this acceptance of negative images of ageing affects individuals, to the detriment of health and well-being (Levy, 2009). The current study provides insight into the role of the psychological mechanism of perceptions of control within the relationship between our cultural images of ageing and healthy ageing itself, and highlights the disparities in these constructs for age and gender.

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Table 1. Bivariate Correlations

	Female	Age	Education	Self-Rated Health	Age Stereotypes	MHLC Internal	MHLC Chance
Age	-0.038						
Education	-0.097**	-0.175**					
Self-Rated Health	0.008	-0.156**	0.129**				
Age Stereotypes	-0.098**	0.229**	-0.199**	-0.098**			
MHLC Internal	-0.073**	-0.130**	-0.018	0.227**	-0.049		
MHLC Chance	0.032	0.057	-0.033	-0.125**	0.249**	-0.198**	
MHLC Powerful	-0.091*	0.386**	-0.155**	-0.192**	0.194**	0.025	0.186**

Note –MHLC = Multidimensional Health Locus of Control. ** $p < .001$, * $p < .01$

Table 2. Model Coefficients with Standard Error and p-value for Health Locus of Control Expectancies

	Model 1			Model 2			Model 3		
	<i>B (SE)</i>	β	<i>p</i>	<i>B (SE)</i>	β	<i>p</i>	<i>B (SE)</i>	β	<i>p</i>
MHLC Chance									
Age Stereotypes	2.84 (0.41)	0.25	<.001	2.91 (0.43)	0.26	<.001	3.14 (2.51)	0.28	.210
Education				0.17 (0.17)	0.04	.327	0.18 (0.17)	0.04	.308
Self-Rated Health				-0.59 (0.20)	-0.11	.003	0.57 (0.20)	-0.11	.004
Age				-0.001(0.01)	-0.00	.966	-0.03 (0.09)	-0.08	.759
Female				0.60 (0.36)	0.06	.100	-2.01 (7.73)	-0.20	.795
Age X Gender							0.11 (0.13)	0.67	.673
Age X ST							0.01 (0.04)	0.09	.808
Gender X ST							0.85 (3.59)	0.18	.814
Age X Gender X ST							0.18 (0.17)	-0.61	.308
R ² (R ² Δ)	.062***			.078*** (.016*)			.084*** (.006)		
MHLC Powerful Others									
Age Stereotypes	2.35 (0.44)	0.19	<.001	1.07 (0.43)	0.09	.012	-2.61 (2.50)	-0.22	.297
Education				-0.36 (0.17)	-0.07	.036	-0.37 (0.17)	-0.08	.033
Self-Rated Health				-0.72 (0.20)	-0.13	<.001	-0.72 (0.20)	-0.12	<.001
Age				0.13 (0.01)	0.33	<.001	0.03 (0.09)	0.09	.722
Female				-0.79 (0.36)	0.36	.030	-2.08 (7.57)	-0.20	.783
Age X Gender							-0.04 (0.13)	-0.21	.778
Age X ST							0.05 (0.04)	0.42	.217
Gender X ST							-2.08 (7.57)	0.32	.783
Age X Gender X ST							0.001 (0.06)	0.01	.987
R ² (R ² Δ)	.038***			.180*** (.142***)			.200*** (.020)		
MHLC Internal									
Age Stereotypes	-0.51 (0.38)	-0.05	.183	-0.32 (0.39)	-0.03	.414	-10.02 (2.27)	-0.97	<.001
Education				-0.35 (0.16)	-0.08	.029	-0.36 (0.16)	-0.84	.024
Self-Rated Health				1.08 (0.18)	0.22	<.001	1.10 (0.18)	0.22	<.001
Age				-0.04 (0.01)	-0.11	.005	-0.37 (0.09)	-1.11	<.001
Female				-0.83 (0.33)	-0.09	.012	-18.38(6.90)	-2.03	.008
Age X Gender							0.26 (0.12)	1.69	.032
Age X ST							0.16 (0.04)	1.49	<.001
Gender X ST							8.74 (3.20)	2.04	.006
Age X Gender X ST							-0.13(0.05)	-1.84	.019
R ² (R ² Δ)	.002			.073*** (.071***)			.100*** (.027***)		

Note – ST = Age Stereotype MHLC = Multidimensional Health Locus of Control; *** $p < .001$,** $p < .01$, * $p < .05$

Figure 1. Plotting of two-way interactions on MHLC internal expectancy scores for a) age by gender, b) age by stereotype and c) gender by stereotype.

Figure 2. The association between age-stereotype and predicted MHLC internal expectancy scores by age for a) females and b) males. Note: higher score in age stereotype = stronger endorsement of negative stereotype.