We are able to reliably think about the past and future as early as preschool (Atance and Meltzoff, 2005). The capacity to mentally project ourselves into an experience that has already occurred, or will eventually occur, allows us to reminisce about receiving an award 2 weeks ago, or envision how we might go about our errands tomorrow (Newby-Clark and Ross, 2012; Sools et al., 2015). Mental time travel provides us with a way of re-experiencing and pre-experiencing events (Suddendorf and Corballis, 2007). These keen abilities of retrospection and prospection enable us to learn from our prior mistakes so that we do not repeat them in the future, thus situating mental time travel as a useful mechanism for promoting and maintaining well-being in a variety of life domains (e.g. Bulley et al., 2017).

Among the many noted benefits of mental time travel, the implications this ability has for physical health are particularly salient. For example, the ability to perform mental time travel may discourage us from engaging in risky or unhealthy behaviours (e.g. smoking, eating junk food) by providing us with unfavourable images of the future self, such as a self that has developed lung cancer or obesity (Moss et al., 2016; Robson and Gray, 2007). To fully reap the benefits associated with thinking
ahead, recognition of the self as a continuous entity – or one that persists through time (Chandler et al., 1987) – the ability to imagine a ‘future self’ are needed (Markus and Nurius, 1986). Indeed, ideas about one’s future self influence how people think and act with respect to who they are and what they do in the present moment (Comello, 2015; D’Argembeau et al., 2012; Peetz and Williams, 2008; Williams and Gilovich, 2008). Thus, there may be close connections among self-perception, mental time travel and physical health.

Self-perception, future thinking and health outcomes

Individuals’ perception of their current health is a critical factor for their present (Hubbard et al., 2009) and future health status (e.g. Benyamini, 2011; DeSalvo et al., 2006; Jylhä, 2009). Generally, the trend appears to be that health perceptions correspond positively with objective markers of health and well-being.

In a landmark study, Miilunpalo et al. (1997) examined 1340 men and 1500 women and found that low health perceptions at initial assessment were related to a greater number of physician visits and prevalence of illness reported during the following year. Idler and Benyamini (1997) conducted a systematic review of 27 studies and found consistent evidence linking lower self-rating of health to greater mortality in longitudinal studies. Notably, these linkages found by Idler and Benyamini persisted after accounting for objective indicators of health. The researchers credited the strong association between mortality and self-ratings to the holistic outlook individuals apply when judging their own future health. Likewise, Heistaro et al. (2001) investigated self-reported health and mortality over a period of 23 years and found that medical history, education and cardiovascular disease risk factors could not fully explain the association between self-reported poor health and mortality. Finally, in addition to physical health, previous studies also suggest that future perceptions are associated with mental health in that optimistic outlooks tend to promote psychological well-being (MacLeod and Conway, 2007; Wang and Koh, 2015).

Considered together, these findings provide evidence for the notion that health expectations may play a key role in health outcomes. This outlook may help individuals make a dynamic evaluation of their health based on numerous factors that influence how they think and behave, which in turn, may impact their actual health downstream.

The future of self and others

Individuals tend to demonstrate a self-enhancing bias or a tendency to view oneself in a more flattering way than others (Heine et al., 1999; Mezulis et al., 2004). This bias also orients individuals to see themselves as being better than the average person (Alicke et al., 1995). Due to this self-enhancing bias, individuals’ appraisals of others’ futures may function differently from that of their own. For example, when making predictions about others’ future behaviour, individuals tend to rely on objective data (i.e. group averages or past behaviour). However, when making predictions about one’s own future behaviour, how one simply hopes to act weighs much more heavily in this judgement (Helzer and Dunning, 2012; Kruger and Gilovich, 2004). As a result, predictions about others tend to be more accurate than predictions about the self (Helzer and Dunning, 2012).

In addition, individuals tend to believe that they will exhibit more self-improvement relative to others as they move towards the future (Kanten and Teigen, 2008) and bias towards self-enhancement tends to worsen with greater temporal distance (Stephan et al., 2015). When making judgements about their future selves, individuals tend to equally emphasize their own present and past selves, adopting a holistic perspective. In contrast, individuals often over-accentuate others’ present selves when making judgements about their futures (MacLeod and Conway, 2007; Markus and Nurius, 1986). Williams and Gilovich (2008) found that individuals viewed the future as playing a larger role in the assessment of themselves than it
does in the assessment of others. In other words, one’s own self is perceived as having more opportunities to evolve compared with others’ selves. Thus, self-perception of the future relies on one’s current capabilities as well as future potential, whereas this multi-layered evaluation does not appear to occur when people perceive others’ futures. Whether self-enhancement bias is also reflected in people’s perception of their future health versus the future health of others remains an empirical question.

Self-enhancement bias and culture

There has been mixed evidence regarding self-enhancement biases and culture. Some have argued that people from many Asian cultures do not exhibit self-enhancement biases, at least in situations where it might seem especially likely to be exhibited (e.g. when dealing with failure; Heine et al., 1999). In contrast, other researchers have argued that self-enhancement bias is universal (Hepper et al., 2013; Sedikides et al., 2005). In fact, Schmitt and Allik (2005) found that traits associated with self-enhancement (e.g. self-esteem) showed a similar correlation pattern with other personality traits regardless of culture. Recent studies have suggested that self-enhancement motivation can indeed be observed in non-Western populations for culturally valued qualities (e.g. Sedikides and Gregg, 2008). For instance, Asians, both native and overseas, consider themselves better on collective aspects of the self (e.g. avoiding open confrontation with group members; Sedikides et al., 2003) and evaluate more favourably their social traits than do North Americans (Ross et al., 2005). However, they do not appear to exhibit self-enhancing biases when judging their individual traits (e.g. trusting own instinct than group’s instinct; Sedikides et al., 2003).

Furthermore, self-enhancing bias may be exhibited to differential degrees depending on one’s cultural context (Kim, 2011; Wang, 2013). Heine and Hamamura (2007) conducted a meta-analysis of published cross-cultural studies on self-enhancement bias. Out of the 91 studies that were examined, 88 of them found that Western participants showed clear self-enhancing bias, whereas East Asian participants displayed less or no bias. East Asians also appear to be less vulnerable to unrealistic optimism (e.g. Rose et al., 2008) and less likely to attribute success to internal factors or to attribute failure to external factors (e.g. Heine et al., 1999; Markus and Kitayama, 1991), when compared with Westerners. In a study by Shao et al., 2010, that examined past and future selves in European American and Chinese college students, participants each recalled two past autobiographical events and imagined two future events. In both cultures, participants reported more positive episodes from the future than from the past. Still, European Americans provided more positive episodes than did Chinese from both the past and the future, consistent with their strong self-enhancing bias.

Taken together, the evidence suggests that Western individuals demonstrate a stronger, more consistent self-enhancement bias than do East Asians. It is of theoretical and practical importance to further examine the role of culture in moderating self-enhancement bias in people’s perception of future health, especially when such processes are intimately tied to current and future health outcomes (Heistaro et al., 2001).

The current study

Investigating how people perceive their own future health and how such perceptions are influenced by culture has immediate importance for designing global health interventions. It is our hope that this will allow people of different contextual background to receive interventions best suited for them. Towards this possibility, this study is the first to explore the complexities of health expectations, self-enhancing bias and culture. The purpose of this study is to compare how people envision their own future health with how they see others’ future health and how culture may shape this perception.
Based on previous research on culture and self-enhancing bias (Heine and Hamamura, 2007; Kim, 2011; Wang, 2013), we expected that culture would moderate the magnitude of self-enhancement bias in future health perception. Specifically, we expected a large self-enhancement bias to be evident among US participants, whereas an attenuated or absent bias would be evident among Korean participants. In other words, we anticipated that US participants would judge their own future health more favourably than others’, and Korean participants would exhibit more even-handed expectations between their own and others’ future health.

**Method**

**Participants**

For the US sample, 503 American participants aged 18–72 years (\(M_{\text{age}}=35.84, SD_{\text{age}}=11.77\)) were recruited online through Amazon’s Mechanical Turk (MTurk). Studies have analysed that data collected through MTurk have found the resulting data to be reliable and of high quality (e.g. Bartneck et al., 2015; Buhrmester et al., 2011). Each participant received US$1.00 for taking part in the survey. To be included in study analyses, participants must have indicated that they were born and raised in the United States. Participants who violated this criterion (\(n=21\)) were ultimately excluded. Among the remaining participants, a slight majority indicated being male (53.23%, \(n=255\)). The ethnic composition of the sample was 73.2% Caucasian, 8.7% African-American, 8.7% Asian, 5.4% Latino/a and 4.0% multiracial or other.

For the Korean sample, 271 participants aged 19–60 years (\(M_{\text{age}}=30.12, SD_{\text{age}}=10.27\)) were recruited through word-of-mouth and a Korean online survey bulletin board. For completing the study, participants were entered into a raffle at the end of data collection for gifticons (equivalent to coupons) through which a quarter of the total sample received coupons that could be exchanged for a cup of coffee. Similar to the above, we sought to include only those participants who were born and raised in Korea. Two participants were excluded for violating this criterion. Among the remaining participants, over half self-identified as being female (69.14%, \(n=186\)) and 100% self-identified as being of Asian ethnicity.

**Materials**

To assess future health ratings, participants were instructed to evaluate both the self and others in various future increments. For better estimates and greater breadth of understanding of future health expectations, participants were asked to generate ratings for current health and three discrete future ages. Participants were asked to provide health ratings on a 0–100 scale (0 = worst health among age, 100 = best health among age). To record their assessment, participants were presented with a sliding scale with the indicator always starting out in the middle of the scale (indicating 50th percentile). Health ratings were then averaged across the four respective prompts to obtain a combined health expectation score for ‘self’ and ‘other’, respectively. Scale reliability estimates for these pooled measures were satisfactory across conditions for both the US (\(\alpha_{\text{self}}=.90; \alpha_{\text{other}}=.89\)) and Korean samples (\(\alpha_{\text{self}}=.90; \alpha_{\text{other}}=.89\)). Prompts were presented as follows:

**Self current health.** If you had to rate your physical and mental health at the present, where would you place your own health?

**Self future health.** Imagine that you are (15/25/40) years older than you are now. How would you rate your own physical and mental health relative at this later age to others of that same age?

**Other current health.** Imagine an average person who is the same age as you without known physical or mental conditions. If you had to rate the person’s health at the present, where would you place the person’s physical and mental health?
Imagine that the person is (15/25/40) years older than now. How would you rate the person’s physical and mental health at this later age relative to others of that same age?

Procedure

Although all participants rated both self and other health expectations, the order in which the conditions appeared was counterbalanced across participants for the Korean sample. There was no randomized order for the US sample. Participants completed the entire survey online and in the language of the country from which they were recruited. Following the translation guidelines proposed by Guillemin et al., 1993, the survey battery given to the Korean sample was translated from the original English version into Korean and then back-translated into English by an assistant who had not seen the original English battery. The two English versions were then reviewed and discrepancies were amended.

Results

There were no missing data for self or other health ratings in either culture sample. In addition to those who were excluded for not meeting our ‘born or raised’ criterion (nUSA = 21; nKorea = 2), three additional individuals were excluded from the US sample as statistical outliers. Outliers were defined as those scoring more than three standard deviations above or below the mean of the sample on measures relevant to analyses. The final sample for analyses contained 748 valid observations, including 479 Americans and 269 Koreans. Participants’ self-health expectation was positively related to their health expectation for other (r(746) = .41, p < .001). Age was negatively correlated with both self (r(746) = −.08, p = .024) and other (r(746) = −.12, p = .001) health expectations.

To test our main hypothesis, a 2 (Culture) × 2 (Target) mixed-model analysis of variance (ANOVA) was utilized on the health expectation score, with culture being a between-subject variable and target (self vs other) being a within-subject variable. There was a significant main effect for culture, F(1, 745) = 7.94, p = .005, η² = .005, but no main effect was present for target, F(1, 745) = 1.62, p = .204, η² = .001. Specifically, while there was no significant difference between self (M_self = 68.40, SD_self = 19.72) and others’ (M_other = 66.60, SD_other = 16.98) conditions when pooled across country, Korean participants showed greater average health expectations pooled across self and other conditions (M_Korea = 69.26, SD_Korea = 18.21) relative to the American participants (M_USA = 66.49, SD_USA = 18.47). The predicted Culture × Target interactive effect was found, F(1, 745) = 4.33, p = .038, η² = .003 (see Figure 1). Consistent with our prediction, the discrepancy between health rating scores for the self and others was greater for the US group (M_self_USA = 68.14, SD_self_USA = 19.89; M_other_USA = 64.84, SD_other_USA = 16.79) than it was for the Korean group (M_self_Korea = 68.86, SD_self_Korea = 19.46; M_other_Korea = 69.66, SD_other_Korea = 16.89). American participants rated the self’s future health significantly higher than the future health of others (t(478) = 2.39, p = .006, d = .18), whereas Koreans rated the self and others similarly (t(268) = −.50, p = .615, d = −.04).

Previous studies have found that age affects future time perspective (e.g. Carstensen, 2006; Li, 2017). Coupled with the fact that age was found to be correlated with our dependent variable, we conducted an additional exploratory analysis to examine if the effects found above would persist after controlling for age. Furthermore, how one sees the self in the present may impact the individual’s future image (Markus and Nurius, 1986). As such, we recalculated health ratings based on just the three future health rating scores and re-ran our model with the current health rating as an additional covariate.

A 2 (Culture) × 2 (Target) mixed-model analysis of covariance (ANCOVA) was utilized to examine health expectation ratings, with age and current health as covariates. Significant main effects of culture, F(1, 744) = 26.04, p < .001, η² = .034, and target, F(1, 744) = 5.10 p = .024, η² = .007, emerged. Furthermore, the
Culture × Target interaction effect remained, \( F(1, 744) = 4.15, p = .042, \eta^2_p = .006 \). Thus, even when controlling for age and current health, the moderating effect of culture persisted. In addition, this Culture × Target interaction effect appeared to sustain above and beyond the effects of age and current health in each future increment: \( F(1, 744) = 7.95, p = .005, \eta^2_p = .011 \) for 15 years; \( F(1, 744) = 5.87, p = .016, \eta^2_p = .008 \) for 25 years; and \( F(1, 744) = 5.73, p = .017, \eta^2_p = .008 \) for 40 years. These results persisted after a Bonferroni correction of \( p = .017 (.05/3) \).

**Discussion**

To address associations between culture and future health perception, as well as self-enhancing bias and health expectations, this study examined how individuals’ future health expectations differed from how they rated others’ potential future health. This study is noteworthy in that the results may allow us to tailor future global health interventions to best fit the needs of the populations they are intended to serve.

As predicted, the interaction between culture and target was significant. American participants rated their own future health significantly higher than others’ future health, whereas Korean participants showed no significant difference in their future health expectations for the self versus others. These results are consistent with Heine et al. (1999)’s findings that suggest positive self-regard may be rooted in North American culture. Although self-enhancement bias appears evident across cultures, it tends to be elevated in Western samples (Mezulis et al., 2004; Shao et al., 2010). The current finding further contributes to the literature by showing that self-enhancement bias varies in degree across cultures in the domain of future health perception.

The disparity in self-enhancement bias between American and East Asian participants may be explained by different values and expectations in the two cultures. There is a great emphasis on positive views of the self in Western, particularly North American, cultures, and constructing one’s identity in these cultures tends to rely on persistent assertion of autonomy. In contrast, East Asian cultures emphasize a diagnostic view of oneself for improvement, and blending in with others is weighed much more heavily in these cultures (e.g. Brown and Kobayashi, 2003; Markus and Kitayama, 1991;...
Wang, 2013). In addition, many East Asians are concerned with deviating from their in-group because of negative feedback (e.g. social rejection) they may experience as a consequence (Heine et al., 1999). Socialization practices further facilitate these different self-views from early in life (e.g. Mullen and Yi, 1995; Wang et al., 2000). Therefore, the distinct patterns for Koreans and Americans may be explained by differences in cultural values and upbringing: American participants may be more motivated to self-enhance than Koreans.

Interestingly, Koreans had higher mean health ratings across self and others than did Americans. This main effect persisted even after age and current health evaluations were controlled. One possible explanation is that Americans face greater health challenges (e.g. obesity; Ogden et al., 2014) than people in other comparable countries (Avendano and Kawachi, 2014), and this may lower future well-being perceptions. This explanation may be substantiated by findings suggesting that one’s present status influences future perspective (Atance and Meltzoff, 2005). However, studies suggest that such ailments are less prevalent, and eating habits tend to be healthier in Korea (e.g. Lee et al., 2002), which may contribute to a higher overall future health rating.

One limitation to the study design is that participants were recruited entirely online. Amazon’s MTurk has become common practice, but it has been found to include a disproportionately high number of middle-aged, White Americans (e.g. Berinsky et al., 2012). However, because of the low participation rate with a Korean internet protocol (IP) address on MTurk, a Korean online survey bulletin board and word-of-mouth was used to collect data in Korea. Since there may be differences between the two systems in terms of the participant composition (e.g. socioeconomic status (SES) and education, which have been found to influence health; Lundstrom et al., 2002), some confounds may have been introduced. Further studies are needed to examine the data quality of MTurk-like websites outside of the United States, so researchers may be better equipped to sample previously hard-to-obtain populations outside of their region.

The results of our study demonstrate that culture influences the degree of discrepancy between self and other future health ratings. Further research is now needed to apply this knowledge to public health. For instance, future studies could investigate whether discrepant thoughts about self and others’ future health outcomes can influence health behaviours. For example, if I believe (due to high self-enhancing bias) that I could never possibly be the one to get breast cancer, or that breast cancer ‘only happens to sick people’, I might be less motivated to engage in preventative health behaviours like monthly breast self-examinations. As such, believing that my future health outlook is better than others’ could mitigate any positive health benefits of such optimism. In order to help interventions become more contextualized and effective, researchers should keep in mind that American participants are often more likely to engage in such biases. Next steps for this arena of research could involve testing whether such biases can be challenged and whether manipulating these biases can change behavioural outcomes. If so, another avenue for bolstering the effectiveness of health interventions, depending on context, could be made available.

Finally, the present findings may have significant implications for how researchers, practitioners and policy-makers think about the relation between mental time travel and public health. Given that an interaction between target and culture was found, our results suggest that socialization within different cultural norms can influence how one rates their own health in comparison to others’ health. Therefore, interventions can be implemented to consider the cultural differences of health ratings to self-enhance (Western participants more vulnerable to this bias than East Asians) which can, in turn, help lay the foundation for interventions aimed at changing one’s perspective of future health on the global scale. Realizing that the context in which individuals grow up in can influence how they view their future health may play a vital role in designing the intervention. For example, rather than trying to directly change how
individuals think, it may be more effective to target the specific contextual circumstances around the individual. Health-related issues involve countless complexities, but designing interventions that fit well with individuals of different cultural backgrounds could be crucial for maximizing individuals’ overall well-being.

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Note
1. Although the US sample was not separated into two different groups based on the order of the self and other ratings, a paired sample t-test of the Korean sample shows that there are no differences in health ratings due to the order (self then other, \( t(134) = -0.195, p = .846 \); other then self, \( t(133) = -0.930, p = .354 \)).

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