

Dispositional optimism and positive health outcomes: Moving from epidemiology to behavioral interventions

Is optimism a modifiable state or a stable trait? This question is not new, but is highly relevant for the interpretation and extension of Koga et al's study on optimism and longevity in this issue of JAGS. States can vary across time as an individual encounters various situations, experiences, and interventions. Traits on the other hand, are stable, intrinsic characteristics of the individual – thus, less likely to be modifiable. While the distinction might be considered esoteric, it begs important questions about what is *actually* being measured by an instrument assessing “optimism.” In addition, this distinction informs the development of interventions that build upon studies linking optimism with improved health outcomes.

In this issue of JAGS, Koga et al. performed a rich secondary analysis of data from the Women's Health Initiative (WHI), combining data from a set of randomized clinical trials and an observational study. They explored two distinct questions: (1) whether higher optimism is associated with longer lifespan across different racial and ethnic groups; and (2) whether these associations are mediated by various lifestyle factors?

The first question has largely been addressed in the literature, but the authors sought to extend prior work in exploring whether optimism and longevity associations remain present across different ethnic and racial categories that were not examined in previous studies.¹ Reassuringly, the authors show that the longevity benefit associated with optimism does not substantially differ across the different WHI-prespecified racial and ethnic groups, after controlling for demographics, chronic conditions, marital status, education, income, occupation, insurance, and region. In highest versus lowest optimism quartiles, higher optimism was associated with a 1.5%–7.6% longer lifespan across racial and ethnic subgroups. The second question examines a causal pathway by which optimism could lead to increased lifespan. To address this question, they performed a mediation analysis that attempts to determine to what extent certain variables (mediators) could account for the effect of

optimism on lifespan. Their results showed that while lifestyle factors seem to play a role in the exposure-outcome interaction, mediating 24% of the optimism-lifespan association in the full sample, lifestyle factors alone could not entirely explain the association.

The authors should be commended for performing an array of models to adjust for potential confounders. They also address important concerns regarding one outcome of interest, that of exceptional longevity (defined as individuals ≥ 90 years old), which was quite common in the WHI dataset (53% of women eligible for analysis). In a subset analysis, they demonstrate similar findings even when redefining exceptional longevity to ≥ 95 years old, which was still common in their cohort (45% of women eligible for analysis). Risk ratios for the association between optimism and likelihood for achieving ≥ 90 years was 1.09–1.14 and for ≥ 95 years was 1.16–1.22 for different models across the entire sample. Notably, when they adjusted for depression as a covariate in one model, associations of optimism and longevity remained present, suggesting that the absence of depression was not the primary driver of their results.

This work adds to a growing body of evidence demonstrating the benefits of positive psychological factors for physical health. This has been shown in a variety of contexts including, but not limited to, coronary artery disease,¹ heart failure,² recovery after coronary artery bypass grafting,³ and HIV progression.⁴ This study also contributes to an alternative framework for the study of disease, centered around positive constructs like resilience, wellness, and optimism, as opposed to negative constructs such as risk factors and pathology. Knowledge of protective factors can be highly important, particularly when it comes to prevention. This positive psychology framework has grown substantially over the last few decades.

The conceptualization of optimism and the instrument used to measure it merit some discussion. Firstly, the authors adopt a well-established measure of optimism, defined as “the generalized tendency to expect positive future outcomes.”⁵ Specifically, Koga et al. rely on the Revised Life Orientation Test (LOT-R)⁶—which is a 6-item scale measuring the extent to which people

This Editorial comments on the articles by [Koga et al.](#) and [Jeffrey M. Levine](#) in this issue.

expect positive and negative outcomes in the future. The items within this scale contain questions that can be said to measure “pessimism,” the generalized tendency to expect negative future outcomes, that are reverse coded and equally weighted when measuring the final score. There is debate as to whether the LOT-R should be scored as a single bipolar dimension (ranging from pessimism to optimism), or whether optimism and pessimism should be treated as separate constructs.⁷ In fact, pessimism may be more strongly associated with physical health outcomes than optimism,⁸ reinforcing other work suggesting that these two constructs are distinct.⁹ Others have argued that the pessimism subscale within the optimism construct is important for controlling acquiescence response bias and that optimism in itself may itself require the lack of pessimism.¹⁰

The framework behind these constructs and the validity of the survey instrument have important implications for how we should interpret Koga et al's results. Specifically, how the conceptualization of the optimism construct affects the validity of the findings, whether future behavioral interventions should be targeted to build psychosocial resilience and optimism or mitigate pessimism, and whether the construct measures something modifiable at all. The authors partly address some of these concerns by separating optimism- and pessimism-related

questions within the LOT-R and modeling whether each is associated with longevity. A subscale of only optimism questions was significantly associated with longevity and the subscale of pessimism questions were inversely associated with longevity. Interestingly, the magnitude of these associations was not identical, suggesting a stronger association of pessimism with negative outcomes than optimism with positive outcomes. This may be in line with mechanistic work demonstrating that an absence of pessimism may have stronger effects on cellular aging and inflammation, key mechanisms of chronic disease, than the presence of optimism.¹¹ This work raises the important question of whether a bipolar single dimensional construct is the best tool for measuring optimism and pessimism in the context of health.

However, several limitations remain. As mentioned above, with an enriched population of study participants aged 90 and older and even aged 95 and older, the WHI cohort itself appears exceptional. Additionally, as the authors concede, the WHI has a higher proportion of participants with a higher-than-average education level, in addition to high marriage rates, many privately insured individuals, and low comorbidity burdens, all leading to questions of selection bias and generalizability. One important unaddressed paradox is that their optimism metric (LOT-R) was measured once in the WHI. By

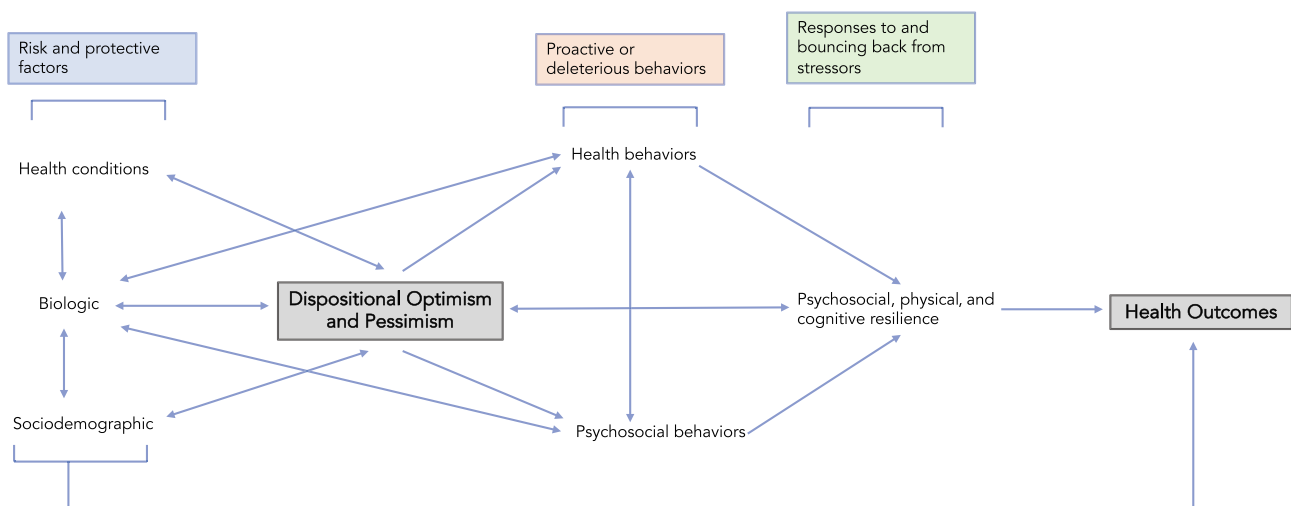


FIGURE 1 Theoretical model of the relationship between dispositional optimism/pessimism and health outcomes. Risk and protective factors contributing to dispositional optimism and pessimism include health conditions, underlying biologic factors and sociodemographic characteristics. Health conditions known to be associated with dispositional optimism and pessimism include cardiovascular diseases such as hypertension and hyperlipidemia, depression and metabolic syndromes like type 2 diabetes. Biologic factors associated with optimism and pessimism include heritable and genetic differences, telomere length, epigenetic changes, antioxidant levels, lipid profiles, inflammatory markers, neurophysiologic and neuroanatomic changes, autonomic function and the hypothalamic–pituitary–adrenal axis. Sociodemographic factors include biologic sex, marital status, education, employment status, income, parental transmission and instruction and childhood socioeconomic status. Health and psychosocial behaviors can interact with optimism and pessimism and include health-promoting factors (e.g., medication adherence, physical activity, diet), avoidance of damaging behaviors (e.g., substance use), social support, self-confidence and agency, active and approach-oriented coping. These can all contribute to how individuals can bounce back from stressors (i.e., resilience) and lead to positive and negative health outcomes.

correlating a single LOT-R measurement with longevity (a distant outcome), the authors assume that the LOT-R represents more than a snapshot or state but has at least some stability over time, a hypothesis that is validated by prior work.^{12,13} However, if optimism and pessimism are stable or fixed, then can they be modifiable? Some studies have indicated that optimism as measured by LOT-R can change in response to extreme stressors¹⁴ or when actively targeted.¹⁵ However, overall, evidence for change in LOT-R scores after behavioral interventions remains sparse. Different instruments measuring optimism as a state or the affective components related to optimism¹⁶ (in lieu of trait optimism) may be required to optimize interventions aimed at improving optimism or “treating” pessimism. Uncovering the causal mechanisms underlying the effects of optimism and pessimism and health outcomes might also guide the development of targeted interventions for those low in optimism and high in pessimism.

What might be the causal framework that might lead to improved health outcomes, particularly if lifestyle factors only contribute modestly? The effect is likely complex and multifactorial, but a possible pathway could be described in Figure 1. While this framework could aid in further causal inference work, the involvement of pre-existing multi- and comorbidity and its positive or negative effects on optimism are unclear and merits more detailed prospective and observational studies. The relationship of optimism and pessimism with psychosocial and physical resilience and dynamic responses to different stressors over time (e.g., a new psychologic or physical trauma, an unexpected hospitalization, critical illness) also require further study. Nonetheless, Koga et al. have provided much to consider and strengthen the growing literature on relationships of positive psychological factors with health outcomes. Like all interesting studies, this one leads to more questions than answers.

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CONFLICT OF INTEREST

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